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Oracle Financial Services Stress Testing and Scenario Analytics Installation Guide



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Oracle Financial Services Stress Testing and Scenario Analytics Installation Guide, Release 8.1.2.8.0

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Contents

1 Preface

2 Introduction

2.1 Deployment Topology 1
2.2 Components of STSA 1
2.3 Installation Checklist 2

3 Hardware and Software Requirements

3.1 License Information 1

4 Preinstallation

4.1 Installing OpenMetadata 1
4.1.1 Upgrading Airflow and OpenMetadata 13
4.1.1.1 Upgrading Airflow 13
4.1.1.2 Upgrading OpenMetadata 15
4.1.2 Configure SSO for OpenMetadata 16
4.1.3 Enabling HTTPS and SSO for OpenMetadata 17
4.2 Oracle Database Instance Settings 19
4.3 Creating Directories in DB 20
4.4 Create the Database Schema on Oracle Database 21
4.4.1 Creating an Oracle User 21
4.4.2 Creating the Application Configuration Schema 21
4.4.3 Create the MMG Studio Schema 23
4.4.4 Create MMG Graph Schema 23
4.4.5 Create the DTP Schema 24
4.5 Create the Installation, Download, and Metadata Repository Directories 25
4.6 Configure the OS File System Settings and Environment Settings in the .profile File 25
4.6.1 Configure Operating System and File System Settings 26
4.6.2 Configure the Environment Settings 27
4.6.2.1 Java Settings 27
4.6.2.2 Oracle Database Server and Client Settings 28
4.6.2.3 TNS entries in the tnsnames.ora file for Non-TCPS 28

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4.6.2.4 Time Zone Settings 29
4.7 Setup Password Stores with Oracle Wallet 29
4.7.1 Setup the Password Stores for Database User Accounts 29
4.7.2 Import Server Certificate to Java Keystore 32
4.7.3 Verify the Connectivity of the Wallet 33

5 Installation

5.1 Prerequisites 1
5.2 Download the OFS STSA Installer Kit 1
5.3 Extract the Software 2
5.4 Configure the config.sh file 3
5.5 Configure the configForEST.sh file 43
5.6 Run the STSA Installer 51
5.7 Modify the Logging Level 53
5.8 Starting STSA Services 56
5.9 Stopping STSA Services 57
5.10 Additional Installations 57
5.10.1 Installing Conda 57
5.10.2 Installing Python Library 57
5.10.2.1 Prerequisites 57
5.10.2.2 Procedure 58
5.10.3 Generate GRAPH-KEYSTORE.P12 60
5.10.4 Setting up the Environment for Hive Data Sourcing 61
5.10.5 Remote MMG Studio Configuration 63
5.10.6 PGX Installation 64
5.10.6.1 Configure the config.sh File of PGX 64
5.10.6.2 Starting PGX Server 67
5.10.6.3 Stopping PGX Server 67
5.10.7 R Interpreter 67
5.10.7.1 Installing Oracle R Distribution 67
5.10.7.2 R 4.1.2 Installation 67
5.10.7.3 MMG Connection Objects Library Setup 68
5.10.7.3.1 Installing ROracle Library 68
5.10.7.3.2 Installing RODBC Library 68
5.10.7.4 Installing the IRkernel 69
5.10.7.5 Configuring R Interpreter 70
5.10.7.6 Using MMG Studio to Oracle Connection Objects 70
5.10.7.6.1 Workspaces 71
5.10.7.6.2 Connections 71
5.10.8 Kafka Installation 72
5.10.9 Configuring Interpreters 75
5.10.9.1 Spark Interpreter 75

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5.10.9.2 Spark Configuration and Execution in Python 75
5.10.9.2.1 Set the Hadoop Clusters 75
5.10.9.2.2 Configuration on the OFS MMG Instance Server 75
5.10.9.2.3 Set Apache Spark in the OFS MMG Installed Server 76
5.10.9.2.4 Code Snippet to Create the Spark Dataframe and Trigger Executions in to Spark Cluster (with PySpark) 77
5.10.9.2.4.1 Environment Configuration 77
5.10.9.2.4.2 Connection 78
5.10.9.2.4.3 Spark Session 79
5.10.9.2.4.4 Sample Query 79
5.10.10 Interpreter Configuration 80

6 Post-installation Steps

6.1 Access the Application 1
6.2 Create Application Users 1
6.3 Map Application User(s) to User Group 1
6.4 .PEM file creation for Model Service 3
6.5 Access and Permissioning Management 4
6.5.1 Access MMG using AAI Realm 5
6.5.1.1 Prerequisites 5
6.5.2 Access MMG using SAML Realm 6
6.6 AAI User Provisioning SQL Scripts Generator Utility 7
6.7 IDCS Server Configuration 8
6.8 BI Multi-Workspace Results Configuration 11
6.8.1 Connection Pool Configuration 12
6.8.2 Required Database Permissions 12
6.8.3 Required Database Objects 12
6.8.4 Troubleshooting 12
6.8.5 Limitations 13
6.9 Model Pipeline Multi-Level Approval Configuration 14

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7 Upgrading or Patching STSA

7.1 Upgrading STSA and MMG Together 1
7.2 Upgrading STSA with Existing MMG (SkipMMG Flag) 2

8 Cloning the MMG Instance

8.1 Copying the Directories 1
8.2 Copying the Database Schemas 1
8.3 Configuring Password Store with Oracle Wallet 1
8.4 Updating the Host Details 2
8.5 Update LOG_HOME and FTPSHARE 2
8.6 Setting up the SSL Keystore 3
8.7 Updating Wallet Aliases for Oracle Schemas 3
8.8 Updating Context and Ports 3
8.9 Starting MMG Services 4

9 Additional Configuration

9.1 RPD and Catalog Deployment 1
9.1.1 Deploying STSA RPD File 1
9.1.2 Deploying the STSA Catalog File 2

10 Frequently Asked Questions (FAQs) and Error Dictionary

10.1 Frequently Asked Questions 1
10.1.1 Frequently Asked Questions 1
10.1.2 Application Pack 8.1.3.1.0 FAQs 14
10.2 Configuration Property Names 15

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1 Preface

This section provides supporting information for the Oracle Financial Services Stress Testing and Scenario Analytics Installation Guide.

Before you begin the installation, ensure that you have access to My Oracle Support with the required login credentials to quickly notify us of any issues at any stage.

Audience

The OFS STSA Installation Guide is intended for administrators, business users, strategists, data analysts, and implementation consultants who are responsible for installing and maintaining the application pack components.

This document assumes that you have experience installing enterprise components and basic knowledge of the following:

- Oracle Financial Services Stress Testing and Scenario Analytics components
- OFSAA architecture
- UNIX commands
- Database concepts
- Web server or web application server

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

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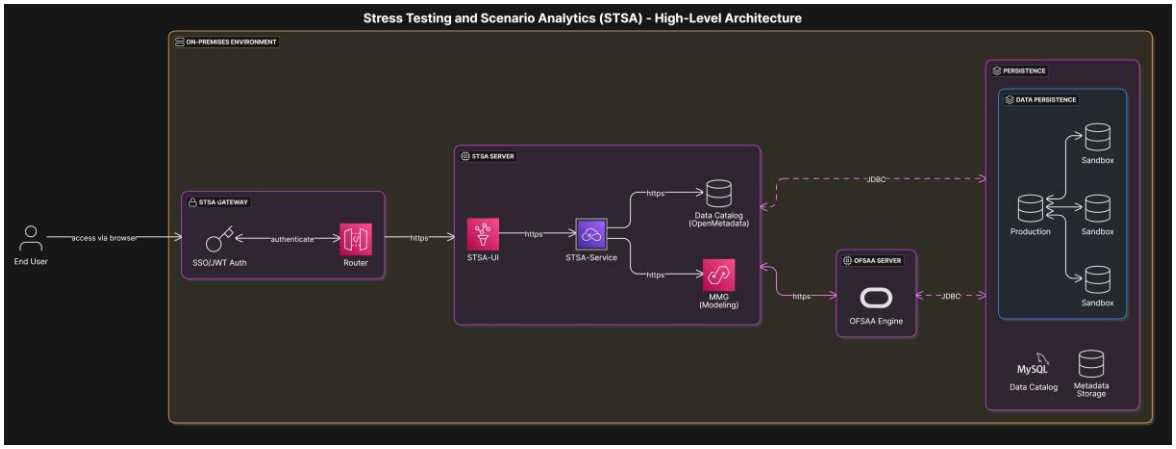
2
Introduction

Oracle Financial Service Stress Testing and Scenario Analytics (OFS STA) is a unified solution that empowers banks and financial institutions to define and perform enterprise-wise stress tests and scenario analysis in an integrated and centralized manner. The solution helps institutions to comply with their regulatory stress testing requirements and carry out adhoc impact assessments and embrace scenario analysis as part of their BAU processes and decision-making.

2.1 Deployment Topology

The following figure depicts the various frameworks and capabilities that make up the STSA Infrastructure.

Figure 2-1 STSA Topology



2.2 Components of STSA

The following are the components of Oracle Financial Services Stress Testing and Scenario Analytics (STSA) Application:

- Data Catalog
- Configuration Manager
- Porfolio
- Metric
- Variable
- Model
- Process
- Analysis Configuration

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- Scenario
- Project
- Model Management & Governance (MMG)

2.3 Installation Checklist

To complete the installation process:

1. Install the OpenMetadata.
2. Install Oracle Analytics Server 2025 (OAS 2025) - version 8.2.
3. Install OFS STSA.
   The OFS STSA installer is bundled with OFS MMG.

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3
Hardware and Software Requirements

The following are the hardware and software requirements:

Table 3-1 Hardware and Software Requirements

Category	Version
Processor Type	Linux x86-64
OS Version	Oracle Linux Server release 8.4 and later versions
Java Version	OpenJDK 17.0.x
Database Server	Oracle Database 19c (19.3+) Enterprise Ed.
OpenMetadata (OM)	Version 1.7.7
Java	Version 17 and 21
MySQL	Version 8.4.10
Oracle Analytics	Server version 7.6
Oracle Database	Version 19 and 23
Python	Version 3.10
Airflow	Version 2.9.3
OS	OEL9, OEL8 and Solaris

> **Note**
>
> For the OpenMetadata and Airflow installation, use Python 3.10.x only. Python 3.11 or later must not be used, as it can cause package compatibility errors during Airflow or OpenMetadata dependency installation or runtime.

3.1 License Information

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

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4
Preinstallation

This section lists all the prerequisites to install OFS STSA.

4.1 Installing OpenMetadata

Install the following libraries, and softwares applications before installing OpenMetadata (OM):

Prerequisites

Install the following libraries, and softwares applications before installing OpenMetadata (OM):

1. Oracle Linux version 8.
2. Linux Libraries → `"Development Tools"` and `gcc gcc-c++ sqlite-devel python39-devel cyrus-sasl-devel bzip2-devel libffi libffi-devel openssl-devel mysql mysql-devel`
3. MySQL version 8.4.10
4. JDK version 17
5. Python version 3.10 only

> **Note**
>
> Python 3.11 or later must not be used for the OpenMetadata/Airflow setup, as it can cause pkg_resources or package compatibility errors during dependency installation or runtime. The Python virtual environment must be created using Python 3.10.x. The Airflow constraint URL must use the Python 3.10 constraints file.

6. Create the following databases in MySQL:

```
CREATE DATABASE openmetadata_db;
CREATE DATABASE airflow_db CHARACTER SET utf8mb4 COLLATE
utf8mb4_unicode_ci;
```

Before creating users, check the active MySQL password validation policy:

```
SHOW VARIABLES LIKE 'validate_password%';
```

Then create users and grant privileges:

```
CREATE USER 'openmetadata_user'@'%' IDENTIFIED BY
'<OPENMETADATA_USER_PASSWORD>';
CREATE USER 'airflow_user'@'%' IDENTIFIED BY '<AIRFLOW_USER_PASSWORD>';
CREATE USER 'airflow_user'@'localhost' IDENTIFIED BY
'<AIRFLOW_USER_PASSWORD>';
```


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```
GRANT ALL PRIVILEGES ON openmetadata_db.* TO 'openmetadata_user'@'%' WITH
GRANT OPTION;
GRANT ALL PRIVILEGES ON airflow_db.* TO 'airflow_user'@'%' WITH GRANT
OPTION;
GRANT ALL PRIVILEGES ON airflow_db.* TO 'airflow_user'@'localhost' WITH
GRANT OPTION;

COMMIT;
```

> **Note**
>
> The sample passwords used in this guide (such as `openmetadata_password` and `airflow_pass`) are examples only. These passwords may fail if MySQL password validation is enabled. Use passwords that comply with the configured MySQL password policy. Run `SHOW VARIABLES LIKE 'validate_password%';` to review the active policy before creating users. If required, temporarily lower the password policy only with DBA and security approval, and restore the required policy after user creation.

7. Install Apache Airflow Version 2.9.3. To do so:
   a. (Optional) Set up a proxy, if your network requires it:

      ```
      export http_proxy=<YOUR_PROXY_URL>
      export  https_proxy=<YOUR_PROXY_URL>
      ```

      > **Note**
      >
      > Skip this step if a proxy is not required.

   b. Define the Airflow installation settings and environment variables. Run the following command:

      ```
      export INSTALL_DIR=<YOUR_INSTALL_DIR>
      export AIRFLOW_HOME=$INSTALL_DIR/airflow
      export MYSQL_DB_HOST=<YOUR_MYSQL_DB_HOST>
      export  MYSQL_DB_PORT=<YOUR_MYSQL_DB_PORT>

      export PYTHON_INS_DIR=<PYTHON_INSTALLATION_PATH>
      export PYTHON_VENV_DIR=$PYTHON_INS_DIR/venv
      ```

   c. Create the required Airflow directories. Run the following command:
      `mkdir -p "$AIRFLOW_HOME" chmod 755 -R "$AIRFLOW_HOME"`
   d. Create and activate a Python 3.10.x virtual environment. Run the following command:

      ```
      export PYTHON_INS_DIR=<PYTHON_INSTALLATION_PATH>
      export PYTHON_VENV_DIR=$PYTHON_INS_DIR/venv

      cd "$INSTALL_DIR"
      python3.10 -m venv "$PYTHON_VENV_DIR"
      source  "$PYTHON_VENV_DIR/bin/activate"
      ```


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e. Upgrade pip to the latest version. Run the following command:
```
python3 -m pip install --upgrade pip
```

f. Install the required dependencies.

