

Oracle Financial Services Model Management and Governance

Installation and Configuration Guide

8.1.2.5.0

November 2023

ORACLE
Financial Services

Model Management and Governance

Copyright © 2023 Oracle and/or its affiliates. All rights reserved.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable.

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are “commercial computer software” pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

For information on third party licenses, click [here](#).

Document Control

| Version Number | Revision Date | Change Log |
|----------------|---------------|---|
| 7.0 | November 2023 | Updated Java Settings section (36018169). |
| 6.0 | November 2023 | Created the document with instructions for the installation of the OFS MMG Release 8.1.2.5.0. |
| 5.0 | April 2023 | Created the document with instructions for the installation of the OFS MMG Release 8.1.2.4.0. |
| 4.0 | November 2022 | Created the document with instructions for the installation of the OFS MMG Release 8.1.2.3.0. |
| 3.0 | August 2022 | Created the document with instructions for the installation of the OFS MMG Release 8.1.2.2.0. |
| 2.0 | June 2022 | Created the document with instructions for the installation of the OFS MMG Release 8.1.2.1.0. |
| 1.0 | February 2021 | Created the document with instructions for the installation of the OFS MMG Release 8.1.2.0.0. |

Table of Contents

| | | |
|----------|---|-----------|
| 1 | Preface | 7 |
| 1.1 | Audience | 7 |
| 1.2 | Additional Resources | 7 |
| 1.3 | Conventions | 8 |
| 1.4 | Abbreviations | 8 |
| 2 | Introduction | 10 |
| 2.1 | Deployment Topology | 10 |
| 2.2 | Components of Oracle Financial Services Model Management Governance | 11 |
| 2.3 | Installation Check List | 11 |
| 3 | Hardware and Software Requirements | 13 |
| 3.1 | License Information | 13 |
| | Part I | 14 |
| 4 | Pre-installation | 15 |
| 4.1 | Oracle Database Instance Settings | 15 |
| 4.2 | Create the Database Schema on Oracle Database | 15 |
| 4.2.1 | <i>Creating an Oracle user</i> | 15 |
| 4.2.2 | <i>Create the MMG Application Schema</i> | 15 |
| 4.2.3 | <i>Create the MMG Studio Schema</i> | 16 |
| 4.2.4 | <i>Create the Graph Schema</i> | 16 |
| 4.3 | Create the Installation, Download, and Metadata Repository Directories | 17 |
| 4.4 | Configure the OS File System Settings and Environment Settings in the .profile File | 18 |
| 4.4.1 | <i>Configure Operating System and File System Settings</i> | 18 |
| 4.4.2 | <i>Configure the Environment Settings</i> | 19 |
| 4.5 | Setup Password Stores with Oracle Wallet | 21 |
| 4.5.1 | <i>Setup the Password Stores for Database User Accounts</i> | 21 |
| 4.5.2 | <i>Verify the Connectivity of the Wallet</i> | 23 |
| 5 | Installation | 24 |
| 5.1 | Prerequisites | 24 |

| | | |
|----------|--|-----------|
| 5.2 | Download the OFS MMG Installer Kit..... | 24 |
| 5.3 | Extract the Software | 24 |
| 5.4 | Configure the config.sh file | 25 |
| 5.4.1 | <i>Import Server Certificate to Java Keystore</i> | 43 |
| 5.5 | Run the MMG Installer | 43 |
| 5.6 | Starting MMG Services | 44 |
| 5.7 | Stopping MMG Services | 45 |
| 5.8 | Generate GRAPH-KEYSTORE.P12 | 45 |
| 5.9 | Install MMG Python Library | 46 |
| 5.9.1 | <i>Prerequisites</i> | 46 |
| 5.9.2 | <i>Procedure</i> | 46 |
| 5.10 | Setting up the Environment for Hive Data Sourcing..... | 47 |
| 5.11 | Remote MMG Studio Configuration | 48 |
| 5.12 | PGX Installation | 49 |
| 5.12.1 | <i>Configure the config.sh File of PGX</i> | 50 |
| 5.12.2 | <i>Starting pgx server</i> | 52 |
| 5.12.3 | <i>Stopping pgx server</i> | 52 |
| 5.13 | R Interpreter | 53 |
| 5.13.1 | <i>ORD-3.6.1 Installation</i> | 53 |
| 5.13.2 | <i>R 4.1.2 Installation</i> | 53 |
| 5.13.3 | <i>Configuring R interpreter</i> | 54 |
| 5.13.4 | <i>MMG Connection Objects Library Setup</i> | 55 |
| 5.13.5 | <i>Using MMG Studio to Oracle Connection Objects</i> | 56 |
| 5.14 | Conda | 57 |
| 6 | Post Installation Steps..... | 59 |
| 6.1 | Access the Application..... | 59 |
| 6.2 | Create Application Users | 59 |
| 6.3 | Map Application User(s) to User Group..... | 60 |
| 6.4 | Model Techniques/ Model Library | 60 |
| 6.5 | User Access and Permissioning Management | 61 |
| 6.5.1 | <i>Access MMG Using AAI Realm</i> | 61 |
| 6.5.2 | <i>Access MMG Using SAML Realm</i> | 62 |
| 6.6 | AAI User Provisioning SQL Scripts Generator Utility..... | 63 |

| | | |
|----------------------|--|-----------|
| 6.7 | IDCS Server Configuration | 63 |
| Part III..... | | 66 |
| 7 | Upgrade Installation | 67 |
| 7.1 | Upgrading to 8.1.2.5.0 | 67 |
| 8 | Update Utility to Reconfigure Installation Parameters | 68 |
| 9 | Cloning the MMG Instance | 69 |
| 9.1 | Copying the Directories | 69 |
| 9.2 | Copying the Database schemas | 69 |
| 9.3 | Configuring Password Store with Oracle Wallet | 69 |
| 9.4 | Updating the Host details | 70 |
| 9.5 | Update LOG_HOME and FTPSHARE | 70 |
| 9.6 | Setting up the SSL Keystore | 71 |
| 9.7 | Updating Wallet aliases for Oracle schemas | 71 |
| 9.8 | Updating Context and Ports | 71 |
| 9.9 | Starting MMG Services | 71 |
| Part IV | | 72 |
| 10 | Frequently Asked Questions (FAQs) and Error Dictionary..... | 73 |
| 10.1 | Frequently Asked Questions | 73 |
| 10.1.1 | <i>Frequently Asked Questions in MMG</i> | 73 |
| 10.1.3 | <i>Application Pack 8.1.2.0.0 FAQs</i> | 100 |
| 10.2 | Error Dictionary | 104 |
| 10.2.1 | <i>Access the Error Dictionary</i> | 104 |
| 10.2.2 | <i>Error Code Dictionary</i> | 104 |

1 Preface

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

Topics:

- [Audience](#)
- [Additional Resources](#)
- [Conventions](#)
- [Abbreviations](#)

1.1 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

1.2 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](#)

1.3 Conventions

The following text conventions are used in this document:

Table 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. |
| <i>italic</i> | 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. |

1.4 Abbreviations

The following table lists the abbreviations used in this document:

Table 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 |

| Abbreviation | Meaning |
|--------------|---|
| 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 |
| 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.