```
pip install "openmetadata-managed-apis~=1.7.7"
pip install "openmetadata-ingestion[all]~=1.7.7"
pip install "apache-airflow==2.9.3" --constraint "https://
raw.githubusercontent.com/apache/airflow/constraints-2.9.3/
constraints-3.10.txt"
pip install "python-daemon>=3.0.0"
```

g. (Optional) Remove unneeded Apache Airflow providers. Run the following command:
```
pip freeze | grep "apache-airflow-providers" | grep -v "docker|
http" | xargs pip uninstall -y
```

> **Note**
>
> Run this step only if you want to prune unused providers.

h. Configure the Airflow database connection. To do so:

i. Set the required environment variables:

```
export AIRFLOW_DB=<YOUR_DB_NAME>
export DB_USER=<YOUR_DB_USER>
export DB_PASSWORD=<YOUR_DB_PASSWORD>
export DB_SCHEME=mysql+pymysql

export AIRFLOW_ADMIN_USER=<ADMIN_USERNAME>
export AIRFLOW_ADMIN_PASSWORD=<ADMIN_PASSWORD>
export AIRFLOW_ADMIN_EMAIL=<ADMIN_EMAIL>
```

ii. Build and export the SQLAlchemy database connection string. Run the following command:
```
export AIRFLOW_DATABASE_SQL_ALCHEMY_CONN="mysql+pymysql://$
{DB_USER}:${DB_PASSWORD}@${MYSQL_DB_HOST}:${MYSQL_DB_PORT}/$
{AIRFLOW_DB}"
```

> **Note**
>
> `DB_PASSWORD` must match the MySQL password created for airflow_user in Step 6. If the password contains special characters (such as @, /, +, or :), URL-encode the password before using it in the SQLAlchemy connection string. For example, `p@ssw0rd` must be encoded as `p%40ssw0rd`. Failure to URL-encode special characters will cause database connection errors at startup.

i. Update `airflow.cfg` by running the following commands:

```
sed -i "s#\(sql_alchemy_conn = \).*#\1$
{AIRFLOW_DATABASE_SQL_ALCHEMY_CONN}#" "$AIRFLOW_HOME/airflow.cfg"
sed -i "s#\(hostname_callable = \).*#\1socket.gethostname#"
"$AIRFLOW_HOME/airflow.cfg"
```


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```
sed -i "s#\(auth_backends =
\).*#\1airflow.api.auth.backend.basic_auth,airflow.api.auth.backend.sess
ion#" "$AIRFLOW_HOME/airflow.cfg"
sed -i "s#\(executor = \).*#\1LocalExecutor#" "$AIRFLOW_HOME/
airflow.cfg"
sed -i "s#\(web_server_host = \).*#\1127.0.0.1#" "$AIRFLOW_HOME/
airflow.cfg"
sed -i "s#\(web_server_port = \).*#\18080#" "$AIRFLOW_HOME/airflow.cfg"
sed -i "s#\(base_url = \).*#\1http://localhost:8080#" "$AIRFLOW_HOME/
airflow.cfg"
sed -i "s#\(enable_proxy_fix = \).*#\1False#" "$AIRFLOW_HOME/
airflow.cfg"
```

> **Note**
>
> By default, web_server_host is set to 0.0.0.0, which exposes the Airflow webserver on all network interfaces. Setting web_server_host to 127.0.0.1 restricts access to the local server only. OpenMetadata is not impacted by this change, as it communicates with Airflow using http://localhost:8080.

j. Initialize the Airflow database. Run the following command:
```
airflow db init
```

k. Create an Administrator Account. To do so:

   i. Create the Airflow administrator user by running the following command:

```
airflow users create \
  --username "$AIRFLOW_ADMIN_USER" \
  --firstname <ADMIN_FIRSTNAME> \
  --lastname <ADMIN_LASTNAME> \
 --role Admin \
  --email "$AIRFLOW_ADMIN_EMAIL" \
  --password "$AIRFLOW_ADMIN_PASSWORD"
```

   ii. (Optional) Run the following command to apply any pending database migrations:
```
airflow db migrate
```

l. Start Apache Airflow. To do so:

   i. Start Airflow in standalone mode:

```
airflow standalone
```

   ii. To run Airflow in the background, use the following command:
```
airflow standalone >> ./airflow.log 2>&1 &
```

   iii. Alternatively, start the webserver and scheduler as separate processes:

```
airflow webserver &
airflow scheduler &
```


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> **Note**
>
> - Replace all <...> placeholders with values specific to your environment.
> - Ensure that Python 3.10 and pip are installed, a MySQL instance is running and accessible, and access to PyPI and GitHub is available.
> - Follow the steps in order, providing the necessary values at each point.

8. Install and Start OpenSearch:
   a. Navigate to your intended install directory. To do so, run the following command:
   `cd <OpenSearch Directory>`
   b. Download OpenSearch installer version 2.7.0 from the following site: https://artifacts.opensearch.org/releases/bundle/opensearch/2.7.0/opensearch-2.7.0-linux-x64.tar.gz
   c. Extract the package and set permissions:

```
chmod 777 opensearch-2.7.0-linux-x64.tar.gz
tar -xvf opensearch-2.7.0-linux-x64.tar.gz
rm -f opensearch-2.7.0-linux-x64.tar.gz
chmod -R 755 opensearch-2.7.0/
echo 'plugins.security.disabled: true' >> opensearch-2.7.0/config/
opensearch.yml
```

   d. Start OpenSearch as a background process. To do so, run the following command:
   `cd opensearch-2.7.0/ ./bin/opensearch -d -p pid`

> **Note**
>
> Ensure that OpenSearch is fully started and operational before proceeding with the startup of OpenMetadata or any other dependent services.

9. Create and update the `set_env.env` environment variable file in the installation directory.

```
OMD_INS_DIR=<OPEN_METADATA_INSTALLATION_PATH>
LOCAL_REPO_DIR=<OPEN_METADATA_INSTALLATION_PATH>/local_repo
AIRFLOW_HOME=<OPEN_METADATA_INSTALLATION_PATH>/airflow

PYTHON_INS_DIR=<PYTHON_INSTALLATION_PATH>
PYTHON_VENV_DIR=$PYTHON_INS_DIR/venv

MYSQL_DB_HOST=<DATABASE_HOST>
MYSQL_DB_PORT=<DATABASE_PORT>

HTTP_PROXY_URL=http://<PROXY_HOST>:80
HTTPS_PROXY_URL=http://<PROXY_HOST>:80

AUTHENTICATION_CLIENT_ID=<AUTHENTICATION_CLIENT_ID>
AUTHENTICATION_AUTHORITY=<AUTHENTICATION_AUTHORITY>
```


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Consider the following file as an example:

```
OMD_INS_DIR=/scratch/openmetadata-ins-dir
LOCAL_REPO_DIR=/scratch/openmetadata-ins-dir/local_repo
AIRFLOW_HOME=/scratch/openmetadata-ins-dir/airflow

PYTHON_INS_DIR=/scratch/openmetadata-ins-dir/python310
PYTHON_VENV_DIR=$PYTHON_INS_DIR/venv

MYSQL_DB_HOST=localhost
MYSQL_DB_PORT=3306
```

10. Install OpenMetadata v1.7.7. To do so:

> **Note**
>
> Replace the example paths (such as /scratch/openmetadata-ins-dir) with your actual installation directories.
>
> ```
> CREATE DATABASE openmetadata_db;
> GRANT ALL PRIVILEGES ON openmetadata_db.* TO
> 'openmetadata_user'@'%' IDENTIFIED BY
> '<OPENMETADATA_USER_PASSWORD>' WITH GRANT OPTION;
> ```

a. Create the OpenMetadata database if it was not already created in Step 6. Run this command:

```
CREATE DATABASE openmetadata_db;
GRANT ALL PRIVILEGES ON openmetadata_db.* TO 'openmetadata_user'@'%'
IDENTIFIED BY '<OPENMETADATA_USER_PASSWORD>' WITH GRANT OPTION;
```

b. Create a Working Directory.

```
mkdir openmetadata
cd openmetadata
```

c. Download and extract OpenMetadata version 1.7.7:

```
wget https://github.com/open-metadata/OpenMetadata/releases/download/
1.7.7-release/openmetadata-1.7.7.tar.gz
tar -xzf openmetadata-1.7.7.tar.gz
```

d. Configure *openmetadata.yaml* to connect to the MySQL database. To do so:

i. Edit the following file:
`<OM-INSTALL-DIR>/openmetadata-1.7.7/conf/openmetadata.yaml`

ii. Update the MySQL database connection details:

```
driverClass: ${DB_DRIVER_CLASS:-com.mysql.cj.jdbc.Driver}
user: ${DB_USER:-<YOUR_DB_USER>}
password: ${DB_USER_PASSWORD:-<YOUR_DB_PASSWORD>}
url: jdbc:${DB_SCHEME:mysql}://${DB_HOST:<YOUR_DB_HOST>}:$
```


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```
{DB_PORT:<YOUR_DB_PORT>}/${OM_DATABASE:<YOUR_DB_NAME>}?${DB_PARAMS:-
allowPublicKeyRetrieval=true&useSSL=false&serverTimezone=UTC}
```

> **Note**
>
> - <YOUR_DB_USER> – MySQL username with privileges for OpenMetadata
> - <YOUR_DB_PASSWORD> – Password for the MySQL user
> - <YOUR_DB_HOST> – Hostname or IP address of the MySQL server (for example, localhost)
> - <YOUR_DB_PORT> – MySQL port number (default: 3306)
> - <YOUR_DB_NAME> – Database name (default: openmetadata_db)

e. Set OpenSearch as the search type. To do so, run the following command:
```
sed -i 's#\(searchType: ${SEARCH_TYPE:-\).*#\1opensearch}#'
conf/openmetadata.yaml
```

f. Prepare the OpenMetadata Database and Indexes. To do so, run the following command:

```
cd <OM-INSTALL-DIR>/openmetadata-1.7.7
./bootstrap/openmetadata-ops.sh drop-create
```

11. Start Airflow, OpenSearch and Openmetadata services.
Use the following sample script to start Airflow, OpenSearch, and OpenMetadata services. Replace all placeholder values with values applicable to your environment before running the script.

> **Note**
>
> Ensure that the Python virtual environment uses Python 3.10.x. Do not use Python 3.11 or later for this OpenMetadata/Airflow setup.

```
#!/bin/bash
set -euo pipefail

################################################################################
####
# OpenMetadata, Airflow, and OpenSearch Startup Script
#
# Replace the placeholder values in the "Customer-specific configuration"
section
# before running this script.
################################################################################
####

################################################################################
####
# Customer-specific configuration
################################################################################
```


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```
####

OMD_INS_DIR="<OPENMETADATA_INSTALLATION_DIRECTORY>"
PYTHON_INS_DIR="<PYTHON_3_10_INSTALLATION_DIRECTORY>"
PYTHON_VENV_DIR="<PYTHON_VIRTUAL_ENVIRONMENT_DIRECTORY>"
AIRFLOW_INS_DIR="<AIRFLOW_HOME_DIRECTORY>"
OPENSEARCH_DIR="<OPENSEARCH_INSTALLATION_DIRECTORY>"
OPENMETADATA_DIR="<OPENMETADATA_INSTALLATION_DIRECTORY>/
<OPENMETADATA_VERSION_DIRECTORY>"
JAVA_HOME="<JAVA_17_INSTALLATION_DIRECTORY>"

AIRFLOW_ADMIN_USER="<AIRFLOW_ADMIN_USER>"
AIRFLOW_ADMIN_PASSWORD="<AIRFLOW_ADMIN_PASSWORD>"

################################################################################
####
# Example configuration
################################################################################
####
# OMD_INS_DIR="/scratch/openmetadata-ins-dir"
# PYTHON_INS_DIR="/scratch/openmetadata-ins-dir/python310"
# PYTHON_VENV_DIR="/scratch/openmetadata-ins-dir/python310/venv"
# AIRFLOW_INS_DIR="/scratch/openmetadata-ins-dir/airflow"
# OPENSEARCH_DIR="/scratch/openmetadata-ins-dir/opensearch-2.7.0"
#  OPENMETADATA_DIR="/scratch/openmetadata-ins-dir/openmetadata-1.7.7"
# JAVA_HOME="/scratch/openmetadata-ins-dir/jdk-17.0.2"
#
# AIRFLOW_ADMIN_USER="admin"
# AIRFLOW_ADMIN_PASSWORD="admin"

################################################################################
####
# Environment setup
################################################################################
####

export JAVA_HOME
export PATH="$JAVA_HOME/bin:$PYTHON_INS_DIR/bin:$PATH"
export AIRFLOW_HOME="$AIRFLOW_INS_DIR"

echo "Using OMD_INS_DIR=$OMD_INS_DIR"
echo "Using PYTHON_INS_DIR=$PYTHON_INS_DIR"
echo "Using PYTHON_VENV_DIR=$PYTHON_VENV_DIR"
echo "Using AIRFLOW_HOME=$AIRFLOW_HOME"
echo "Using OPENSEARCH_DIR=$OPENSEARCH_DIR"
echo "Using OPENMETADATA_DIR=$OPENMETADATA_DIR"
echo "Using JAVA_HOME=$JAVA_HOME"

echo "Checking Java version..."
java -version

echo "Checking Python version..."
python3 --version

echo "Activating Python virtual environment..."
source "$PYTHON_VENV_DIR/bin/activate"
```


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```
echo "Validating Python virtual environment version..."
python -c "import sys; exit(0 if sys.version_info[:2] == (3, 10) else 1)"
|| {
  echo "Python 3.10.x is required for this OpenMetadata/Airflow setup. Do
not use Python 3.11 or later."
  exit 1
}

echo "Checking Airflow version..."
airflow version

#############################################################################
####
# Start Airflow
#############################################################################
####

echo "Starting Airflow standalone..."
cd "$OMD_INS_DIR"
airflow standalone >> "$OMD_INS_DIR/airflow.log" 2>&1 &
echo $! > "$OMD_INS_DIR/airflow.pid"
echo "Airflow PID: $(cat "$OMD_INS_DIR/airflow.pid")"

deactivate

#############################################################################
####
# Start OpenSearch
#############################################################################
####

echo "Starting OpenSearch..."
cd "$OPENSEARCH_DIR"
./bin/opensearch -d -p pid
echo "OpenSearch PID file: $OPENSEARCH_DIR/pid"

#############################################################################
####
# Start OpenMetadata
#############################################################################
####

echo "Starting OpenMetadata..."
cd "$OPENMETADATA_DIR"
./bin/openmetadata-server-start.sh conf/openmetadata.yaml >>
"$OPENMETADATA_DIR/output.log" 2>&1 &
echo $! >"$OPENMETADATA_DIR/output.pid"
echo "OpenMetadata PID: $(cat "$OPENMETADATA_DIR/output.pid")"

#############################################################################
####
# Validation
#############################################################################
####
```


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```
echo "Startup commands completed."
echo "Review logs if services are not reachable:"
echo "  Airflow:     $OMD_INS_DIR/airflow.log"
echo "  OpenSearch:  $OPENSEARCH_DIR/logs/"
echo "  OpenMetadata: $OPENMETADATA_DIR/output.log"

echo "Validation commands:"
echo "  curl -i -u ${AIRFLOW_ADMIN_USER}:${AIRFLOW_ADMIN_PASSWORD} http://
localhost:8080/api/v1/dags"
echo "  curl -i http://localhost:9200"
echo "  curl -i http://localhost:8585/api/v1/system/version"
```

12. Stop Airflow, OpenSearch, and OpenMetadata services
Use the following sample script to stop Airflow, OpenSearch, and OpenMetadata services. Replace all placeholder values with values applicable to your environment before running the script.

```
#!/bin/bash
set -euo pipefail

##############################################################################
####
# OpenMetadata, Airflow, and OpenSearch Shutdown Script
#
# Replace the placeholder values in the "Customer-specific configuration"
section
# before running this script.
##############################################################################
####

##############################################################################
####
# Customer-specific configuration
##############################################################################
####

OMD_INS_DIR="<OPENMETADATA_INSTALLATION_DIRECTORY>"
PYTHON_INS_DIR="<PYTHON_3_10_INSTALLATION_DIRECTORY>"
PYTHON_VENV_DIR="<PYTHON_VIRTUAL_ENVIRONMENT_DIRECTORY>"
OPENSEARCH_DIR="<OPENSEARCH_INSTALLATION_DIRECTORY>"
OPENMETADATA_DIR="<OPENMETADATA_INSTALLATION_DIRECTORY>/
<OPENMETADATA_VERSION_DIRECTORY>"

##############################################################################
####
# Example configuration
##############################################################################
####
# OMD_INS_DIR="/scratch/openmetadata-ins-dir"
# PYTHON_INS_DIR="/scratch/openmetadata-ins-dir/python310"
#  PYTHON_VENV_DIR="/scratch/openmetadata-ins-dir/python310/venv"
# OPENSEARCH_DIR="/scratch/openmetadata-ins-dir/opensearch-2.7.0"
# OPENMETADATA_DIR="/scratch/openmetadata-ins-dir/openmetadata-1.7.7"

##############################################################################
####
```


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```
# Helper functions
################################################################################
####

stop_pid() {
  local name="$1"
  local pid="$2"

  if [ -z "$pid" ]; then
    return 0
  fi

  if kill -0 "$pid" 2>/dev/null; then
    echo "Stopping $name PID $pid"
    kill -TERM "$pid" 2>/dev/null || true
  else
    echo "$name PID $pid is not running."
  fi
}

stop_matching_processes() {
  local pattern="$1"
  local description="$2"

  local pids
  pids=$(pgrep -f "$pattern" || true)

  if [ -n "$pids" ]; then
    echo "Stopping $description:"
    echo "$pids"
    echo "$pids" | xargs -r kill -TERM 2>/dev/null || true
  else
    echo "No running process found for $description"
  fi
}

force_kill_matching_processes() {
  local pattern="$1"
  local description="$2"

  local pids
  pids=$(pgrep -f "$pattern" || true)

  if [ -n "$pids" ]; then
    echo "Force stopping $description:"
    echo "$pids"
    echo "$pids" | xargs -r kill -KILL 2>/dev/null || true
  fi
}

################################################################################
####
# Stop Airflow
################################################################################
####
```


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```
echo "Stopping Airflow..."

if [ -f "$OMD_INS_DIR/airflow.pid" ]; then
  AIRFLOW_PID=$(cat "$OMD_INS_DIR/airflow.pid")
  stop_pid "Airflow startup PID" "$AIRFLOW_PID"
else
  echo "Airflow PID file not found at $OMD_INS_DIR/airflow.pid"
fi

stop_matching_processes "$PYTHON_VENV_DIR/bin/airflow webserver|airflow
webserver" "Airflow webserver"
stop_matching_processes "$PYTHON_VENV_DIR/bin/airflow triggerer|airflow
triggerer" "Airflow triggerer"
stop_matching_processes "airflow executor -- LocalExecutor" "Airflow
LocalExecutor executor"
stop_matching_processes "airflow worker -- LocalExecutor" "Airflow
LocalExecutor workers"
stop_matching_processes "airflow scheduler -- DagFileProcessorManager"
"Airflow DAG file processor manager"
stop_matching_processes "gunicorn.*airflow-webserver|gunicorn: worker \
[airflow-webserver\]" "Airflow gunicorn webserver workers"
stop_matching_processes "airflow standalone" "Airflow standalone"

sleep 8

force_kill_matching_processes "$PYTHON_VENV_DIR/bin/airflow webserver|
airflow webserver" "remaining Airflow webserver"
force_kill_matching_processes "$PYTHON_VENV_DIR/bin/airflow triggerer|
airflow triggerer" "remaining Airflow triggerer"
force_kill_matching_processes "airflow executor -- LocalExecutor"
"remaining Airflow LocalExecutor executor"
force_kill_matching_processes "airflow worker -- LocalExecutor" "remaining
Airflow LocalExecutor workers"
force_kill_matching_processes "airflow scheduler --
DagFileProcessorManager" "remaining Airflow DAG file processor manager"
force_kill_matching_processes "gunicorn.*airflow-webserver|gunicorn:
worker \[airflow-webserver\]" "remaining Airflow gunicorn webserver
workers"
force_kill_matching_processes "airflow standalone" "remaining Airflow
standalone"

rm -f "$OMD_INS_DIR/airflow.pid"

##############################################################################
####
# Stop OpenMetadata
##############################################################################
####

echo "Stopping OpenMetadata..."

if [ -f "$OPENMETADATA_DIR/output.pid" ]; then
  OM_PID=$(cat  "$OPENMETADATA_DIR/output.pid")
  stop_pid "OpenMetadata" "$OM_PID"
else
  echo "OpenMetadata PID file not found at $OPENMETADATA_DIR/output.pid"
```


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```
fi

stop_matching_processes "OpenMetadataApplication" "OpenMetadata
application"
sleep 5
force_kill_matching_processes "OpenMetadataApplication" "remaining
OpenMetadata application"
rm -f "$OPENMETADATA_DIR/output.pid"

################################################################################
####
# Stop OpenSearch
################################################################################
####

echo "Stopping OpenSearch..."

if [ -f "$OPENSEARCH_DIR/pid" ]; then
  OS_PID=$(cat  "$OPENSEARCH_DIR/pid")
  stop_pid "OpenSearch" "$OS_PID"
else
echo "OpenSearch PID file not found at $OPENSEARCH_DIR/pid"
fi

stop_matching_processes "OpenSearch" "OpenSearch"
sleep 5
force_kill_matching_processes "OpenSearch" "remaining OpenSearch"
rm -f "$OPENSEARCH_DIR/pid"

################################################################################
####
# Validation
################################################################################
####

echo "Shutdown commands completed."
echo "Validation commands:"
echo "  ps -ef | grep -E 'airflow|gunicorn|OpenMetadataApplication|
OpenSearch' | grep -v grep"
echo "  ss -lntp | grep -E '8080|8585|9200'"
```

4.1.1 Upgrading Airflow and OpenMetadata

If OpenMetadata and Apache Airflow are already installed in earlier versions, perform the following steps to upgrade the environment.

4.1.1.1 Upgrading Airflow

This section provides information about upgrading Airflow

To upgrade Airflow, follow these steps:

1. Take a backup of your Airflow instance. To do so:
   a. Back up the metadata database (using tools such as mysqldump or pg_dump), along with project DAGs, configuration files, and any custom plugins.

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Example: `mysqldump -u root -p airflow_db > airflow_db_1.8.9.sql`

b. Note your current Airflow version to manage the upgrade path.

2. Deactivate Any Running Airflow Services. To do so, stop all running Airflow processes, including the web server, scheduler, and workers by running the following command:

```
pkill -f airflow
```

3. Activate Your Airflow Virtual Environment (if using virtualenv). To do so, run the following command:

```
source <YOUR_AIRFLOW_HOME>/venv/bin/activate
```

> **Note**
>
> Skip this step if you are not using a virtualenv.

4. Upgrade Airflow and Providers

a. To upgrade Airflow, install the desired Airflow version by running the following command:

```
pip install --upgrade "apache-airflow==<NEW_VERSION>" \ --
constraint "https://raw.githubusercontent.com/apache/airflow/
constraints-<NEW_VERSION>/<PYTHON_VERSION>.txt"
```

> **Note**
>
> - Replace *<NEW_VERSION>* with the target Airflow version (for example, 2.9.3).
> - Replace *<PYTHON_VERSION>* with the required Python version (for example, 3.10 for Python 3.10). If you are unsure, run *python --version* and use *cut -d. -f1,2* to extract the major and minor version.

b. To Airflow Providers, run the following command:

```
pip install --upgrade apache-airflow-providers-cncf-kubernetes \
apache-airflow-providers-docker
```

> **Note**
>
> For more information about additional/updated providers relevant to your DAGs, see Airflow provider documentation.

5. Upgrade Custom or Linked Packages. To do so,upgrade custom dependencies such as OpenMetadata and ingestion tools by running the following commands:

```
pip install --upgrade "openmetadata-managed-apis==1.7.7.0"

pip install --upgrade "openmetadata-ingestion[all]==1.7.7.0"
pip install --upgrade "python-daemon>=3.0.0"
```

6. Upgrade Airflow Metadata Database. To do so, run the database migration to update the schema for the new Airflow version:

```
airflow db upgrade
```


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or

```
airflow db migrate
```

7. Review and Update Airflow Configuration. To do so:
   a. Review your *airflow.cfg* and update it to reflect any new, modified, or deprecated configuration settings as described in the Airflow version upgrade notes.
   b. If you use SQLAlchemy connection URIs or other custom configurations, adjust them as required.
   c. Confirm that web_server_host in airflow.cfg is set to 127.0.0.1 (not 0.0.0.0). This restricts the Airflow webserver on port 8080 to the local server only. If the upgrade process regenerates or resets airflow.cfg, reapply this setting along with base_url = http://localhost:8080 and enable_proxy_fix = False. OpenMetadata is not impacted, as it communicates with Airflow using http://localhost:8080.
8. Start or Restart Airflow Services. To do so, start the Airflow web server, scheduler, and any workers:

   ```
   airflow webserver & airflow scheduler &
   ```

   or

   ```
   airflow standalone >> ./airflow.log 2>&1 & echo $! > airflow.pid
   ```

9. Validate the Airflow Upgrade. To do so:
   a. Verify the installed Airflow version:
      ```
      airflow version
      ```
   b. Open the Airflow web UI and confirm that all DAGs load correctly.
   c. Trigger a few test DAGs to ensure proper execution.
   d. Review Airflow logs for any warnings or errors.
10. Clean Up. To do so:
    a. Remove deprecated packages or old virtual environments that are no longer needed.
    b. Monitor the system and DAG execution over the next few cycles to detect any unexpected issues.

4.1.1.2 Upgrading OpenMetadata

This section provides information about upgrading OpemMetadata (OM)

To upgrade OM, follow these steps:

1. Before you perform the upgrade, create a backup of the database to ensure data safety. To do so, run the following command:

   ```
   mysqldump -u root -p openmetadata_db >
   openmetadata_db_backup_1.7.7.0.sql
   ```

2. Download the OpenMetadata v1.7.7.0 package and replace the existing OpenMetadata installation. To do so, run the following command:

   ```
   wget https://github.com/open-metadata/OpenMetadata/releases/
   download/1.7.7-release/openmetadata-1.7.7.0.tar.gz tar -xzf
   openmetadata-1.7.7.0.tar.gz
   ```

3. Migrate the Database Schema. To do so, run the following command:

   ```
   ./bootstrap/openmetadata-ops.sh migrate
   ```


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4. Reindex Metadata Data. To do so, run the following command:

```
./bootstrap/openmetadata-ops.sh reindex
```

4.1.2 Configure SSO for OpenMetadata

To configure SSO in installed OpenMetadata (OM):

Prerequisites:

- Ensure that you have access to the IDCS domain.
- Note down the IP address or Host Name of the server where OM is installed.

1. Create a private application.
2. Enable **Client credentials** and **Authorization Code grant flow** in the private application.

   The following authorization grants must be enabled:

   - **Implicit:**
   - **Authorization code**
   - **Client credentials**
3. Provide the **Redirect URL**, **Post-logout redirect URL** and **Logout URL** when configuring the private application.

   For example:

   - Redirect URL : http(s)://<OM IP/FQDN>:8585/silent-callback http(s)://<OM IP/FQDN>:8585/callback
   - Post Logout Url: http(s)://<OM IP/FQDN>:8585/signin
   - Logout URL: http(s)://<OM IP/FQDN>:8585/api/v1/users/logout
4. Enable client access in domain.
5. Copy the **Client ID** and **Client Secret** from **General Information** section of the private application.

   The Client ID and the Client Secret will be used during the installation for the following properties: *OPENMETADATA_IDCS_APPLICATION_CLIENT_ID* and *OPENMETADATA_IDCS_APPLICATION_CLIENT_SECRET*
6. Copy the **Domain** URL from the **Overview** section.
7. Add relevant users to the private application.

   Ensure that STSA and OM are on the same SAML or IDCS domain.
8. Update the SSO Configuration. To do so:

   a. If you are using Single Sign-On (SSO), locate the `authenticationConfiguration` section and configure the SSO provider details:

```
authenticationConfiguration:
  provider: ${AUTHENTICATION_PROVIDER:-"custom-oidc"}
  responseType: ${AUTHENTICATION_RESPONSE_TYPE:-id_token}
  providerName: ${CUSTOM_OIDC_AUTHENTICATION_PROVIDER_NAME:-"Oracle"}
  publicKeyUrls:
    - "https://idcs-
e1cc81fab76840ff92e07aa94c413b76.identity.pint.oc9qadev.com:443/
admin/v1/SigningCert/jwk"
    - "http(s)://xxx.xx.xx.xxx:8585/api/v1/system/config/jwks"
```


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```
  authority: ${AUTHENTICATION_AUTHORITY:-https://idcs-
e1cc81fab76840ff92e07aa94c413b76.identity.pint.oc9qadev.com}
  clientId: $
{AUTHENTICATION_CLIENT_ID:-"e8e56537bb6047e7a0a70565a1f64239"}
  callbackUrl: ${AUTHENTICATION_CALLBACK_URL:-"http(s)://
xxx.xx.xx.xxx:8585/callback"}
  jwtPrincipalClaims: ${AUTHENTICATION_JWT_PRINCIPAL_CLAIMS:-
[email,preferred_username,sub]}
  enableSelfSignup: ${AUTHENTICATION_ENABLE_SELF_SIGNUP:-true}
```

b. Replace the placeholders with your provider-specific values, such as:
   - **AUTHENTICATION_AUTHORITY:** The URL for your SSO provider.
   - **AUTHENTICATION_CLIENT_ID:** The client ID for your application.
   - **AUTHENTICATION_CALLBACK_URL:** The callback URL for your application.