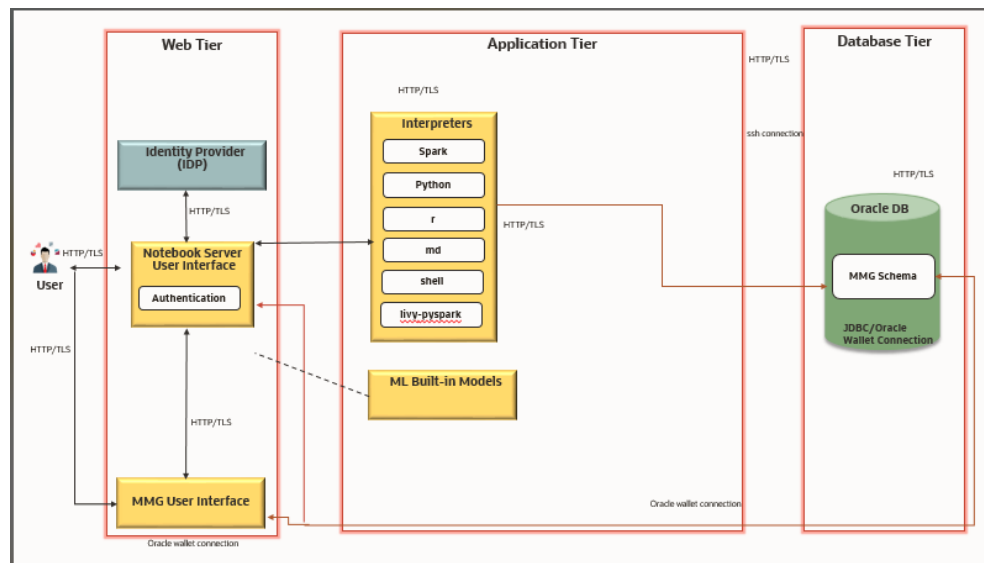
The OFS Model Management and Governance application enables institutions to implement their IT policies while providing flexibility and freedom that Data Scientists and Statistical Modelers desire. OFS MMG's design facilitates financial institutions to manage external regulatory and internal governance 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:

- [Deployment Topology](#)
- [Components of Oracle Financial Services Model Management Governance](#)

2.1 Deployment Topology

Figure 1: The logical architecture implemented for OFS MMG Application Pack



2.2 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](#).

2.3 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 3: Installation Checklist

| Sl. No. | Activity |
|-------------------------------|---|
| Pre-installation Steps | |
| 1 | Install all the prerequisite <i>hardware and software</i> 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: <ul style="list-style-type: none"> • Installation Directory • Temporary Directory • Staging Area/Metadata Repository • Download Directory |
| 4 | Configure the following Operating System and File System Settings: <ul style="list-style-type: none"> • File Descriptor • Total number of processes • Port(s) |

| Sl. No. | Activity |
|--------------------------------|--|
| | <ul style="list-style-type: none"> • .profile file permissions • Add FTP or SFTP Configuration for file transfer (to access Staging Area and Metadata Directory) |
| 5 | <p><u>Update</u> the following Environment Settings as required for the installation in the .profile file:</p> <ul style="list-style-type: none"> • Java Settings <ul style="list-style-type: none"> ▪ Oracle Database Server and Client Settings ▪ Add TNS entries in the TNSNAMES.ORA file ▪ Time Zone Settings |
| Installation Steps | |
| 6 | <u>Download</u> the Installer Kit. |
| 7 | <u>Extract</u> the Installer Kit. |
| 8 | <u>Configure</u> the config.sh file. |
| 9 | <u>Trigger</u> the Application Installation. |
| Post-Installation Steps | |
| 10 | <u>Access</u> the MMG Application. |
| 11 | <u>Create</u> Application Users. |
| 12 | <u>Map</u> Application User(s) to User Groups. |

3 Hardware and Software Requirements

See the [Oracle Financial Services Analytical Applications 8.1.2.0.0 Technology Matrix](#) for the hardware and software required for OFS MMG Release 8.1.2.0.0.

3.1 License Information

For details on the third-party software tools used, see the [OFSAALicensing Information User Manual Release 8.1.2.0.0](#).

Part I

Topics:

- [Pre-installation](#)
- [Installation](#)
- [Post-installation](#)
- [PGX Installation](#)

4 Pre-installation

This section contains the pre-installation requirements to install the OFS MMG Application.

4.1 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

4.2 Create the Database Schema on Oracle Database

You need to create the following Database Schemas:

- [MMG Application Schema](#)
- [MMG Studio Schema](#)
- [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;
```

4.2.1 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
```

4.2.2 Create the MMG Application Schema

You must create an Oracle User to create the MMG Application 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 MMG Config Schema and the Workspace Schemas.

4.2.3 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>;
```

4.2.4 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.

4.3 Create the Installation, Download, and Metadata Repository Directories

To install OFS MMG, 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.
- **Temporary Directory:** 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 that you allocate more than 10 GB of space. Assign 755 permission to this directory with NOEXEC Option disabled.

NOTE

If 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, which will fail the installation.

- **OFS MMG 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):** 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 "FTP SHARE". Create a Staging/Metadata Repository Directory to copy data files, save data extracts, and so on.

The directory must exist on the same system as the OFS MMG Installation. This directory can be configured on a different mount or under a different user profile.

NOTE Ensure the OFS MMG staging directory is not set to the same path as the OFS MMG Installation Directory and is not a subdirectory inside the OFS MMG Installation Directory.

4.4 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.

4.4.1 Configure Operating System and File System Settings

To configure the Operating System and file system settings refer the parameters and configuration actions that must be performed to install the OFS MMG Application.

Table 4: Configure Operating System and File System Settings

| Parameter | Configuration Action |
|--------------------------|--|
| File Descriptor Settings | <p>In the <code>sysctl.conf</code> file, to change the number of file descriptors, do the following as the root user:</p> <ol style="list-style-type: none"> 1. Edit the following line in the <code>/etc/sysctl.conf</code> file: <code>fs.file-max = <value></code> where <code><value></code> is greater than 15000 2. Apply the change by running the following command: <code># /sbin/sysctl -p</code> <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.</p> |

| Parameter | Configuration Action |
|----------------------------------|---|
| Total Number of Process Settings | In the <code>sysctl.conf</code> 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. |

4.4.2 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.

4.4.2.1 Java Settings

To configure the Java Settings, refer the following table.

Table 5: Java Settings

| Description | Example Value |
|---|---|
| In the <code>.profile</code> 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. | <pre>JAVA_TOOL_OPTIONS=" - Djdk.util.zip.disableZip64ExtraFieldValidation=true" export JAVA_TOOL_OPTIONS</pre> NOTE: OFS MMG does not support OpenJDK . |
| In the <code>.profile</code> file, set JAVA_BIN to include the JDK absolute path. | For example: <pre>JAVA_BIN=/usr/java/jdk-11.0.20/bin export JAVA_BIN</pre> |

4.4.2.2 Oracle Database Server and Client Settings

To configure the Oracle Database Server and Client settings refer the following table.

Table 6: Oracle Database Server and Client Settings

| Description | Example Value |
|--|--|
| In the <code>.profile</code> file, set TNS_ADMIN pointing to the appropriate <code>tnsnames.ora</code> file. | <pre>TNS_ADMIN=\$HOME/tns</pre> |
| In the <code>.profile</code> file, set ORACLE_HOME pointing to the appropriate Oracle Client installation. | <pre>ORACLE_HOME=/scratch/oraofss/app_client19c/product/ 19.0.0/client_1</pre> |

| Description | Example Value |
|--|---|
| In the <code>.profile</code> file, set <code>PATH</code> to include the appropriate <code>\$ORACLE_HOME/bin</code> path. | <code>PATH=\$JAVA_HOME/bin:\$ORACLE_HOME/bin</code> |

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

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

4.4.2.3.1 Non-TCPS

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

Table 7: TNS entries in the `TNSNAMES.ORA` file for Non-TCPS

| Description | Example Value |
|--|--|
| Ensure that an entry (with <code>SID</code> or <code>SERVICE NAME</code>) is added in the <code>tnsnames.ora</code> file on the OFSAA server. | <pre><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>)))</pre> |