9. Restart OM.

4.1.3 Enabling HTTPS and SSO for OpenMetadata

This section provides step-by-step instructions for configuring HTTPS and Single Sign-On (SSO) in OpenMetadata.

To enable HTTPS and SSO for OpenMetadata:

1. Generate or Obtain a Keystore.

   For production environments, use an X.509 certificate from a trusted Certificate Authority (CA) and import it into a Java Keystore. For testing or development, you can create a self-signed certificate.

   To create a self-signed certificate, run the following command:

   ```
   keytool -ext SAN=<IP/HOST> -keystore openmetadata.keystore.jks -alias
   <ALIAS> -keyalg RSA -keysize 2048 -sigalg SHA256withRSA -genkey -validity
   365
   ```

   > **Note**
   > - SAN (Subject Alternative Name): Ensure the SAN matches the host or IP.
   > - Alias: Use a meaningful alias for the certificate.
   > - Password: Choose a secure password.

   Example:

   ```
   keytool -ext SAN=IP:100.76.164.165 -keystore openmetadata.keystore.jks -
   alias localhost -keyalg RSA -keysize 2048 -sigalg SHA256withRSA -genkey -
   validity 365
   ```

2. Move the Keystore. After generating the keystore, move the file to the OpenMetadata configuration directory:

   ```
   <OM-INSTALL-DIR>/<openmetadata-version>/conf
   ```


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3. Export the Certificate. You can either create a certificate separately and add it to the keystore, or extract it directly from the keystore using this command:

   ```
   keytool -exportcert -keystore openmetadata.keystore.jks -alias
   <ALIAS> -file <CERT_NAME>
   ```

   Alternatively, use a UI tool for exporting the certificate.

4. Import the Certificate to the Java Truststore. To add the certificate to Java's cacerts truststore, run the following command:

   ```
   keytool -importcert -file <cert-file> -cacerts -alias <ALIAS>
   ```

5. Update the OpenMetadata SSL Configuration. To do so:

   a. Modify the OpenMetadata configuration file located at: `<OM-INSTALL-DIR>/<openmetadata-version>/conf/openmetadata.yaml`

   b. In the `server` section, ensure the `applicationConnectors` section includes the following HTTPS configuration:

   ```
   server:
     applicationConnectors:
       - type: https
         port: ${SERVER_PORT:-8585}
         keyStorePath: ./conf/openmetadata.keystore.jks
         keyStorePassword: password123
         keyStoreType: JKS
         certAlias: om_als
         supportedProtocols: [TLSv1.2, TLSv1.5]
         excludedProtocols: [SSL, SSLv2, SSLv2Hello, SSLv3]
   ```

   > **Note**
   >
   > - keyStorePath: Ensure the path points to the correct keystore file.
   > - keyStorePassword: Enter the password for your keystore.

6. Update the SSO Configuration. To do so:

   a. If you are using Single Sign-On (SSO), locate the `authenticationConfiguration` section and configure the SSO provider details:

   ```
   authenticationConfiguration:
     provider: ${AUTHENTICATION_PROVIDER:-"custom-oidc"}
     responseType: ${AUTHENTICATION_RESPONSE_TYPE:-id_token}
     providerName: ${CUSTOM_OIDC_AUTHENTICATION_PROVIDER_NAME:-"Oracle"}
     publicKeyUrls:
       - "https://idcs-
   e1cc81fab76840ff92e07aa94c413b76.identity.pint.oc9qadev.com:443/
   admin/v1/SigningCert/jwk"
       - "https://100.76.147.137:8585/api/v1/system/config/jwks"
     authority: ${AUTHENTICATION_AUTHORITY:-https://idcs-
   e1cc81fab76840ff92e07aa94c413b76.identity.pint.oc9qadev.com}
     clientId: $
   {AUTHENTICATION_CLIENT_ID:-"e8e56537bb6047e7a0a70565a1f64239"}
     callbackUrl: ${AUTHENTICATION_CALLBACK_URL:-"https://
   100.76.147.137:8585/callback"}
   ```


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```
  jwtPrincipalClaims: ${AUTHENTICATION_JWT_PRINCIPAL_CLAIMS:-
[email,preferred_username,sub]}
  enableSelfSignup: ${AUTHENTICATION_ENABLE_SELF_SIGNUP:-true}
```

b. Replace the placeholders with your provider-specific values, such as:
   - **AUTHENTICATION_AUTHORITY:** The URL for your SSO provider.
   - **AUTHENTICATION_CLIENT_ID:** The client ID for your application.
   - **AUTHENTICATION_CALLBACK_URL:** The callback URL for your application.

7. Update Pipeline Service Client Configuration for HTTPS. To do so:
   a. In the OpenMetadata configuration file, verify the `pipelineServiceClientConfiguration` section is updated for HTTPS:

```
pipelineServiceClientConfiguration:
  enabled: ${PIPELINE_SERVICE_CLIENT_ENABLED:-true}
  className: $
{PIPELINE_SERVICE_CLIENT_CLASS_NAME:-"org.openmetadata.service.clients.p
ipeline.airflow.AirflowRESTClient"}
  apiEndpoint: ${PIPELINE_SERVICE_CLIENT_ENDPOINT:-https://
localhost:8080}
  metadataApiEndpoint: ${SERVER_HOST_API_URL:-https://
100.76.147.137:8585/api}
  verifySSL: ${PIPELINE_SERVICE_CLIENT_VERIFY_SSL:-"validate"}
  sslConfig:
    certificatePath: ${PIPELINE_SERVICE_CLIENT_SSL_CERT_PATH:-"<OM-
INSTALL-DIR>/<openmetadata-version>/conf/om.cer"}
```

   b. Ensure the following:
      - **PIPELINE_SERVICE_CLIENT_ENDPOINT:** Set to https://.
      - **SERVER_HOST_API_URL:** Points to the HTTPS API endpoint for OpenMetadata.
      - **PIPELINE_SERVICE_CLIENT_SSL_CERT_PATH:** Ensure the correct SSL certificate path is specified.
8. Update STSA Configuration. To do so, modify the OpenMetadata URL in the EST configuration file to use the HTTPS URL.
9. Start Services and Verify. To do so:
   a. After all configurations are updated, restart the OpenMetadata and STSA services.
   b. Verify that both the connection and integration are functioning correctly.

> **Note**
>
> If using a self-signed certificate, browsers may display a warning. For production environments, always use certificates signed by a trusted Certificate Authority (CA).

4.2 Oracle Database Instance Settings

Ensure that the following database instance settings are configured:

- NLS_CHARACTERSET to AL32UTF8

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

4.3 Creating Directories in DB

To create directories in DB:

1. Login to the database server and create the below directories:
2. Create a directory to store logs generated by the external table.

   ```
   mkdir -p /file_store/fs_list/logs
   ```

3. Create a directory to store a preprocessor script for listing files. This directory requires read and execute permissions.

   ```
   mkdir -p /file_store/fs_list/script
   ```

4. Create a directory to store control files that define accessible directories. This directory requires read permissions.

   ```
   mkdir -p /file_store/fs_list/control
   ```

5. Create a directory to store CSV files.

   ```
   mkdir -p /scratch/oraofss/fccm-data
   ```

6. Log in to the database as the `SYS` user and run the following commands. Replace `<STSA/MMG App Schema>` with the actual schema name created for the application.

   ```
   CREATE OR REPLACE DIRECTORY fs_list_logs_dir AS '/file_store/fs_list/
   logs/';
   GRANT READ, WRITE ON DIRECTORY fs_list_logs_dir TO <STSA/MMG App Schema>;

   CREATE OR REPLACE DIRECTORY fs_list_script_dir AS '/file_store/fs_list/
   script/';
   GRANT READ, EXECUTE ON DIRECTORY fs_list_script_dir TO <STSA/MMG App
   Schema>;

   CREATE OR REPLACE DIRECTORY fs_list_control_dir AS '/file_store/fs_list/
   control/';
   GRANT READ ON DIRECTORY fs_list_control_dir TO <STSA/MMG App Schema>;

   CREATE OR REPLACE DIRECTORY external_tables_dir AS '/scratch/oraofss/fccm-
   data/';
   GRANT READ ON DIRECTORY external_tables_dir TO <STSA/MMG App Schema>;

   GRANT CREATE TABLE TO <STSA/MMG App Schema>;
   ```

7. Create preprocessor script.

   This script lists files in the directory referenced by the external table's LOCATION clause, formatting timestamps in a readable format.

   ```
   cat > /file_store/fs_list/script/list_directory.sh <<EOF
   #!/bin/bash
   /usr/bin/ls -l --time-style=+"%Y%m-%d:%H:%M:%S" "\$(/usr/bin/cat \$1)"
   EOF
   ```


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8. To view the script created and the contents of the file created from the previous step run the following command:

```
cat > /file_store/fs_list/control/trace.txt <<EOF
/scratch/oraofss/fccm-data
EOF
```

4.4 Create the Database Schema on Oracle Database

Create the following Database Schemas:

- MMG Studio Schema
- MMG Graph Schema
- DTP Schema

Tablespace

You can either use the existing tablespace or you can create a new tablespace during the schema creation by 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;
```

4.4.1 Creating an Oracle User

You can create an Oracle user by using the following script:

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

4.4.2 Creating the Application Configuration Schema

Create the application schema. You must create an Oracle User to create the application schema. For more details, see Creating an Oracle User section. This section discusses the various grants required for the Oracle Database User.

Assign the Grants

Assign the following grants to the workspace schema user.

```
grant create SESSION to <oracle_database_user>;

grant create PROCEDURE to <oracle_database_user>;
```


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```
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>;

create or replace DIRECTORY fs_list_logs_dir AS '/file_store/fs_list/logs/';

grant read, write on DIRECTORY fs_list_logs_dir TO schema_name;

create or replace DIRECTORY fs_list_script_dir AS '/file_store/fs_list/script/';

grant read, execute on DIRECTORY fs_list_script_dir TO schema_name;

create or replace DIRECTORY fs_list_control_dir AS '/file_store/fs_list/
control/';

grant read on DIRECTORY fs_list_control_dir TO schema_name;

-- Directory creation and access grants
create or replace DIRECTORY fs_list_logs_dir AS '/file_store/fs_list/logs/';
grant read, write on DIRECTORY fs_list_logs_dir to &schemaname;

create or replace DIRECTORY fs_list_script_dir AS '/file_store/fs_list/
script/';
grant read, execute on DIRECTORY fs_list_script_dir to &schemaname;

create or replace DIRECTORY fs_list_control_dir AS '/file_store/fs_list/
control/';
grant read on DIRECTORY fs_list_control_dir to &schemaname;
```


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In STSA v8.1.2.4.0, the following additional grants are required by OM:

```
grant SELECT ON DBA_CONSTRAINTS TO &schemaname;
grant SELECT ON DBA_CONS_COLUMNS TO &schemaname;
grant SELECT ON DBA_COL_COMMENTS TO &schemaname;


GRANT EXECUTE ON SYS.DBMS_CRYPTO TO schema_name;
```

4.4.3 Create the MMG Studio Schema

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

Assign the following grants:

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

A new user group created in OFS MMG requires permissions for studio operations must be added in the following files:

- `mmgstudio/conf/application.yml`
- `mmgstudio/conf/ofsaa-permissions.init.yml`

> **Note**
>
> Ensure that the groups are in upper case, as OFS AAI groups are always in an upper case format.

4.4.4 Create MMG Graph Schema

Ensure that you create an oracle user before creating the MMG Graph Schema. For more details, see the 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 the graph schema:

```
{{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>;}}
```


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```
{{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>;}}
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>` for the schema that is used in the graph pipeline.

> **Note**
>
> If a user has to execute the custom graph, the same permissions have to be provided for the input tables that are referred to in the custom graph pipeline.

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4.4.5 Create the DTP Schema

```
grant create SESSION to < DTP SCHEMA NAME >;
grant create PROCEDURE to < DTP SCHEMA NAME >;
grant create SEQUENCE to < DTP SCHEMA NAME >;
grant create TABLE to < DTP SCHEMA NAME >;
grant create TRIGGER to < DTP SCHEMA NAME >;
grant create VIEW to < DTP SCHEMA NAME >;
grant create MATERIALIZED VIEW to < DTP SCHEMA NAME >;
grant select on SYS.V_$PARAMETER to < DTP SCHEMA NAME >;
grant create SYNONYM to < DTP SCHEMA NAME >;
grant select on sys.v_$parameter to < DTP SCHEMA NAME >;
grant select on sys.dba_free_space to < DTP SCHEMA NAME >;
grant select on sys.dba_tables to < DTP SCHEMA NAME >;
grant select on sys.Dba_tab_columns to < DTP SCHEMA NAME >;
grant create RULE to < DTP SCHEMA NAME >;
grant create any trigger to < DTP SCHEMA NAME >;
grant drop any trigger to < DTP SCHEMA NAME >;
grant select on SYS.DBA_RECYCLEBIN to < DTP SCHEMA NAME >;

CREATE OR REPLACE DIRECTORY fs_list_logs_dir AS
'/file_store/fs_list/logs/';
GRANT READ, WRITE ON DIRECTORY fs_list_logs_dir TO < DTP SCHEMA NAME >;

CREATE OR REPLACE DIRECTORY fs_list_script_dir AS
'/file_store/fs_list/script/';
GRANT READ, EXECUTE ON DIRECTORY fs_list_script_dir TO < DTP SCHEMA NAME >;

CREATE OR REPLACE DIRECTORY fs_list_control_dir AS
'/file_store/fs_list/control/';
GRANT READ ON DIRECTORY fs_list_control_dir TO < DTP SCHEMA NAME >;
```


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4.5 Create the Installation, Download, and Metadata Repository Directories

To install the application, create the following directories:

- **OFS STSA 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:** This is the default temporary directory where the installation files are stored for a short time to support faster installation. Configure adequate space on the `/tmp` directory. It is recommended to allocate more than 10 GB of space. Assign 755 permission to this directory and disable the `NOEXEC` option.

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

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

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

4.6 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.

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

4.6.1 Configure Operating System and File System Settings

To install the application, configure the operating system and file system settings. Refer to the following parameters and configuration actions as tabulated.

Table 4-1 Configure operating system and file system settings

Parameter	Configuration Action

File Descriptor Settings	In the `sysctl.conf` file, if you want to change the number of file descriptors, perform the following action as a root user:
	1. Edit the following line in the /etc/`sysctl.conf` file:
	`fs.file-max = <value>`
	where `<value>` is greater than 15000
	• Apply the change by running the following command:
	`# /sbin/ sysctl -p`

> **Note**
>
> The value specified here is the minimum value to be set for the installation process to go forward. For other modules, this value may depend on the available resources and the number of processes executed in parallel.

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Table 4-1 (Cont.) Configure operating system and file system settings

Parameter	Configuration Action
Total Number of Process Settings	In the `sysctl.conf` file, set the value to greater than 4096.

> **Note**
>
> The value specified here is the minimum value to be set for the installation process to go forward. For other modules, this value may depend on the available resources and the number of processes executed in parallel.

4.6.2 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 to the following topics:

- Java Settings
- Oracle Database Server and Client Settings
- TNS entries in the tnsnames.ora file for Non-TCPS
- Time Zone Settings

4.6.2.1 Java Settings

To configure the Java Settings, refer the following table:

> **Note**
>
> In the application, Java 21 is supported.

Table 4-2 Java Settings

Description	Example Value
In the `.profile` file, set JAVA_BIN to include the JDK absolute path.	For example: JAVA 21

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Table 4-3 Java Settings

Description	Example Value
In the `.profile` file, set the Java tool options for all versionsJDK-17 and above updates. Ensure that SYMBOLIC links to JAVA installation are not set in the PATH variable.	`JAVA_TOOL_OPTIONS=" -Djdk.util.zip.disableZip64ExtraFieldValidation=true"` `export JAVA_TOOL_OPTIONS`
In the `.profile` file, set JAVA_BIN to include the JDK absolute path.	For example: JAVA_BIN `=/usr/java/jdk-17/bin` `export JAVA_BIN`

4.6.2.2 Oracle Database Server and Client Settings

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

Table 4-4 Oracle Database Server and Client Settings

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

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

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

4.6.2.3.1 Non-TCPS

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

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

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

```
<SID NAME> =

(DESCRIPTION =
```


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```
(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>)
)
)
```

4.6.2.4 Time Zone Settings

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

Table 4-6 Time Zone Settings

Description	Example Value
Time Zone	TZ=Asia/Calcutta

4.7 Setup Password Stores with Oracle Wallet

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

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

4.7.1 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.

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

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

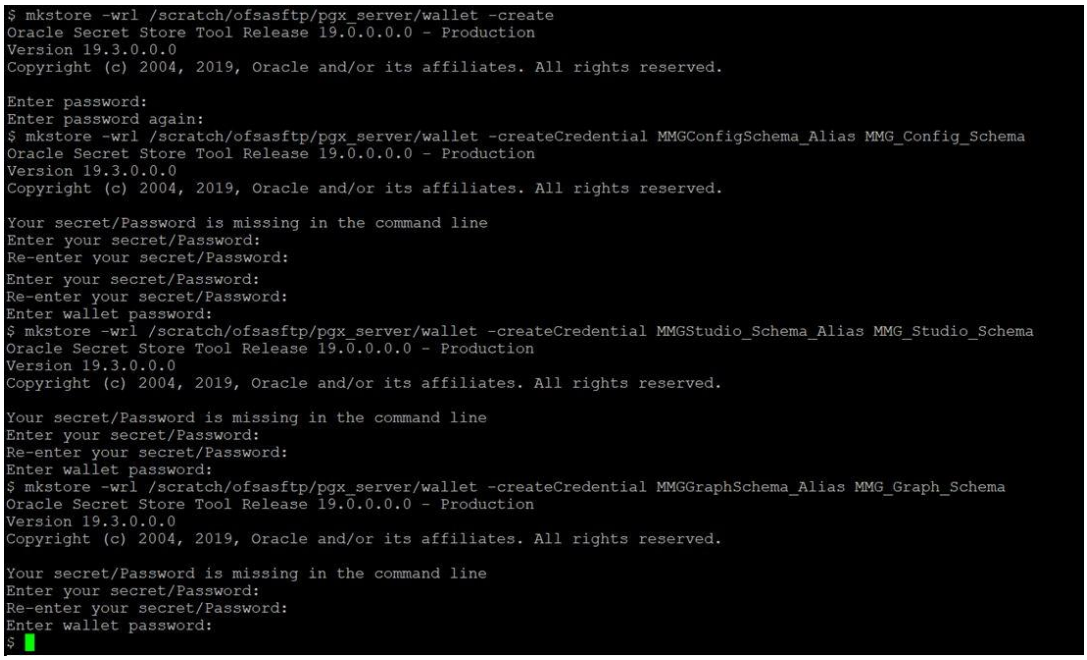
To create a wallet, follow these steps:

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

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

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

Figure 4-1 Wallet Creation



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

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

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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**.

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.

> **Note**
>
> In addition to creating wallet aliases for MMG Studio and Graph, you must also create wallet aliases for the production schemas; specifically, the config and atomic schemas. Ensure these aliases are added to the `tnsnames.ora` file.

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:

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

4.7.2 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.

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4.7.3 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>"
```


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5
Installation

This section provides detailed steps to install the application.

5.1 Prerequisites

The following are the prerequisites:

- Stress Testing and Scenario Analytics 8.1.2.8.0
- Oracle Financial Services Analytical Applications Infrastructure (OFS AAI) 8.1.2.5.0 Ensure the following mandatory patches are applied on AAI 8.1.2.5.0 before installing OFS STSA 8.1.2.8.0:

Table 5-1 OFS AAI 8.1.2.5.0 Mandatory Patches

Patch ID	Description
38345597	CONSOLIDATED PATCH FOR FIXES REQUIRED FOR EST 8125
37365030	CONSOLIDATED PATCH FOR EST ON PLATFORM 8125

Download and apply the above patches from My Oracle Support (MOS) before proceeding with the STSA installation.

- **Port Details**
  MMG Studio uses the following ports by default, hence, ensure that 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
```

5.2 Download the OFS STSA Installer Kit

To download the software as a .zip folder, download the mandatory minor release patch **39605264** from My Oracle Support (MOS).

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

5.3 Extract the Software

Ensure that you log 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 binary kit, unzip the `<os>.zip` kit, and copy the extracted files in binary mode to a directory that is included in your PATH variable.

   If you 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 this error message is displayed, then contact your UNIX Administrator:
   > `uncompress: not found [No such file or directory]`

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 STSA Application Pack installer archive file in the download directory with the following command:

   `unzip OFS_STSA_8.1.2.8.0_<OS>.zip`
   After unzipping the OFS_STSA_8.1.2..0 8folder, the following zip folders are available:

   - OFS_STSA_8.1.2.8.0_Release_Notes.html
   - STSA-installer.zip

   After unzipping the `stsa-installer.zip` folder, the following components are available:

   - STSABI
   - MMG
   - stsa-ui
   - stsa-ui-service
   - stsa-service
   - build-schema-creator
   - bin

   Navigate to the MMG folder and unzip the `OFS_MMG_26.2.0_LINUX.zip`. The OFS-MMG folder is available with the following files.

   - mmg-installer.zip
   - mmg-pgx.zip
   - OFSMMG_26.2.0_Readme.html

   Unzip the `mmg-installer.zip` for the following components:

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

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

```
chmod -R 750 OFS_STSA
```

5.4 Configure the config.sh file

To configure the `config.sh` file for installing the application, perform the following steps:

1. Log in to the server as a non-root user.
2. Navigate to the `<installation directory>/OFS_STSA/MMG/OFS_MMG/bin` directory.
3. Configure the following applicable `config.sh` attributes (click config_26.2.0.txt to view a sample of the file.) as tabulated in the following table:

> **Note**
>
> OFS MMG authenticates users by calling OFSAA over REST. You must ensure that the firewall or network rules allow outbound connectivity from the OFS MMG host or ports to the OFSAA host or ports that are used for authentication.

> **Note**
>
> DTP related parameters have been added in the `config.sh` file. To support these parameters, the `mmg-dtp` folder has been added and the `dtp-pipeline-logs` folder has been added that contains all the DTP pipeline related logs.

> **Note**
>
> Only tokens (classic) is supported. Fine grained is not yet supported.

> **Note**
>
> Ensure that `DATASTUDIO_ZPLN_SCHED_THREADPOOL_SIZE` is greater than `DATASTUDIO_SERVER_TOMCAT_THREADS_MAX+DATASTUDIO_SERVER_ASYNC_THREADPOOL_SIZE`

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> **Note**
>
> Gateway is enabled by default and the gateway port is mandatory to access gateway enabled UI.

Table 5-2 config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
Common Application Properties General settings for the application, logging, and context.			
##ENB_GRP_SYNC##	This is the Enable Group sync property. When this is set as `TRUE`, then whichever groups have been added in AAI/SAML for that particular user will automatically get reflected in OFS MMG when logged in via that user. If a user has created any group in the OFS MMG application and logs out and then logs in again , the new group that was added will get removed because `ENB_GRP_SYNC` was set as `TRUE`. This means that it will sync groups from AAI/SAML. If `ENB_GRP_SYNC` is set as `FALSE`, then if the user creates groups in the OFS MMG application, logs out and then logs back in, that group will not be removed.	NA	NA
##ENB_CSTM_GRP##	This is the Enable Custom Group. When this is set as `TRUE`, the user can create any custom groups in the OFS MMG application. This must not be deleted when the user logs out and logs back into the application by using that particular user.	NA	NA

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##APPLICATION_NAME##	Title of the application. If it is not replaced, then the default value is : **Model Management and Governance**.	YES	The defaults value is "Model Management and Governance." **Note:** Provide double quotes for the application name if it is long or contains spaces.
##APPLICATION_ID##	The id will be stored as app_id and must be the same as mentioned in the APP_ID column of MMG_PATCHES table. Currently the UI displays the MMG Version <version number of application> and last applied MMG version.	YES	The APPLICATION_ID should be without spaces.
##MMG_LOG_DIR##	A writable folder designated for storing application and MMG Studio logs.	YES	`/scratch/users/logs` **Note** Ensure that the log folder is created before installation.
##FTPSHARE_DIR##	This can be any writable folder accessible to the process owner.	YES	`/scratch/users/ftpshare` Ensure that the ftpshare folder is created before installation. This should be same as the metadata directory mentioned above.
##MMG_LOG_TIMEZONE##	Specifies the timezone used for displaying log timestamps	YES	GMT+05:30, GMT-04:00, Asia/Kolkata

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##WEB_CONTEXT##	Context path of the application. This parameter is also present in the `config.sh` file of the DTP feature. When `install.sh` is triggered from OFS MMG, then this parameter gets updated with the same values in the `config.sh` of the DTP feature.	YES	MMG
##RESTRICT_UNMAPPED_DATASTORES_ACCESS##	Restriction of users access to Data Stores from a workspace for unmapped datasources: If the value is set as True, then only the current workspace attached data stores will get a connection in the notebook sessions using get_conn(). This will only work if the session-mode in the application.yml is set to NOTEBOOK_USER. Only True/False is allowed.	YES	The default value is *False*.
##MMG_API_USERNAME##	API user for FCC Studio.	YES	**Note** If not applicable, enter NA
##MMG_SESSION_SECRET##	The password used to generate the Authorization header token to communicate with mmg-services.	YES	**Note** If not applicable, enter NA

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##MMG_UI_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`
##MMG_MODEL_PIPELINE_SANDBOX_DEFAULT_VIEW##	This controls the default UI view for the Model Pipeline Sandbox via `mmg.pipeline.sandbox-default-view`; effective values are `canvas` and `notebook`.	NO	The default is `canvas`. If this is not set or is invalid: `services/build-ui/bin/install.sh`changes the value to lowercases and forces it to `canvas` unless the value is exactly `notebook`.
SMTP host and port parameters for email notifications			
##EMAIL_SMTP_HOST##	Hostname of the SMTP server used for email notification service. This value will be populated in the **AAICL_SC_COMPONENT_DETAILS** table.	YES	Defaults to localhost. Provide SMTP server hostname is external mail server is used.
##EMAIL_SMTP_PORT##	Port number for the SMTP server used for email notification service. This value will be populated in the **AAICL_SC_COMPONENT_DETAILS** table.	YES	Defaults to 25. Update this if your SMTP service listens on a different port.
Database and Wallet Settings Configurations for database connections, wallets, and schemas.			
##MMG_DB_WALLET_PATH##	The wallet is the folder that contains the `sqlnet.ora`, `wallet.sso`, and `.p12` files.	YES	`/scratch/users/wallet`
##MMG_DB_TNS_ADMIN_PATH##	The folder that contains the `tnsnames.ora` file.	YES	`/scratch/users/tns`

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##MMG_DB_SCHEMA_WALLET_ALIAS##	The wallet alias name that is configured for the MMG application config schema. This parameter is also present in the `config.sh` file of the DTP feature. When `install.sh` is triggered from OFS MMG, then this parameter gets updated with the same values in the `config.sh` of the DTP feature.	YES	MMG CONFIG
##DATASTUDIO_SCHEMA_WALLET_ALIAS##	This is the Studio datas source wallet alias used to build the JDBC URL (`jdbc:oracle:thin:@<alias>`) for `services/mmg-studio/conf/application.yml` and to run the `DATASTUDIO_DATASOURCE_UPDATE` during install.		
##GRAPH_SCHEMA_WALLET_ALIAS##	Wallet alias created for the Graph Schema.	YES	NA
##GRAPH_SCHEMA_DB_SCHEMA_NAME##	Name of the Graph schema.	YES	NA
##GRAPH_DB_SERVER_NAME##	Name of the MMG Database Server.	YES	NA
##GRAPH_DB_PORT##	The port of the MMG database server.	YES	NA
##GRAPH_DB_SERVICE_NAME##	Name of the MMG Database Service.	YES	NA
Network and Port Configurations Hostnames, ports for services, interpreters, and components.			
##MMG_SERVICE_HOST##	Hostname on which the backend service (mmg-service) runs. Use the same hostname wherever applicable.	YES	HostIP or FQDN
##MMG_SERVICE_PORT##	Port on which the backend service (mmg-service) needs to be run.	YES	7002

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##MMG_UI_PORT##	Port on which the UI service (mmg-ui) needs to run.	YES	7001
##MMG_SCHEMA_CREATOR_PORT##	Port on which the Schema Creator service needs to run.	YES	7003
The following are the default ports 7008, 7009, 7012, -1. If needed, you can change the port numbers other than the default values.			
##DATASTUDIO_SERVER_PORT##	The port of the Data Studio server.	NO	The default value is 7008.
##DATASTUDIO_MARKDOWN_INTERPRETER_PORT##	The port of the Data Studio Markdown Interpreter.	NO	The default values are 7009, 7029.
##DATASTUDIO_PYTHON_INTERPRETER_PORT##	The port of the Data Studio Python Interpreter.	NO	The default values are 7012, 7032, 6012.
##DATASTUDIO_R_INTERPRETER_PORT##	The port that is assigned to the Data Studio R remote interpreter server; used in Studio startup/ shutdown scripts and is written into `r.json`.	NO	The default value is `-1` and is mapped in `bin/initialize-install.sh`. If this has not been set, then R interpreter stays disabled (`-1`).
##DATASTUDIO_JDBC_INTERPRETER_PORT##	The port of the Data Studio JDBC Interpreter.	NO	The default values are 7011, 7031.
##DATASTUDIO_PYTHON_INTERPRETER_REST_SERVER_PORT##	The port of the Data Studio Python Interpreter Rest server.	NO	The default value is 6012
##DATASTUDIO_PGX_PYTHON_INTERPRETER_REST_SERVER_PORT##	The port of the Data Studio PGX Python Interpreter Rest server.	NO	The default value is 6022
##DATASTUDIO_THRIFT_EVENT_HANDLER_PORT##	The port of the Data Studio Thrift Event handler.	NO	The default value is 8432
##DATASTUDIO_PGX_INTERPRETER_PORT##	The port of the Data Studio PGX Interpreter.	NO	The default value is 7022.