```
<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>)
    )
  )
```

4.4.2.4 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 8: Time Zone Settings

| Description | Example Value |
|-------------|------------------|
| Time Zone | TZ=Asia/Calcutta |

4.5 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 [Oracle 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.

4.5.1 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: Wallet Creation

```
$ mkstore -wrl /scratch/ofsasftp/pgx_server/wallet -create
Oracle Secret Store Tool Release 19.0.0.0.0 - Production
Version 19.3.0.0.0
Copyright (c) 2004, 2019, Oracle and/or its affiliates. All rights reserved.

Enter password:
Enter password again:
$ mkstore -wrl /scratch/ofsasftp/pgx_server/wallet -createCredential MMGConfigSchema_Alias MMG_Config_Schema
Oracle Secret Store Tool Release 19.0.0.0.0 - Production
Version 19.3.0.0.0
Copyright (c) 2004, 2019, Oracle and/or its affiliates. All rights reserved.

Your secret/Password is missing in the command line
Enter your secret/Password:
Re-enter your secret/Password:
Enter your secret/Password:
Re-enter your secret/Password:
Enter wallet password:
$ mkstore -wrl /scratch/ofsasftp/pgx_server/wallet -createCredential MMGStudio_Schema_Alias MMG_Studio_Schema
Oracle Secret Store Tool Release 19.0.0.0.0 - Production
Version 19.3.0.0.0
Copyright (c) 2004, 2019, Oracle and/or its affiliates. All rights reserved.

Your secret/Password is missing in the command line
Enter your secret/Password:
Re-enter your secret/Password:
Enter wallet password:
$ mkstore -wrl /scratch/ofsasftp/pgx_server/wallet -createCredential MMGGraphSchema_Alias MMG_Graph_Schema
Oracle Secret Store Tool Release 19.0.0.0.0 - Production
Version 19.3.0.0.0
Copyright (c) 2004, 2019, Oracle and/or its affiliates. All rights reserved.

Your secret/Password is missing in the command line
Enter your secret/Password:
Re-enter your secret/Password:
Enter wallet password:
$
```


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. 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.

6. 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>) ) )
```

4.5.2 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 OFS MMG Application.

5.1 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](#).

5.2 Download the OFS MMG Installer Kit

To download the software as a .zip folder, download the mandatory minor release patch **35744607** 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.

5.3 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 8.1.2.5.0 installer archive file in the download directory with the following command:

```
unzip OFS_MMG_8.1.2.5.0_<OS>.zip
```

After unzipping the `OFS_MMG_8.1.2.5.0` folder, following zip folders are displayed under OFS MMG folder.

- `mmg-installer.zip`
- `mmg-metadata-manager.zip`
- `mmg-pgx.zip`
- `OFSMMG_8.1.2.5.0_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
```

5.4 Configure the config.sh file

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

1. Login to the server as a non-root user.
2. Navigate to the `<MMG_PACK>OFS_MMG/bin` directory.
3. Configure the applicable `config.sh` attributes as shown here.

Sample config.sh file

```
#!/bin/sh
## Common properties
export APPLICATION_NAME=##APPLICATION_NAME##
export WALLET_LOCATION=##WALLET_LOCATION##
export TNS_ADMIN_PATH=##TNS_ADMIN_PATH##
export WALLET_ALIAS=##WALLET_ALIAS##
export LOG_HOME=##LOG_HOME##
export FTPSHARE=##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=##BE_HOSTNAME##
export BE_PORT=##BE_PORT##
export UI_PORT=##UI_PORT##
export SCHEMA_PORT=##SCHEMA_PORT##
export CONTEXT_PATH=##CONTEXT_PATH##
export STUDIO_AUTH_TYPE=##STUDIO_AUTH_TYPE##
export SSO_TOKEN=##SSO_TOKEN##
export SSL_ENABLED=##SSL_ENABLED##
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##
export SESSION_TOKEN_CREDENTIALS=##SESSION_TOKEN_CREDENTIALS##
export FCC_API_USER=##FCC_API_USER##
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=##APPLICATION_ID##
## Properties for mmg-ui
export APPLICATION_FAVICON_PATH=##APPLICATION_FAVICON_PATH##
export UI_AUTH_TYPE=##AUTH_TYPE##
export AAI_AUTH_URL=##AAI_AUTH_URL##
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=##SERVER_COOKIE_DOMAIN##
export SERVER_COOKIE_NAME=##SERVER_COOKIE_NAME##
export SERVER_COOKIE_TIMEOUT=##SERVER_COOKIE_TIMEOUT##
export SERVER_COOKIE_IS_SECURE=##SERVER_COOKIE_IS_SECURE##
##Properties for mmg-service
export BE_AUTH_TYPE=public
export MMG_PYTHON_INTERPRETER=##MMG_PYTHON_INTERPRETER##
export DATACATALOG_SERVICE_URL=##DATACATALOG_SERVICE_URL##
##Properties for mmg-studio
export STUDIO_WALLET_ENABLED=##STUDIO_WALLET_ENABLED##
export LOGIN_SHOW=##LOGIN_SHOW##
export SESSION_MODE=##SESSION_MODE##
export STUDIO_REALM=##STUDIO_REALM##
export OFSAA_URL=##OFSAA_URL##
export API_USERS=##API_USERS##
export VALID_ROLES=##VALID_ROLES##
export DATASOURCE_URL=##DATASOURCE_URL##
export DATASOURCE_USERNAME=##DATASOURCE_USERNAME##
export DATASOURCE_PASSWORD=##DATASOURCE_PASSWORD##
export DATASOURCE_DRIVER=##DATASOURCE_DRIVER##
export JPA_DB_PLATFORM=##JPA_DB_PLATFORM##
```

```
export STUDIO_LOG_LEVEL=##STUDIO_LOG_LEVEL##
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=##DATAPIPELINE_SERVICE_PORT1##
export DATAPIPELINE_SERVICE_PORT2=##DATAPIPELINE_SERVICE_PORT2##
export
DATAPIPELINE_METADATA_ARCHIVE_PATH=##DATAPIPELINE_METADATA_ARCHIVE_PATH##
export
DATAPIPELINE_METADATA_IMPORT_SERVICE_PORT=##DATAPIPELINE_METADATA_IMPORT_SER
VICE_PORT##
export DATAPIPELINE_ERXMLPATH=##DATAPIPELINE_ERXMLPATH##
export
DATAPIPELINE_GATEWAY_SERVICE_PORT=##DATAPIPELINE_GATEWAY_SERVICE_PORT##
export PIPELINE_UI_SERVICE_PORT=##PIPELINE_UI_SERVICE_PORT##
export DATA_PIPELINE_UI_SERVICE_PORT=##DATA_PIPELINE_UI_SERVICE_PORT##
#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=##MATCHRULE_BASE_URL##
export LOADGRAPH_BASE_URL=##LOADGRAPH_BASE_URL##
export MATCHSRVC_UI_URL=##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=##GRAPH_INDEX_BASE_URL##
export LOADINDEX_UI_URL=##LOADINDEX_UI_URL##
#Changes for auth services + mmg keys
export AAI_COOKIE_DOMAIN=##AAI_COOKIE_DOMAIN##
export MMG_KEYS_LOC=##MMG_KEYS_LOC##
#Properties to package Load to Graph (L2G) service inside MMG
## Start of L2G Properties ##
export GRAPH_INSTALLATION_PATH=##GRAPH_INSTALLATION_PATH##
export GRAPH_KEYSTORE_PASSWORD=##GRAPH_KEYSTORE_PASSWORD##
export GRAPH_SERVICE_PORT=##GRAPH_SERVICE_PORT##
## Graph schema configurations
export MMG_DB_SERVER_NAME=##MMG_DB_SERVER_NAME##
export MMG_DB_PORT=##MMG_DB_PORT##
export MMG_DB_SERVICE_NAME=##MMG_DB_SERVICE_NAME##
export PGX_SERVER_URLS=##PGX_SERVER_URLS##
#### PGX data memory limits configurations
## Overall Configuration
export
MAX_TOTAL_SHARED_DATA_MEMORY_SIZE=##MAX_TOTAL_SHARED_DATA_MEMORY_SIZE##
export
MAX_TOTAL_PRIVATE_DATA_MEMORY_SIZE=##MAX_TOTAL_PRIVATE_DATA_MEMORY_SIZE##
export MAX_PER_SESSION_DATA_MEMORY_SIZE=##MAX_PER_SESSION_DATA_MEMORY_SIZE##
## Role wise data memory limits
export MAX_DATA_MEMORY_SIZE_DSUSRGRP=##MAX_DATA_MEMORY_SIZE_DSUSRGRP##
export MAX_DATA_MEMORY_SIZE_DSBATCH=##MAX_DATA_MEMORY_SIZE_DSBATCH##
export MAX_DATA_MEMORY_SIZE_DSINTER=##MAX_DATA_MEMORY_SIZE_DSINTER##
export MAX_DATA_MEMORY_SIZE_DSAPPROVER=##MAX_DATA_MEMORY_SIZE_DSAPPROVER##
export MAX_DATA_MEMORY_SIZE_DSUSER=##MAX_DATA_MEMORY_SIZE_DSUSER##
#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=##GRAPH_SCHEMA_WALLET_ALIAS##
export GRAPH_SCHEMA_DB_SCHEMA_NAME=##GRAPH_SCHEMA_DB_SCHEMA_NAME##
#Additional MMG Features
export
MMG_MODEL_PIPELINE_SANDBOX_DEFAULT_VIEW=##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
export EST_ENABLED=##EST_ENABLED##
export EST_UI_URL=##EST_UI_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=##DATASTUDIO_SERVER_PORT##
export
DATASTUDIO_MARKDOWN_INTERPRETER_PORT=##DATASTUDIO_MARKDOWN_INTERPRETER_PORT#
#
export
DATASTUDIO_PYTHON_INTERPRETER_PORT=##DATASTUDIO_PYTHON_INTERPRETER_PORT##
export DATASTUDIO_JDBC_INTERPRETER_PORT=##DATASTUDIO_JDBC_INTERPRETER_PORT##
export
DATASTUDIO_PYTHON_INTERPRETER_REST_SERVER_PORT=##DATASTUDIO_PYTHON_INTERPRET
ER_REST_SERVER_PORT##
export
DATASTUDIO_PGX_PYTHON_INTERPRETER_REST_SERVER_PORT=##DATASTUDIO_PGX_PYTHON_I
NTERPRETER_REST_SERVER_PORT##
export
DATASTUDIO_THRIFT_EVENT_HANDLER_PORT=##DATASTUDIO_THRIFT_EVENT_HANDLER_PORT#
#
export DATASTUDIO_PGX_INTERPRETER_PORT=##DATASTUDIO_PGX_INTERPRETER_PORT##
#ENDOFFILE#

```

Table : 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. |

| Parameter | Description | Is Mandatory | Comments |
|---------------------|---|--------------|---|
| ##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 |
| ##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/ftpsshare 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. |
| ##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 |

| Parameter | Description | Is Mandatory | Comments |
|----------------------|--|--------------|---|
| ##CONTEXT_PATH## | Context path of the application. | YES | mmg |
| ##STUDIO_AUTH_TYPE## | <ul style="list-style-type: none"> FCC_SSO – for SAMLRealm based authentication in FCC Studio. <p>Note: Direct log in to Data studio using the Studio URL <https: {host name: 7008/context path}> is not supported.</p> <ul style="list-style-type: none"> MMG_AAI- AAI Based authentication for MMG Studio. | YES | Can be either MMG_AAI or FCC_SSO |
| ##SSO_TOKEN## | <p>SSO Token value for Studio authentication.</p> <p>Applicable only when STUDIO_AUTH_TYPE is FCC_SSO and MMG_AAI.</p> <p>For FCC_SSO, refer to the Oracle Financial Services Compliance Studio Installation Guide.</p> <p>For MMG_AAI, to create the SSO Token, follow these steps.</p> <ol style="list-style-type: none"> Locate <MMG_INSTALLATION_PATH>/OFS_MMG/bin/key-generator.sh and execute it. 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 | YES | Note: SSO token value needs to be regenerated whenever new keys are generated. |

| Parameter | Description | Is Mandatory | Comments |
|--------------------------|---|--------------|---|
| | <p>4. After successful execution, a file named token.out is created inside the same bin directory. The token.out file contains the following content:</p> <pre>“Generated JWT Token for MMG_API_USER: <some-long-random- token-value>”</pre> <p>5. 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##.</p> | | |
| ##SSL_ENABLED## | <p>Flag to enable the SSL for the MMG application.</p> <p>NOTE: SSL is enabled for MMG Studio by default.</p> | YES | Can be either true or false. |
| ##SSL_KEYSTORE## | <p>Absolute path for the keystore file.</p> <p>NOTE:</p> <p>Run the following command to create a keystore:</p> <pre>keytool -genkey -v -alias demoalias -keyalg RSA - keysize 2048 -keystore server.keystore -validity 3650 -keypass secret - storepass secret -storetype PKCS12</pre> | YES | <p>../conf/server.keystore . Include the file name in the path.</p> <p>NOTE:</p> <p>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.</p> |
| ##SSL_KS_SECRET## | <p>Keystore secret</p> <p>The value passed in the aforementioned command for -keypass</p> | YES | Example: secret |

| Parameter | Description | Is Mandatory | Comments |
|---|--|--------------|--|
| ##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 |
| Properties required if STUDIO_AUTH_TYPE is FCC_SSO | | | |
| ##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 |
| Properties for MMG Connection | | | |