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##DATASTUDIO_SPARK_INTERPRETER_PORT ##	This is the port that is assigned to the Data Studio Spark remote interpreter server. This is used in the Studio startup/shutdown scripts and written into `spark.json`.	NO	The default value is `-1` and is mapped in `bin/initialize-install.sh`. If this has not been set then the Spark interpreter stays disabled (`-1`); `services/mmg-studio/bin/install.sh` also forces `-1` when Spark is disabled.
##MMG_COHERENCE_CLUSTER_PORT##	This is the port where the Coherence Cluster for the Notification service runs. By default, this value is 7574.	YES	NA
##MMG_GATEWAY_PORT##	Specifies the port on which the MMG Gateway will run. This parameter is also present in the `config.sh` file of the DTP feature. When `install.sh` is triggered from OFS MMG, then this parameter gets updated with the same values in the `config.sh` of the DTP feature.	YES	NA
##GRAPH_SERVICE_PORT##	Graph Service Port	YES	By default, it is set as 7059. You should not modify the Graph Service Port if graphs are already created and executed.
##GRAPH_SERVICE_CACHE_SERVER_PORT##	This is the port injected into the load-to-graph `graph-service` configuration as `##GRAPH_SERVICE_CACHE_SERVER_PORT##`; appears to control the graph service cache server listener.	NA	If this is not set, then, no MMG-side defaulting logic was found. The downstream `graph-service config/install` behavior would determine the outcome.
##DATAPIPELINE_SERVICE_PORT1##	The port where the pipeline service resides.	YES	By default, it is set as 18005.

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##DATAPIPELINE_SERVICE_PORT2##	The port where the data pipeline service resides.	YES	By default, it is set as 18006.
##DATAPIPELINE_METADATA_IMPORT_SERVICE_PORT##	Meta data import service port.	YES	By default, it is set as 18007.
##DATAPIPELINE_GATEWAY_SERVICE_PORT##	Data pipeline gateway service port.	YES	NA
##DATAPIPELINE_PIPELINE_UI_SERVICE_PORT##	Pipeline UI service port.	YES	NA
##DATAPIPELINE_DATA_PIPELINE_UI_SERVICE_PORT##	Data pipeline UI service port	YES	NA
##DATAPIPELINE_HAZELCAST_PORT##	This is the hazelcast port injected into the pipeline installation config as `PPS_HAZELCAST_PORT` and is used by the pipeline stack for Hazelcast clustering/ discovery.	NA	If this is not set, then, no defaulting logic was found in the MMG installer scripts. The downstream pipeline install/runtime behavior would determine a failure.
SSL and Security Settings Settings for SSL, keystores, and security credentials.			
##MMG_SSL_ENABLED##	This enables HTTPS.	YES	Example: `true`
##SSL_KEYSTORE_PATH##	Absolute path for the keystore file. **Note** Run the following command to create a keystore: keytool -genkey -v -alias demoalias -keyalg RSA -keysize 2048 -keystore server.keystore -validity 3650 -keypass secret -storepass secret -storetype PKCS12	YES	../conf/server.keystore. Include the file name in the path. If ##MMG_SSL_ENABLED## is set to false, then you must configure the 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.

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##SSL_KEYSTORE_PASSWORD##	Keystore secret The value passed in the aforementioned command for -keypass	YES	Example: secret
##SSL_KEYSTORE_TYPE##	Keystore type The value passed in the aforementioned command for -storetype. Can be either JKS or PKCS12	YES	Example: PKCS12
##SSL_CERT_ALIAS##	Keystore alias The value passed in the aforementioned command for -alias.	YES	Example: demoalias
##GRAPH_KEYSTORE_PASSWORD##	Graph Keystore Password.	YES	Password
##AUTH_MMG_KEYS_DIR##	Indicates public and private key location.	YES	Example:< MMG Installation Path> / OFS_MMG/conf
Authentication and Authorization Configurations for authentication types, SAML, LDAP, AAI, and sessions.			
##MMG_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.
##MMG_SERVICE_AUTH_TYPE##	Auth Type on which the backend service (mmg-service) runs.	YES	It defaults to public.
##DATASTUDIO_AUTH_TYPE##	• FCC_SSO – for SAMLRealm based authentication in FCC Studio • MMG_AAI- AAI based authentication for MMG Studio	YES	Can be either MMG_AAI or FCC_SSO

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##DATASTUDIO_SHOW_LOGIN##	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.
##DATASTUDIO_SESSION_MODE##	Can be either NOTEBOOK or NOTEBOOK_USER.	YES	If not set, it defaults to NOTEBOOK_USER.
##DATASTUDIO_AUTH_REALM##	Can be either OFSAARealm or saml.OFSAASamlRealm	YES	OFSAARealm – the default realm for studio auth type FCC_AAI, MMG_AAI. .auth.saml.OFSAASamlRealm – for SAML specific studio authentication
##DATASTUDIO_AAI_URL##	AAI login IDM Service URL. This is applicable only if ## DATASTUDIO_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.
##DATASTUDIO_API_USERNAMES##	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
##DATASTUDIO_VALID_ROLES_LIST##	MDLUSR,MDLREV,MDLAPPR The comma separated values for Studio-related roles in USER-ROLE mapping.	YES	MDLBATCHUSR, DSUSRGRP, DSREDACTGRP
AAI Authorization Applicable for SAML/LDAP profiles.			
##IS_USER_AUTHZ_FROM_AAI##	This is disabled and is set to *False* by default. Set IS_USER_AUTHZ_FROM_AAI to *True* to enable.	YES	

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##AUTH_AAI_AUTH_URL##	Base URL of the AAI instance. Will be used for ##UI_AUTH_TYPE## = aai If the target AAI is https, then it is necessary to import the AAI host certificate into the MMG server Java keystore.	YES	http(s)://whfxxxxx.in.oracle.com:7110/mmg
##AUTH_AAI_OAUTH_CLIENT_ID##	This is an instance name generated via the sysadmn in the OFSAA Application to which the aai_auth_url is pointing to. Create this in the OFSAA application in the location where you had configured the AAI Auth URL. a. Login as sysadmn in OFSAA b. From **System Configuration**, navigate to **Configure Instance Access Token** c. Add a new access token.	YES	
##AUTH_AAI_OAUTH_CLIENT_SECRET##	This is an instant access token.	YES	
##AUTH_AAI_COOKIE_DOMAIN##	The domain of the server.	YES	Example: in.xyz.com
SAML Configurations			
##AUTH_SAML_IDP_URL##	This is the endpoint on the IDP side where SAML requests are posted. The Service Provider (SP) needs to obtain this information from the Identity Provider (IDP).	Yes	http(s)://idcs-xxxx.com/fed/v1/idp/sso This is used only if ##MMG_UI_AUTH_TYPE## is SAML.
##AUTH_SAML_SP_ENTITY_URL##	Enter a globally unique name for SAML entity. It typically takes the URL of an identity provider or a service provider as a value.		http(s)://<UI_HOST>:<MMG_UI_PORT>/mmg This is used only if ##MMG_UI_AUTH_TYPE## is SAML.

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##AUTH_SAML_ACS_URL##	UI Landing Page URL.	YES	http(s)://<UI_HOST>:<MMG_UI_PORT>/mmg/home This is used only if ##MMG_UI_AUTH_TYPE## is SAML.
##AUTH_SAML_LOGOUT_URL##	Initiated SAML Single Logout URL.	Yes	http(s)://idcs-xxxx.com/sso/v1/user/logout This is used only if ##MMG_UI_AUTH_TYPE## is SAML.
##AUTH_SAML_SIGN_AUTHN_REQ##	NA	Yes	NA
##AUTH_SAML_SP_KEY_PATH##	NA	NA	/scratch/mmg8131/config/sp-privatekey.pem
##AUTH_SAML_SP_X509_CERT_PATH##	NA	NA	/scratch/mmg8131/config/sp-certificate.cer

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##AUTH_SAML_SIGN_ALGORITHM##	Specifies the XML Digital Signature algorithm URI to be used for signing SAML assertions/requests. The accepted values are: • `http://www.w3.org/2001/04/xmldsig-more#rsa-sha512` • `http://www.w3.org/2001/04/xmldsig-more#rsa-sha384` • `http://www.w3.org/2001/04/xmldsig-more#rsa-sha256` • `http://www.w3.org/2000/09/xmldsig#rsa-sha1` **Note** Configure this value to match the signing algorithm supported/ required by your Identity Provider (IdP).	NA	##AUTH_SAML_SIGN_ALGORITHM##
##AUTH_SAML_BINDING_TYPE##	This can be set to REDIRECT (default) / POST.	NA	NA
##AUTH_SAML_INCLUDE_SP_CERT##	This can be set to True/ False (default).	NA	NA
##AUTH_SAML_DS_ISSUER##	The SAML entity ID (Studio URL) configured in the IDP.	YES	https://<hostname>.xyz.com:7008

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##AUTH_SAML_DS_DESTINATION##	The SAML IDP URL that the Identity Provider provides after creating the SAML application.	YES	https://idcs-xyzgvh.com/fed/v1/idp/sso
##AUTH_SAML_DS_ASSERTION_CONSUMER_URL##	The SAML Consume URL (Studio/URL/saml/consume) that is configured in IDP.	YES	https://<hostname>.xyz.com:7008/saml/consume
##AUTH_SAML_DS_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
##AUTH_SAML_DS_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
##AUTH_SAML_DS_COOKIE_DOMAIN##	Domain of the server.	YES	Example: in.xyz.com
LDAP Configurations			
##AUTH_LDAP_URL##	LDAP URL Will be used for ##MMG_UI_AUTH_TYPE## = LDAP	YES	ldap://whf00xyz:3060/
##AUTH_LDAP_SEARCH_BASE_DN##	LDAP Search Base Will be used for ##MMG_UI_AUTH_TYPE## = LDAP	YES	"cn=Users,dc=oracle,dc=com"
##AUTH_LDAP_USER_FILTER##	LDAP User Filter Will be used for ##MMG_UI_AUTH_TYPE## = LDAP	YES	"cn={0}"
##AUTH_LDAP_USER_SEARCH_FILTER##	LDAP User Search Filter Will be used for ##MMG_UI_AUTH_TYPE## = LDAP	YES	NA

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##AUTH_LDAP_GROUP_FILTER##	LDAP Group Search Filter Will be used for ##MMG_UI_AUTH_TYPE## = LDAP	YES	NA
##AUTH_LDAP_GROUP_BASE_DN##	LDAP Group Search Base Will be used for ##MMG_UI_AUTH_TYPE## = LDAP	YES	NA
##AUTH_LDAP_GROUP_MEMBER_ATTR##	LDAP Group Member Will be used for ##MMG_UI_AUTH_TYPE## = LDAP	YES	NA
Cookie Settings			
##DATASTUDIO_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.
##DATASTUDIO_SERVER_COOKIE_NAME##	The name for the cookie.	YES	If not set it will default to ORA_OLDS_SESSION
##DATASTUDIO_SERVER_COOKIE_TIMEOUT##	Timeout/expiry duration in seconds.	YES	If not set, it defaults to 999999
##DATASTUDIO_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.
HTTP and Connection Pooling Settings for HTTP clients and datasource connection pools.			

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##MMG_HTTP_CLIENT_MAX_CONN##	The maximum number of connections allowed across all routes.	YES	The default value is 200. Set this to any one of the following values: • **Low concurrency (10 users) + Normal usage (low cpu):** 50 • **Low concurrency (10 users)+High usage (time intensive):** 100 • **High concurrency (50 users) + Normal usage (low cpu):** 200
##MMG_HTTP_CLIENT_MAX_CONN_PER_ROUTE##	The maximum number of HTTP connections allowed for a route.	YES	It defaults to 100. • **Low concurrency (10 users) + Normal usage (low cpu):** 40 • **Low concurrency (10 users)+High usage (time intensive):** 50 • **High concurrency (50 users) + Normal usage (low cpu):** 100
##MMG_HTTP_CLIENT_CONN_TIMEOUT_MS##	The connection timeout for HTTP connection. A timeout value of 0 specifies an infinite timeout.	YES	The default value is 30000.
##MMG_HTTP_CLIENT_READ_TIMEOUT_MS##	The socket read timeout for HTTP connection. A timeout value of 0 specifies an infinite timeout.	YES	The default value is 120000.
##MMG_CONFIG_DATASOURCE_MAX_POOL_SIZE##	Maximum connection pool size allowed for Config Datasource.	YES	The default value is 80. You can set this to any one of the following values: • **Low concurrency (10 users) + Normal usage (low cpu):** 16 • **Low concurrency (10 users)+High usage (time intensive):** 80 • **High concurrency (50 users) + Normal usage (low cpu):** 80

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##MMG_CONFIG_DATASOURCE_MIN_IDLE##	Hikari minimum idle is a configuration property for the HikariCP database connection pool that sets the minimum number of idle connections the pool should maintain. Its default value is 10, and it ensures that there are always a certain number of connections ready for use, which helps reduce latency when new requests arrive. If the number of idle connections falls below this value, HikariCP will quickly create new ones to restore the desired minimum.	YES	
##MMG_CONFIG_DATASOURCE_IDLE_TIMEOUT_MS##	Idle timeout for config Datasource.	YES	It defaults to 30000. You can edit it if required.
##MMG_CONFIG_DATASOURCE_CONN_TIMEOUT_MS##	Connection timeout for Config Datasource.	YES	It defaults to 80000. You can edit it if required.
##MMG_EXT_DATASOURCE_MAX_POOL_SIZE##	Maximum connection pool size allowed for meta/data schemas.	YES	It defaults to 10. You can edit it if required.
##MMG_EXT_DATASOURCE_MIN_IDLE##	Hikari minimum idle is a configuration property for the HikariCP database connection pool that sets the minimum number of idle connections the pool should maintain. Its default value is 10, and it ensures that there are always a certain number of connections ready for use, which helps reduce latency when new requests arrive. If the number of idle connections falls below this value, HikariCP will quickly create new ones to restore the desired minimum.	YES	

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##MMG_EXT_DATASOURCE_IDLE_TIMEOUT_MS##	Idle timeout for meta/data schemas.	YES	It defaults to 30000. You can edit it if required.
##MMG_EXT_DATASOURCE_CONN_TIMEOUT_MS##	Connection timeout for meta/data schemas.	YES	It defaults to 80000. You can edit it if required.
Data Studio Hikari Pool			
##DATASTUDIO_HIKARI_MAXPOOLSIZE##	This setting controls the maximum number of database connections that can be maintained by the HikariCP connection pool in the Data Studio server. When the system needs to interact with a database (for data fetching, report generation, etc.), it requests a connection from the pool.	YES	The default value is 650. Set this to any one of the following values:
##DATASTUDIO_HIKARI_CONN_TIMEOUT_MS##	This setting controls the maximum time (in milliseconds) that the HikariCP connection pool will wait for an available database connection. If no connection is available within that time frame, it will throw an error.	YES	NA
##DATASTUDIO_HIKARI_MINIMUM_IDLE##	This determines the minimum number of idle connections HikariCP will maintain in the connection pool at all times. Even if there are no active requests for database connections, HikariCP will ensure that at least this number of idle connections remain open, ready to be used.	YES	NA

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##DATASTUDIO_HIKARI_MAX_LIFE_TIME##	This controls the maximum duration a connection can stay open before being closed and replaced by a new one. This helps prevent issues like stale connections or long-lived, problematic connections that could lead to database issues or degrade performance over time. (Not a mandatory parameter)	NA	
External Schema Connection Pooling			
##GRAPH_EXT_SCHEMA_ENABLE_CP##	Enables/disables the external schema connection pooling for the graph-service load-to-graph configuration (`EXT_SCHEMA_ENABLE_CP`).	NA	If this has not been set, then, no MMG-side default was found. The generated graph-service config receives whatever value is provided, so the downstream behavior depends on the graph-service defaults/ validation.
##GRAPH_EXT_SCHEMA_CP_MAX_IDLE##	The maximum number of idle connections allowed in the graph-service external schema connection pool (`EXT_SCHEMA_CP_MAX_IDLE`).	NA	If this is not set, then, no MMG-side defaulting logic was found. The downstream graph-service pooling configuration determines the effective behavior.
##GRAPH_EXT_SCHEMA_CP_MIN_IDLE##	Minimum number of idle connections to be retained in the graph-service external schema connection pool (`EXT_SCHEMA_CP_MIN_IDLE`).	NA	If this is not set, then, no MMG-side defaulting logic was found. The downstream graph-service pooling configuration determines the effective behavior.
##GRAPH_EXT_SCHEMA_CP_INITIAL_SIZE##	Initial size of the graph-service external schema connection pool (`EXT_SCHEMA_CP_INITIAL_SIZE`).	NA	If this is not set, then, no MMG-side defaulting logic was found. The downstream graph-service pooling configuration determines the effective behavior.

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##GRAPH_EXT_SCHEMA_CP_MAX_TOTAL##	Maximum total connections allowed in the graph-service external schema connection pool (EXT_SCHEMA_CP_MAX_TOTAL).	NA	If this is not set, then, no MMG-side defaulting logic was found; downstream graph-service pooling configuration determines effective behavior.
##GRAPH_EXT_SCHEMA_CP_MAX_WAIT_MILLIS##	Maximum time in milliseconds that graph-service waits for an external schema pooled connection (EXT_SCHEMA_CP_MAX_WAIT_MILLIS).	NA	If this is not set, then, no MMG-side defaulting logic was found; downstream graph-service pooling configuration determines effective behavior.
##GRAPH_EXT_SCHEMA_CP_MIN_EVICTABLE_IDLE_TIME##	Minimum idle time before a connection in the graph-service external schema pool becomes eligible for eviction (EXT_SCHEMA_CP_MIN_EVICTABLE_IDLE_TIME).	NA	If this is not set, then, no MMG-side defaulting logic was found. The downstream graph-service pooling configuration determines the effective behavior.
##GRAPH_EXT_SCHEMA_CP_SOFT_MIN_EVICTABLE_IDLE_TIME##	Soft minimum idle time before graph-service may evict connections from the external schema pool while still trying to keep the configured minimum idle count (EXT_SCHEMA_CP_SOFT_MIN_EVICTABLE_IDLE_TIME).	NA	If this is not set, then, no MMG-side defaulting logic was found; downstream graph-service pooling configuration determines effective behavior.
Graph HikariCP Configuration Placeholders			
##GRAPH_HIKARI_CP_MIN_IDLE##	Defines the minimum number of idle connections that HikariCP maintains in the pool.	YES	
##GRAPH_HIKARI_CP_MAX_POOL_SIZE##	Specifies the maximum number of total connections (active + idle) allowed in the pool.	YES	
##GRAPH_HIKARI_CP_IDLE_TIMEOUT##	Sets the maximum time a connection can remain idle before being removed from the pool.	YES	

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##GRAPH_HIKARI_CP_MAX_LIFETIME##	Determines the maximum lifetime of a connection before it is retired and replaced.	YES	
##GRAPH_HIKARI_CP_TIMEOUT##	Defines how long HikariCP waits for a connection from the pool before timing out.	YES	
Data Studio Specific Settings Configurations specific to Data Studio, including interpreters and logging. 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.			
##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.
##DATASTUDIO_LOG_LEVEL##	Logging level for logs.	YES	info, warn, debug or error logs
##DATASTUDIO_PYTHON_BINARY##	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
##MMG_PYTHON_INTERPRETER_LIST##	A comma separated value without whitespaces that specifies python interpreter python,fcc-ml4aml	YES	If not set, it defaults to python.

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##DATASTUDIO_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 **DATASTUDIO_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.
##DATASTUDIO_R_PYTHON_BINARY##	Python binary/directory used by the Data Studio R interpreter (`R_PYTHON_HOME` / `plainr.json` "Python directory").	NO	If not set, then, no explicit defaulting logic was found. The generated R interpreter config receives the provided value or placeholder, and R interpreter behavior depends on the Studio/R setup.
Spark and R Configurations Settings for Spark integration and R support.			
##DATASTUDIO_SPARK_ENABLED##	Enables or disables the Spark support for Data Studio and is mapped to the legacy `MMG_SPARK_ENABLED`.	NO	The default value is `false` when not explicitly set to `true` in `bin/initialize-install.sh`. If this has not been set then it is normalized to `false`, and `services/mmg-studio/bin/install.sh` disables the Spark interpreter by forcing `DATASTUDIO_SPARK_INTERPRETER_PORT=-1`.
##DATASTUDIO_SPARK_HOME##	Absolute path of Apache Spark Library.	NO	NA

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##DATASTUDIO_HADOOP_HOME##	The hadoop home directory that are passed into the Studio startup/install scripts for Spark-related runtime configuration.	NO	If this is not set, then, no explicit defaulting logic was found. Spark-related runtime behavior depends on how Studio/Spark is configured.
##DATASTUDIO_SPARK_MASTER##	The spark master URL/ mode that is written into the Studio Spark interpreter configuration (spark.json).	NO	If this is not set, then, no explicit default was found. `services/mmg-studio/bin/install.sh` has special handling only for `SPARK_DEPLOY_MODE` when master starts with `local`; otherwise Spark config uses the provided value.
##DATASTUDIO_SPARK_DEPLOY_MODE##	Spark deploy mode written into the Studio Spark interpreter configuration (`spark.json`), e.g. client/cluster depending on the Spark setup.	NO	No explicit defaultexists. If `SPARK_MASTER` starts with local and deploy mode is still the placeholder, then, `services/mmg-studio/bin/install.sh` clears it to an empty value.
External Services and URLs URLs and paths for external services, pipelines, and components.			
##CS_AUTH_SERVICE_URL##	The AUTH service URL that is activated after the fccstudio.sh file runs.	NO	Example: https://<hostname>:7041/authservice
##CS_META_SERVICE_URL##	The metaservice URL that is activated after the fccstudio.sh file runs.	NO	Example: https://<hostname>:7045/metaservice
##CS_ER_SERVICE_URL##	Used for the entity resolution service.	NO	Example: https://<hostname>:<port>
##CS_BATCH_SERVICE_URL##	Used for the batch service.	NO	Example: https://<hostname>:<port>/batchservice
##CS_TEMPLATE_CONFIG_PATH##	Configuration path of the Template.	NO	NA
##CS_TEMPLATE_DEFAULT_LINK##	Default link of the template.	NO	NA
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			
##CS_MATCHRULE_BASE_URL##	The host and port where the match rule service resides.	NO	http(s)://abc.in.xyz.com:7051

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##CS_LOADGRAPH_BASE_URL##	The host and port where the load graph service resides.	YES	http(s)://abc.in.xyz.com:7059/graph-service
##CS_MATCHSRVC_UI_URL##	Matching Service UI resource path.	NO	NA
URLS for index service. Leave as it is if not applicable. Will impact the pipeline that could be added to a graph			
##GRAPH_INDEX_BASE_URL##	Indicates the Graph Index resource path.	NO	http(s)://<hostname>xyz.com:7053/load-to-elastic-search
##GRAPH_LOAD_INDEX_UI_URL##	Indicates the Graph Load Index UI resource path.	NO	NA
##GRAPH_MATCHING_MECHANISM##	Indicates the matching mechanism for Entity Resolution and Graph Enter the value that is used for matching mechanism for Entity Resolution and Graph. The options are OS, and OT. Where OS refers to OpenSearch 2.7.0, and OT refers to Candidate Selection with Oracle Text matching. By default, the value of the parameter is OT. For GRAPH_MATCHING_MECHANISM = OT, no additional installation or configuration is required as it is part of the Oracle Database. **NOTE:** This is applicable for Compliance Studio.	NO	NA
##GRAPH_CANDIDATE_SELECTION_SERVICE_URL##	Enable this service for Entity Resolution and Graph use cases when GRAPH_MATCHING_MECHANISM is set to OT. **NOTE:** This is applicable for Compliance Studio.	NO	NA

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##GRAPH_LOAD_TO_OS_URL##	Provide the URL for Entity Resolution and Graph use cases when GRAPH_MATCHING_MECHANISM is set to OT. **NOTE:** This is applicable for Compliance Studio.	NO	NA
##EST_ENABLED##	Only used when EST application is integrated with MMG.	YES	The default value is FALSE.
##EST_UI_URL##	The URL of EST application. This is set based on ##EST_ENABLED## property.	NO	NA
##EST_SERVICE_URL##	The Base URL to STSA Backend Application	YES	<HOST_NAME>:<EST_SERVICE_SERVER_PORT>/<EST_SERVER_SERVLET_CONTEXT_PATH>
##DATACATALOG_SERVICE_URL##	Only used when EST application is integrated with MMG.	NO	NA
##DATAPIPELINE_METADATA_ARCHIVE_PATH##	The dump path for the pipeline service.	YES	/OFS_MMG/mmg-pipeline/pipeline/pipeline-service-x.x.x.x.x.
Graph and Advanced Features Configurations for graph services, memory limits, and paths.			
##GRAPH_INSTALLATION_PATH##	The installation path of the Graph.	YES	<MMG Installation Path>/ OFS_MMG/mmg-load-to-graph/graph-service
##PGX_SERVER_URLS##	Indicates the pgx server resource path. Skip this if not installing pgx.	YES	http(s)://<hostname>.xyz.com:<pgx port>/<pgx context name>
##GRAPH_MAX_TOTAL_SHARED_DATA_MEMORY_SIZE##	Maximum total shared data memory size.	YES	Edit if required; default value is 20 GB.
##GRAPH_MAX_TOTAL_PRIVATE_DATA_MEMORY_SIZE##	Maximum total private data memory size.	YES	Edit if required; default value is 8 GB.
##GRAPH_MAX_PER_SESSION_DATA_MEMORY_SIZE##	Maximum per session data memory size.	YES	Edit if required; default value is 700 MB.
##GRAPH_MAX_DATA_MEMORY_SIZE_DSUSRGRP##	Maximum data memory size allowed for DSUSRGRP.	YES	Edit if required; default value is 10 GB.