| ##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_TIMEO UT## | Idle timeout for config Datasource. | YES | It defaults to 30000. You can edit it if required. |
| ##MMG_DATASOURCE_CONN_TIME OUT## | Connection timeout for Config Datasource. | YES | It defaults to 80000. You can edit it if required. |
| ##EXT_DATASOURCE_MAX_POOL_SI ZE## | Maximum connection pool size allowed for meta/data schemas. | YES | It defaults to 10. You can edit it if required. |
| ##EXT_DATASOURCE_IDLE_TIMEOU T## | Idle timeout for meta/data schemas. | YES | It defaults to 30000. You can edit it if required. |
| ##EXT_DATASOURCE_CONN_TIMEO UT## | 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_ROUT E## | 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. |

| Parameter | Description | Is Mandatory | Comments |
|---|---|--------------|---|
| ##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. |
| Properties for 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 |
| ##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. |
| Properties required if ##UI_AUTH_TYPE## = aai | | | |
| ##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)://whfxxxx.in.Oracle.com:7110/mmg |
| Properties required if ##UI_AUTH_TYPE## = saml | | | |
| ##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/so 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. |

| Parameter | Description | Is Mandatory | Comments |
|---|--|--------------|---|
| ##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-xxx.com/sso/v1/user/logout This is used only if ##UI_AUTH_TYPE## is SAML. |
| Properties required if ##UI_AUTH_TYPE## = LDAP | | | |
| ##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 | |
| Properties for Cookie settings | | | |

| Parameter | Description | Is Mandatory | Comments |
|-------------------------------------|--|--------------|--|
| ##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 |
| ##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. |
| ##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. |

| Parameter | Description | Is Mandatory | Comments |
|-------------------------|---|--------------|--|
| ##STUDIO_REALM## | Can be either OFSAARealm or saml.OFSAASamlRealm | YES | OFSAARealm – the default realm for studio auth type FCC_AAI, MMG_AAI. .auth.saml.OFSAASaml Realm – for SAML specific studio authentication |
| ##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:@<DS_ALIAS> 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 |
| ##DATASOURCE_PASSWORD## | MMG Studio Schema/User Password; required only when ##WALLET_ENABLED## is false | YES | password |

| Parameter | Description | Is Mandatory | Comments |
|---|--|--------------|--|
| ##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 |
| Properties for R Interpreter | | | |
| ##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. |
| Properties for if ##R_ENABLED## is set to true | | | |
| ##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/rinterpreter/keystore |
| ##RS_KS_SECRET## | Keypass for rinterpreterkeystore. | YES | Example: changeit |
| # Following are fcc services specific configurations, leave as it is if not applicable | | | |
| ##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 |

| Parameter | Description | Is Mandatory | Comments |
|---|--|--------------|--|
| ##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 |
| Properties required if STUDIO_REALM is OFSAASamlRealm and STUDIO_AUTH_TYPE is FCC_SSO | | | |
| ##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 |
| # Following are pipeline services specific configurations, leave as it is if not applicable. | | | |
| ##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. |

| Parameter | Description | Is Mandatory | Comments |
|---|---|--------------|---|
| ##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 ER and matching service. Leave as is if not applicable. Will impact the pipeline that could be added to a graph. ER and Matching services are available as part of Studio. If the services are deployed, the following properties must be configured. | | | |
| ##MATCHRULE_BASE_URL## | The host and port where the match rule service resides. | NO | http(s)://abc.in.xyz.com:7051 |
| ##MATCHSRVC_UI_URL## | Matching Service UI resource path. | NO | |
| Properties for LoadGraph | | | |
| ##LOADGRAPH_BASE_URL## | The host and port where the load graph service resides. | YES | http(s)://abc.in.xyz.com:7059/graph-service |
| URLs for index service. Leave as is if not applicable. Will impact the pipeline that could be added to a graph if Graph and Index services are available as part of Studio. If the services are deployed, the following properties must be configured. | | | |
| ##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. | | |
| Changes for auth services and mmg keys | | | |
| ##AAI_COOKIE_DOMAIN## | The domain of the server. | YES | Example: in.xyz.com |
| ##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. |

| Parameter | Description | Is Mandatory | Comments |
|---|--|--------------|--|
| ## 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_DS BATCH## | 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. |
| ##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 | |

| Parameter | Description | Is Mandatory | Comments |
|--|---|--------------|--|
| Additional MMG features | | | |
| ##MMG_MODEL_PIPELINE_SANDBOX_DEFAULT_VIEW## | You can configure the view that needs to be displayed in the UI. | NO | By default, it is set as Canvas. You can change to 'Notebook' if required. |
| ## The following properties are optional and enabled by default. If needed, you can uncomment them and set them to false. | | | |
| ##MMG_HTTP2_ENABLED## | Required for enabling or disabling the HTTP2 feature. TRUE or FALSE. | YES | The default value is TRUE |
| ##MMG_SERVER_ACCESS_LOG_ENABLED## | Required for enabling or disabling the server access logs TRUE or FALSE. | YES | The default value is TRUE |
| ## The following properties are optional and disabled by default. If needed, you can uncomment them and set them to true. | | | |
| ##OJET_CDN_ENABLED## | Required for enabling or disabling the OJET CDN feature. TRUE or FALSE. | YES | The default value is FALSE. |

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 config 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
```

5.4.1 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.

5.5 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
```

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 installation:

```
<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.

5.6 Starting MMG Services

To start the MMG service, run the following command:

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

A message similar to following means a successful startup:

```
<mmg installation path>/OFS_MMG/bin>./startup.sh
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.

5.7 Stopping MMG Services

To stop the MMG services, run the following command:

```
./shutdown.sh
```

A message similar to following means a successful shutdown:

```
<MMG_INSTALLATION_PATH>/mmg-pipeline/pipeline
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.
```

5.8 Generate GRAPH-KEYSTORE.P12

Prerequisite : 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/`

5.9 Install MMG Python Library

This section provides detailed steps to install the MMG Python Library.

5.9.1 Prerequisites

- Python 3.9.x

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`

5.9.2 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.
```

5.10 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.

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-configuration2-2.11.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.

5.11 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 '-' character present in the `token.out` file.

5.12 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-23.4.3
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.

5.12.1 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 : 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## | <p>The values can be true /false.</p> <p>If true, follow the below steps if Self Signed is being used:</p> <ul style="list-style-type: none"> • Import pgx server .cer file to MMG server java keystore • Import MMGserver .cer file to pgx server java keystore <p>For more details, see Import Server Certificate to Java Keystore section.</p> | YES | |
| Properties if ##PGX_SSL_ENABLED## is set to true. | | | |
| ##PGX_SSL_KEYSTORE## | <p>Absolute path for the keystore file.</p> <p>This is applicable only if ##PGX_SSL_ENABLED## is set to true.</p> <p>NOTE:</p> <p>Run the following command to create a keystore:</p> <pre>keytool -genkey -v -alias demoalias -keyalg RSA -keysize 2048 -keystore server.keystore -validity 3650 -keypass secret -storepass secret -storetype PKCS12</pre> | YES | ../conf/server.keystore. Include the file name in the path. |
| ##PGX_SSL_KS_SECRET## | <p>Value passed in above command for keypass.</p> <p>This is applicable only if ##PGX_SSL_ENABLED## is set to true.</p> | YES | Keystore password |
| ##PGX_SSL_KS_TYPE## | <p>The type of the pgx keystore.</p> <p>This is applicable only if ##PGX_SSL_ENABLED## is set to true.</p> | YES | PKCS12 |

| Parameter | Description | Is Mandatory | Comments |
|---------------------------------|---|--------------|---|
| ##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. | YES | /scratch/users/logs |
| ##LOG_LEVEL## | Logging level for logs. | YES | The values can be DEBUG/INFO/WARN |

5.12.2 Starting pgx server

To start the pgx server, run the following command:

1. 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.

5.12.3 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.

5.13 R Interpreter

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

5.13.1 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/')"

5.13.2 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/')"

5.13.3 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
```

5.13.4 MMG Connection Objects Library Setup

5.13.4.1 Installing ROracle Library

Prerequisites

DBI is one of the dependencies for using this library.

- Installing DBI
 - a. `curl -O https://cran.r-project.org/src/contrib/DBI_1.1.1.tar.gz`
 - b. `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**
 - a. `curl -O https://cran.r-project.org/src/contrib/ROracle_1.3-1.1.tar.gz`
 - b. Install oracle instant client sdk package.
This is required for additional header files and an example makefile for developing Oracle Applications with Instant Client.
 - c. 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
```

- d. `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
```

5.13.4.2 Installing RODBC Library

- **For ORD 3.6.1**
 - a. `curl -O https://cran.r-project.org/src/contrib/Archive/RODBC/RODBC_1.3-16.tar.gz`
 - b. `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**

- a. `curl -O https://cran.r-project.org/src/contrib/RODBC_1.3-19.tar.gz`
- b. `R CMD INSTALL RRODBC_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 R ODBC 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`)

5.13.5 Using MMG Studio to Oracle Connection Objects

5.13.5.1 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")
```

5.13.5.2 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
```

5.14 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*.

5.15 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.

```
workflow:  
  workflow-name: Default Workflow  
  num-approver-levels: 2  
  levels:  
    - level: 1  
      approvers: APPROVER1  
      escalation-approvers: MDLAPPR  
    - level: 2  
      approvers: APPROVER2  
      escalation-approvers: MDLAPPR  
  escalation-trigger-time: 12  
  enable-approver-notification: true  
  lock-approver-selection: true
```

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.

6.1 Access the Application

To access the application, follow these steps:

1. Open a browser and enter the URL in the following format:

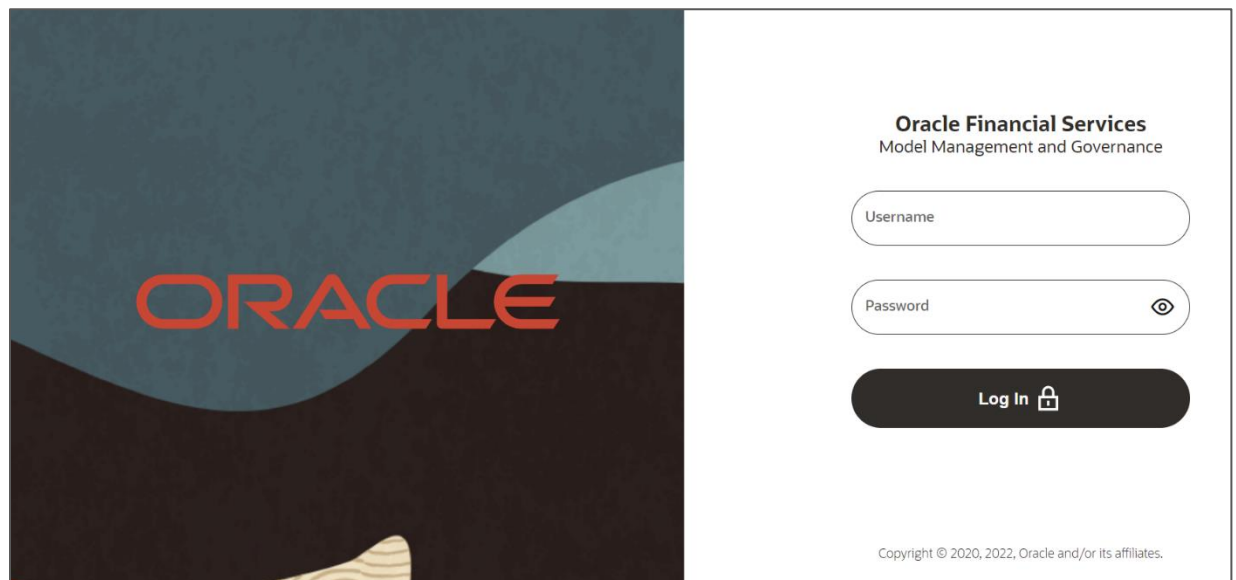
`http(s)://<MMG UI service host name>:<UI_PORT>/mmg/home`

For example,

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

The MMG Login window is displayed.

Figure: MMG Login Window – AAI Authentication



For more information, see the [User Access and Permissioning Management](#) section.

6.2 Create Application Users

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

6.3 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 9: 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

6.4 Model Techniques/ Model Library

Following are the pre-requisite to use the model techniques from the older version when you upgrade to the latest 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.

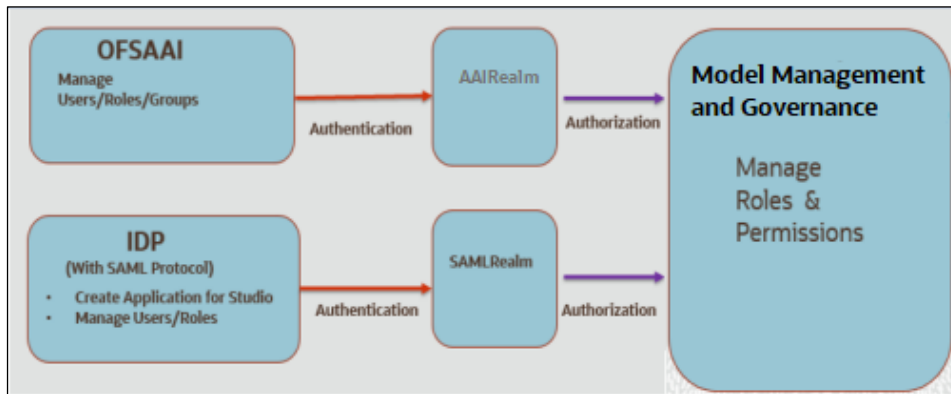
If the same records has to be used in the latest version of MMG, you must update the table MMG_TECHNIQUE_MASTER with relevant workspace id.

6.5 User 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.

The following image illustrates the authentication and authorization process in MMG.



6.5.1 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.

6.5.1.1 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.

6.5.2 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.

6.6 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. Also, 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:

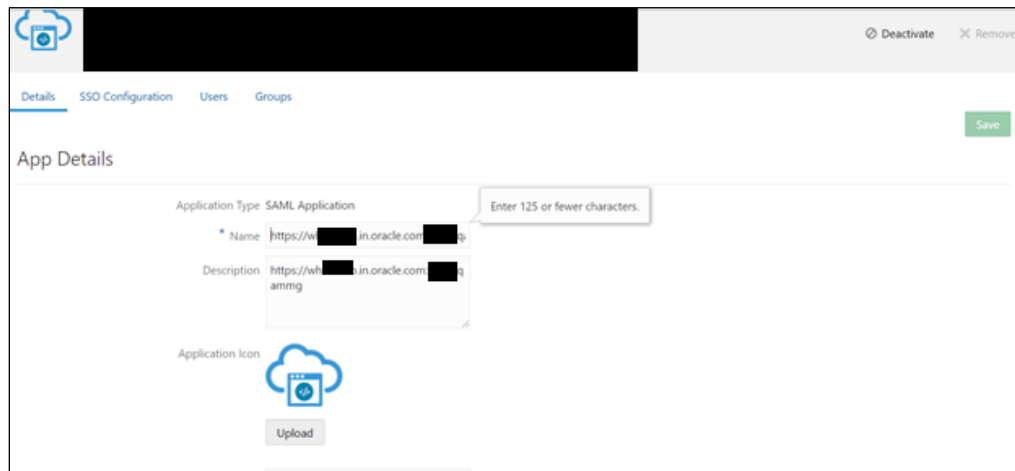
```
./userprovisioning-script-generator.sh SCRIPTUSER ALL OFSAAAIINFO EMFLD
```

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

6.7 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:



The screenshot shows the 'App Details' configuration page in the IDCS Admin console. The page has a navigation bar with 'Details', 'SSO Configuration', 'Users', and 'Groups'. A 'Save' button is visible in the top right. The main content area is titled 'App Details' and contains the following fields:

- Application Type:** SAML Application
- Name:** A text input field containing a URL (https://...in.oracle.com) with a tooltip that says 'Enter 125 or fewer characters.'
- Description:** A text input field containing a URL (https://...in.oracle.com) and the text 'ammg'.
- Application Icon:** A section with a cloud icon and an 'Upload' button.

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

The screenshot shows the SSO Configuration page with the following settings:

- General:**
 - Entity ID: `https://whf[redacted].in.oracle.com/[redacted]`
 - Assertion Consumer URL: `https://[redacted].in.oracle.com/[redacted]`
 - NameID Format: Unspecified
 - NameID Value: User Name
 - Signing Certificate: Upload
- Advanced Settings:**
 - Signed SSO: Response
 - Include Signing Certificate in Signature:
 - Signature Hashing Algorithm: SHA-256
 - Enable Single Logout:
 - Logout Binding: POST
 - Single Logout URL: `https://whf[redacted].in.oracle.com/[redacted]/q;`
 - Logout Response URL: `https://whf[redacted].in.oracle.com/[redacted]/q;`
 - Encrypt Assertion:

Advanced Settings

Attribute Configuration

Use this section to add user attributes. This is useful if you want to send user information including group membership details as part of the assertion.

Attributes +

| Name | Format | Type | Value | Condition | Value |
|-------------------|--------|----------------|-------------------|------------|-------------------------|
| username | Basic | User Attribute | Last Name | | |
| email | Basic | User Attribute | Primary Email | | |
| ofs_mapped_groups | Basic | User Attribute | Group Membersh... | All Groups | All Groups are selected |

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.

The screenshot displays the 'Groups' management interface in IDCS. At the top right, there are 'Deactivate' and 'Remove' buttons. Below the navigation tabs (Details, SSO Configuration, Users, Groups), there is a search bar and action buttons: 'Select All', '+ Assign', and 'X Revoke'. The main content area lists six groups, each with a square selection checkbox, a circular icon, and the group name:

- ID IDNTYADMN
- ID IDNTYAUTH
- MD MDLAPPR
- MD MDLREV
- MD MDLUSR
- WK WKSPADMIN

Part III

Topics:

- [Upgrade Installation](#)

7 Upgrade Installation

7.1 Upgrading to 8.1.2.5.0

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 8.1.2.3.0/8.1.2.4.0 version, 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/ofsaapp/OFS_MMG/mmg-pipeline/pipeline
/scratch/ofsaapp/OFS_MMG/mmg-pipeline/pipeline
PIPELINE_HOME: /scratch/ofsaapp/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.

9.1 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.

9.2 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.

9.3 Configuring Password Store with Oracle Wallet

To configure the password store with Oracle wallet:

1. 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.

9.4 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##' where V_URL_NAME in
('CS_SERVICE_URL', 'MMG_SERVICE_URL', 'WORKSPACE_URL')
/
```

9.5 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'
/
```

9.6 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.

9.7 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_ALIASES##' where  
V_PROPERTY_NAME = 'WALLET_ALIASES' and V_DB_NAME = '##DATASOURCE NAME##'  
/
```

9.8 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](#).

9.9 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`

Part IV

Topics:

- [FAQs](#)

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.

- [Frequently Asked Questions](#)
- [Error Dictionary](#)

10.1 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.

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 Config 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 Config 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 Config 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?

7. 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.

8. 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 \(MOS\)](#).

9. 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.

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 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.

12. 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 \(MOS\)](#).

13. 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.getOrCr
eateSession(CombinedPgxDriver.java:147) at
oracle.pgx.graphviz.driver.PgxDriver.getGraph(PgxDriver.jav
a:334) at
oracle.pgx.graphviz.library.QueryEnhancer.createEnhancer(Qu
eryEnhancer.java:223) at
oracle.pgx.graphviz.library.QueryEnhancer.createEnhancer(Qu
eryEnhancer.java:209) at
oracle.pgx.graphviz.library.QueryEnhancer.query(QueryEnhanc
er.java:150) at
oracle.pgx.graphviz.library.QueryEnhancer.execute(QueryEnha
ncer.java:136) at
oracle.pgx.graphviz.interpreter.PgsqlInterpreter.interpret(P
gsqlInterpreter.java:131) at
```



```
oracle.datastudio.interpreter.pgx.PgxInterpreter.interpret (
PgxInterpreter.java:120) at
org.apache.zepplin.interpreter.LazyOpenInterpreter.interpr
et(LazyOpenInterpreter.java:103) at
org.apache.zepplin.interpreter.remote.RemoteInterpreterSer
ver$InterpretJob.jobRun(RemoteInterpreterServer.java:632)
at org.apache.zepplin.scheduler.Job.run(Job.java:188) at
org.apache.zepplin.scheduler.FIFOScheduler$1.run(FIFOSched
uler.java:140) at
java.base/java.util.concurrent.Executors$RunnableAdapter.ca
ll(Executors.java:515) at
java.base/java.util.concurrent.FutureTask.run(FutureTask.ja
va:264) at
java.base/java.util.concurrent.ScheduledThreadPoolExecutor$
ScheduledFutureTask.run(ScheduledThreadPoolExecutor.java:30
4) at
java.base/java.util.concurrent.ThreadPoolExecutor.runWorker
(ThreadPoolExecutor.java:1128) at
java.base/java.util.concurrent.ThreadPoolExecutor$Worker.ru
n(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 (Comple
tableFuture.java:1999) at
oracle.pgx.api.PgxFuture.get(PgxFuture.java:99) at
oracle.pgx.api.ServerInstance.getSession(ServerInstance.jav
a:670)
oracle.datastudio.interpreter.pgx.CombinedPgxDriver.getOrCr
eateSession(CombinedPgxDriver.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.toUnseriali
zedException(ExceptionMarshaler.java:107) at
oracle.pgx.common.marshalers.ExceptionMarshaler.unmarshal (E
xceptionMarshaler.java:123) at
oracle.pgx.client.RemoteUtils.parseExceptionalResponse (Remo
teUtils.java:130) at
oracle.pgx.client.HttpRequestExecutor.executeRequest (HttpRe
questExecutor.java:198) at
oracle.pgx.client.HttpRequestExecutor.get (HttpRequestExecut
or.java:165) at
oracle.pgx.client.RemoteControlImpl$10.request (RemoteContro
lImpl.java:313) at
oracle.pgx.client.RemoteControlImpl$ControlRequest.request (
RemoteControlImpl.java:119) at
oracle.pgx.client.RemoteControlImpl$ControlRequest.request (
RemoteControlImpl.java:110) at
oracle.pgx.client.AbstractAsyncRequest.execute (AbstractAsyn
```

```
cRequest.java:47) at
oracle.pgx.client.RemoteControlImpl.request (RemoteControlIm
pl.java:107) at
oracle.pgx.client.RemoteControlImpl.getSessionInfo (RemoteCo
ntrolImpl.java:296) at
oracle.pgx.api.ServerInstance.lambda$getSessionInfoAsync$14
(ServerInstance.java:490) at
java.base/java.util.concurrent.CompletableFuture.uniCompose
Stage (CompletableFuture.java:1106) at
java.base/java.util.concurrent.CompletableFuture.thenCompos
e (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",

```
[ {
  "name" : "manual Decision",
  "description" : null,
  "link": "manualDecision",
  "tags" : null,
  "version" : "5",
  "layout" : "zeppelin",
  "type" : "Default",
  "readOnly" : false,
```

Truncate the table "fcc_er_paragraph_manual" in Studio Schema.

Import the modified notebook again.

14. 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`.



- c. Set the value to the required size.
- d. Restart the Studio Application.

15. 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.conf
ig.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.laundryThrowable
(KubernetesClientException.java:64) ~[kubernetes-client-
4.4.1.jar!/:?] at
io.fabric8.kubernetes.client.KubernetesClientException.laundryThrowable
(KubernetesClientException.java:72) ~[kubernetes-client-
4.4.1.jar!/:?] at
io.fabric8.kubernetes.client.dsl.base.BaseOperation.getMandatory(BaseOp
eration.java:229) ~[kubernetes-client-4.4.1.jar!/:?] at
io.fabric8.kubernetes.client.dsl.base.BaseOperation.get(BaseOperation.j
ava:162) ~[kubernetes-client-4.4.1.jar!/:?] at
org.springframework.cloud.kubernetes.config.ConfigMapPropertySource.get
Data(ConfigMapPropertySource.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]
```

16. 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.

17. 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.

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. User group which cannot edit interpreter

You can restrict user group who cannot edit interpreter in two methods:

First method

Below are the list of roles which will allow the analyst access in MMG.

- a. Create a group as custom group.

Example: MMGANALYSTGRP in MMG application using Administration UI without mapping any roles.

- b. This custom group should be mapped to the below roles and authorize the same.

- i.** BATCH_ADV
 - ii.** DATASETACCESS
 - iii.** DATASETREAD
 - iv.** DATASETWRITE
 - v.** DSACCESS
 - vi.** DSAPPROVER
 - vii.** DSBATCH
 - viii.** DSREAD
 - ix.** DSWRITE
 - x.** MDLACCESS
 - xi.** MDLADV
 - xii.** MDLAUTH
 - xiii.** MDLDEPLOY
 - xiv.** MDLEXE
 - xv.** MDLREAD
 - xvi.** MDLREVIEW
 - xvii.** MDLWRITE
 - xviii.** WKSPACC
 - xix.** WKSPAUTH
 - xx.** WKSPREAD
 - xxi.** WKSPWRITE
- c.** Create the same custom group eg: MMGANALYSTGRP in AAI/IDCS application and map this group to the user which will be used for login. (Map any role and domain for group authorization)
- d.** Edit the ofsaa-permissions.init.yml under */OFS_MMG/mmg-studio/conf/ofsaa-permissions.init.yml, add the below line after DSUSRGRP "*" : true
- ```
add
MMGANALYSTGRP:
 "*" : true
```
- e.** Edit the \*/OFS\_MMG/mmg-studio/conf/application.yml and add the custom group eg: "MMGANALYSTGRP " group in the Valid roles property.
- f.** Restart the services and login with the user mapped to the new custom group. Note: This user should not have any other groups provisioned in

database.

- g.** If workspaces are already created, user with admin privilege's should edit the workspace and map the new custom group for the workspace.

Method 2:

Function which has interpreter settings access

**Table : Document Conventions**

| Function      | Description                                                               |
|---------------|---------------------------------------------------------------------------|
| LINKDSINTR    | This function gives access to the DataStudio Credential link in LHS Menu  |
| LINKDSTSK     | This function gives access to the Datastudio interpreter link in LHS Menu |
| LINKDSPERMSSN | This function gives access to the DataStudio Permission link in LHS Menu  |
| LINKDSCRNTAL  | This function gives access to the DataStudio Templates link in LHS Menu   |
| LINKDSTMPLT   | This function gives access to the DataStudio task link in LHS Menu        |

Roles mapped to the above functions

DSADMIN -- Studio Admin Role

DSINTER -- Studio Interpreter Configuration Role

DSUSER --Studio User Role

Above roles should not be mapped to the group if the user doesn't need interpreter setting link to be enabled.

**23. 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 `tstartup.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.

### 10.1.1 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>\n cx\_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:

- Install the **compat-openssl10** module on **Linux 8**.
- Log in to the server as a root user where MMG application is installed.
- Run the following Shell command:

```
yum -y install compat-openssl10
```

## OFSAA Support

Raise a Service Request (SR) in [My Oracle Support \(MOS\)](#) for queries related to the OFSAA Applications.

## Send Us Your Comments

Oracle welcomes your comments and suggestions on the quality and usefulness of this publication. Your input is an important part of the information used for revision.

- Did you find any errors?
- Is the information clearly presented?
- Do you need more information? If so, where?
- Are the examples correct? Do you need more examples?
- What features did you like most about this manual?

**If you find any errors or have any other suggestions for improvement, indicate the title and part number of the documentation along with the chapter/section/page number (if available) and contact the [My Oracle Support](#).**

Before sending us your comments, you might like to ensure that you have the latest version of the document wherein any of your concerns have already been addressed. You can access the [My Oracle Support](#) site that has all the revised or recently released documents.