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##GRAPH_MAX_DATA_MEMORY_SIZE_DSBATCH##	Maximum data memory size allowed for DSBATCH.	YES	Edit if required; default value is 10 GB.
##GRAPH_MAX_DATA_MEMORY_SIZE_DSINTER##	Maximum data memory size allowed for DSINTER.	YES	Edit if required; default value is 5 GB.
##GRAPH_MAX_DATA_MEMORY_SIZE_DSAPPROVER##	Maximum data memory size allowed for DSAPPROVER.	YES	Edit if required; default value is 5 GB.
##GRAPH_MAX_DATA_MEMORY_SIZE_DSUSER##	Maximum data memory size allowed for DSUSER.	YES	Edit if required; default value is 5 GB.
##GRAPH_MAX_DATA_MEMORY_SIZE_IHUSRGRP##	Maximum data memory size allowed for IHUSRGRP.	YES	Edit if required.
##GRAPH_DOCUMENT_DOWNLOAD_PATH##	Filesystem path injected into graph-service config as `DOCUMENT_DOWNLOAD_PATH`. This appears to be where the graph-related document downloads are stored/read.	NA	If this is not set, then, no MMG-side defaulting logic was found. The downstream graph-service behavior determines whether document download features fail.
Graph Proxy Configurations			
##GRAPH_NO_PROXY##	Proxy bypass list injected into graph-service config as `NO_PROXY`. This is used so that graph-related outbound calls can skip an HTTP proxy for specified hosts/domains.	NA	If this is not set, then, no MMG-side defaulting logic was found. The graph-service/runtime proxy behavior falls back to its own environment or defaults.
GIT and Proxy Configurations Properties for enabling git based import and export of model pipelines set username and PAT(personal access token) to access private remote repositories set proxy url and port if you are behind a firewall			

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##GIT_ENV_ID##	This variable represents the environment in which your GIT operations or deployments are being performed. Common environment names include dev (development), QA (quality assurance), SIT (system integration testing), PROD (production), and so on. It helps you to understand with which branch you need to work.	NA	##GIT_ENV_ID## A new group GIT ADMIN is created which is mapped to GIT_ADV role which is mapped to below functions. Kindly map the above group to the user to access the required GIT functionality: • GITVIEW • GITPUSH • GITPULL
##GIT_USERNAME##	This is your GitHub username.	NA	##GIT_USERNAME##
##GIT_PAT_SECRET##	This variable stores your GitHub Personal Access Token (PAT). A PAT is a secret token used for authenticating API requests or GIT operations over HTTPS instead of a password.	NA	##GIT_PAT_SECRET##
##GIT_PROXY_URL##	If your environment requires you to access external resources like GitHub through a proxy server, this variable defines the proxy server's hostname or IP Address.	NA	##GIT_PROXY_URL##
##GIT_PROXY_PORT##	This defines the port number on which the proxy server listens. It works together with GIT_PROXY_URL to route your Git traffic through the proxy.	NA	##GIT_PROXY_PORT##
Performance Tuning and Miscellaneous Performance parameters, timeouts, and optional features.			
##MMG_CSP_FRAME_ANCESTORS##	Configure this attribute to all or the AAI origin when MMG has to be embedded from AAI. By default, MMG pages cannot be embedded if Gateway is enabled. This is to prevent CLickjacking vulnerability.	YES	NA

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##DATASTUDIO_CSP_FRAME_ANCESTORS##	If the Gateway is enabled, this property can be set to control the pages where Data Studio can be embedded: • Set to '*' to allow embedding from any origin (less secure). • Set to a comma-separated list of origins to allow embedding from those specified origins and from the same origin. **Note** When specifying multiple origins for **DATASTUDIO_CSP_FRAME_ANCESTORS**, provide a comma-separated list with no spaces. Spaces after commas may be interpreted as part of the value and can result in incorrect CSP directives being generated in `application.yml`.	YES	NA

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
	For Example: **Working**: export DATASTUDIO_CSP_FRAME_ANCESTORS= [https://localhost.com,https://localhost2.com,https://localhost3.com| https://localhost.com,https// localhost2.com,https://localhost3.com] or export DATASTUDIO_CSP_FRAME_ANCESTORS='[https://localhost.com,https://localhost2.com,https://localhost2.com | https://localhost.com,https// localhost2.com,https://localhost2.com]' **Not supported (You must not include spaces after commas)**: export DATASTUDIO_CSP_FRAME_ANCESTORS='[https://localhost.com | https://localhost.com/], [https://localhost2.com | https://localhost2.com/],		

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
	[https://localhost3.com | https://localhost3.com/]' By default, this is set to MMG Gateway URL.		
##MMG_MODEL_ENDPOINT_RESTART_INTERVAL##	This is a fixed-rate interval, in milliseconds, for periodically restarting model endpoint servers (`ENDPOINT_RESTART_INTERVAL`).	NO	The default value is `43200000` milliseconds (12 hours). If this is not set / blank / non-numeric, then, `services/mmg-service/bin/install.sh` resets it to `43200000`. `ModelCatalogRestService` uses it in `@Scheduled(fixedRateString ="${ENDPOINT_RESTART_INTERVAL}")`.
##DATASTUDIO_JOBS_INCOMPLETE_TIMEOUT##	You can configure how often a cleanup job will be run to mark unfinished jobs as incomplete by setting studio-server.jobs.incomplete.scheduled-cleanup-delay value. A job can be in incomplete state if the server restarts in the middle of a Job execution or if it takes longer the specified timeout (studio-server.jobs.incomplete.timeout).	Yes	NA
##DATASTUDIO_JOBS_INCOMPLETE_SCHEDULED_CLEANUP_DELAY##	You can configure how often a cleanup job will be run to mark unfinished jobs as incomplete by setting studio-server.jobs.incomplete.scheduled-cleanup-delay value. A job can be in incomplete state if the server restarts in the middle of a Job execution or if it takes longer the specified timeout (studio-server.jobs.incomplete.timeout).	Yes	NA

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##DATASTUDIO_SECURITY_SESSION_TIMEOUT_MS##	You can configure user login sessions to be renewed by activity. The number specifies the amount of milliseconds a user session will be renewed after activity. When there is no user-activity within the specified relative timeout, the session expires and is no longer valid. Here activity means edit of paragraph content, addition or deletion of paragraph, execution of paragraph, etc.	Yes	43200000
##DATASTUDIO_SECURITY_ABSOLUTE_SESSION_TIMEOUT_MS##	You can configure user login sessions to be logged out automatically after a set amount of time. The number specifies the amount of milliseconds to pass after a session is created. When the timeout expires, the session is no longer valid Here login means when the user logs in to the Compliance Studio. When a user session ends, all associate executions will also be killed.	Yes	It is recommended to set this. A value of 0 means that the sessions will never time out. Users can set this to 86400000 to set a timeout of 24 hours or it can be set to 234000000 to set a timeout of 65 hours, in case the jobs are needed to be run the entire weekend.
##DATASTUDIO_INTERPRETER_EXECUTION_RUN_TIMEOUT##	You can configure to automatically cancel a paragraph execution after a set amount of time. When the timeout expires, Data Studio will automatically interrupt the execution of the paragraph.	Yes	NA

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##DATASTUDIO_INTERPRETER_IDLE_SESSION_TIMEOUT##	The amount of time an interpreter session can stay idle before getting invalidated by the application to free resources. An interpreter session is considered idle while it isn't running any tasks. Example values are: 1h (one hour), or use ISO 8601 duration format for more complex values like PT2H30M (2h30m).	NA	
##DATASTUDIO_INTERPRETER_CLEANUP_ENABLED##	Idle sessions will never get invalidated if cleanup is not enabled by the additional settings described below, or when the idle-session-timeout value is set to 0.	Yes	False
##DATASTUDIO_INTERPRETER_CLEANUP_CRON##	Refers to a scheduled cleanup task for an interpreter (such as the one that executes reports or queries) within a system like Data Studio, which helps optimize system performance by clearing out temporary or unused data at regular intervals.	Yes	
##DATASTUDIO_SERVER_ASYNC_THREADPOOL_SIZE##	This is a configuration parameter for controlling the number of concurrent threads allocated to handle asynchronous tasks (like data processing, report rendering, etc.) on a Data Studio (or similar) server. It helps manage system performance, especially when many users are interacting with the system or large amounts of data need to be processed.	Yes	The default value is 128. Set this to any one of the following values: • **Low concurrency (10 users) + Normal usage (low cpu):** 32 • **Low concurrency (10 users)+High usage (time intensive):** 128 • **High concurrency (50 users) + Normal usage (low cpu):** 128

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##DATASTUDIO_SERVER_SCHED_THREADPOOL_SIZE##	This is a setting that controls the number of concurrent threads available for executing scheduled tasks on the Data Studio server. By adjusting this, you can manage how many tasks, such as data refreshes or scheduled reports, can be processed in parallel.	Yes	The default value is 128. Set this to any one of the following values: • **Low concurrency (10 users) + Normal usage (low cpu):** 32 • **Low concurrency (10 users)+High usage (time intensive):** 128 • **High concurrency (50 users) + Normal usage (low cpu):** 128
##DATASTUDIO_SERVER_TOMCAT_THREADS_MAX##	This controls the maximum number of concurrent threads that the Tomcat server can use to process incoming requests.	Yes	Set this to any one of the following values: • **Low concurrency (10 users) + Normal usage (low cpu):** 100 • **Low concurrency (10 users)+High usage (time intensive):** 200 • **High concurrency (50 users) + Normal usage (low cpu):** 200 • **High concurrency (50 users) + High usage (time intensive):** 500
##DATASTUDIO_ZPLN_SCHED_THREADPOOL_SIZE##	This controls the number of threads in the ZPLN scheduler's thread pool, determining how many concurrent tasks the system can handle	Yes	NA
Optional Features enabled by default			
##MMG_HTTP2_ENABLED##	This enables HTTP/2 for the UI, service, and gateway via `server.http2.enabled`.	NO	By default it is enabled to `true`. If it is not set then, `bin/initialize-install.sh` normalizes any value other than explicit `false` to `true`.

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##MMG_SERVER_ACCESS_LOG_ENABLED##	This enables the Jetty access logs for the UI and service via `server.jetty.accesslog.enabled`.	NO	By default this is enabled to `true`. If this is not set then `bin/initialize-install.sh` normalizes any value other than explicit `false` to `true`.
disabled by default			
##OJET_CDN_ENABLED##	Controls whether the UI loads Oracle JET assets from a CDN via `mmg.ojet-cdn.enabled`.	NO	This is disabled by default (`false`). If it is not set, then, `bin/initialize-install.sh` normalizes any value other than explicit true to `false`.
##DTP_PIPELINE_SERVICE_PORT##	This is the port for the backend DTP Pipeline Service.	NA	NA
##DTP_PIPELINE_FILES##	The absolute file system path for the pipeline files directory that is used by the DTP pipeline service.	NA	NA
##DTP_DATA_PIPELINE_SERVICE_PORT##	This is the port for the backend DTP data pipeline service.	NA	NA
##DTP_SCENARIO_PIPELINE_SERVICE_PORT##	This is the port for the backend DTP scenario pipeline service.	NA	NA
##DTP_SCENARIO_METADATA_JOB_PORT##	This is the port used by the scenario metadata job component.	NA	NA
##DTP_PIPELINE_SCHEMA_ALIAS##	The database TNS alias or service name for the DTP schema connection.	NA	NA
##DTP_DATA_METADATA_JOB_PORT##	The port number on which the `dtp-data-metadata-job` should run to import metadata related to the “Data Pipeline” type.	YES	If not set: The pre-install check fails with **DTP_DATA_METADATA_JOB_PORT** is not configured. If already in use: The pre-install check fails with **DTP_DATA_METADATA_JOB_PORT** <PORT_NUMBER> is in Use
UI and Gateway ports for DTP services			

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Table 5-2 (Cont.) config.sh File Parameters and Descriptions

Parameter	Description	Is Mandatory	Comments
##DTP_DATA_PIPELINE_SERVICE_UI_PORT##	This is the port for the DTP data pipeline service UI.	NA	NA
##DTP_PIPELINE_SERVICE_UI_PORT##	This is the port for the DTP pipeline service UI.	NA	NA
##DTP_SCENARIO_PIPELINE_SERVICE_UI_PORT##	This is the port for the DTP scenario pipeline service UI.	NA	NA
##DTP_GATEWAY_SERVICE_PORT##	This is the port for the DTP gateway.	NA	NA
Scheduler Timezone Properties. If either SCHEDULER_TIMEZONE or SCHEDULER_TIMEZONE_DISPLAY_NAME is unset, a default value of UTC will be applied during installation. Configured for aai-scheduler team			
##SCHEDULER_TIMEZONE##	This displays the timezone ID for the respective region. For the list of supported timezones, see the Appendix I - List of Supported Timezones.		The default timezone is UTC (Coordinated Universal Time).
##SCHEDULER_TIMEZONE_DISPLAY_NAME##	This property is used to display the timezone region information in the Schedule screen. The value in this field must be provided in the "" format.		The default timezone is UTC (Coordinated Universal Time).

> **Note**
>
> If changes are done directly on the UI and then restarted, then the overwrite will not be triggered and the configuration will not change. It is only dependent on the file system JSON.

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Note

- In case of ##DATASTUDIO_AAI_URL## and ##MMG_SVC_URL##, do not add any ending '/' in the URLs
- If the pool size, connection timeout and idle timeout are not configured, then it will proceed with the default Hikari Configurations.
- The default session timeout is 3600 seconds (60 mins). You can configure the timeout by using the 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 to be present for a successful subsequent logins.
- The name for the MMG Studio cookie is ORA_OLDS_SESSION.
- If the ##MMG_SSL_ENABLED## is set to false, the 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 the same for all the MMG services including MMG Studio. Hence, if you want to use MMG Studio with wallet configurations, then configure it in the same wallet.
- If MMG Studio is remotely configured, then the MMG Application Configuration Schema wallet alias and `tnsnames.ora` file entries need to be added to the MMG Studio configured wallet and `tnsnames.ora` file.
- If the MMG application is Non SSL, set the below property to "false" in the `application.yml` file inside MMG Studio and restart the services.

```
security:

cookies:

secure: false
```

Note

The flag `*IS_SELF_USR_GRP_AUTH_ALLOWED*` in the NEXTGENEMF_CONFIG table is used to check if the Self Groups Approvers/Reviewers are allowed or not. If it is **'Y'**, then the Requested User as well Approvers and Reviewers can belong to the same user group. Otherwise, **'Self User Group Authorization is not allowed'** is returned.

Support of Alphanumeric Name in SAML Entity ID for SAML Configuration

MMG Application: `mmg_ui/application.properties` file contains SAML entity `saml.auth.sp.entity` placeholder that contains values like `https://<FQDN of compliance server>:7001/cs`

However, the requirement is to have this parameter value as `amlcs8126` i.e. support of SAML Entity ID as alphanumeric name.

The expected value from SAML team:
`saml.auth.sp.entity="amlcs8126":`

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Entity ID should not contain below special character as per ForgeRock MF Authentication (Policy sets in the UI: ForgeRock Identity Cloud docs).

The regex allowed is: `^[A-Za-z0-9,.\\/:@&?\\-_]+$`, and it should be passed in a string.

MMG Monitor Configuration

The following settings are configured in `installer/bin/config.sh` and control the bundled Prometheus, Node Exporter, and Oracle DB Exporter components used by OFS MMG monitoring.

Table 5-3 Configured Settings in config.sh

Setting	What it controls	Allowed values	Default	Impact / behavior
MMG_PROMETHEUS_PORT	Port used by Prometheus	Provide a free TCP port	9090	Changes the Prometheus listen port. Any local consumers of the bundled Prometheus service must use the same port.
MMG_PROMETHEUS_SCRAPE_INTERVAL	Global Prometheus scrape interval	Provide a Prometheus-compatible duration string	30s	Lower values collect metrics more often but increase load and storage growth. Higher values reduce load but make monitoring data less granular.
MMG_PROMETHEUS_EVALUATION_INTERVAL	Global Prometheus rule evaluation interval	Provide a Prometheus-compatible duration string	30s	Controls how often Prometheus evaluates rules. In the current checked-in config.sh, no rule files are defined, so this matters only if rules are added separately.
MMG_PROMETHEUS_RETENTION_TIME	How long Prometheus keeps stored metrics	Provide a Prometheus-compatible retention string	15d	Higher retention keeps more history but uses more disk. Lower retention reduces disk usage but keeps less history.
MMG_PROMETHEUS_DATA_DIR	Directory used by Prometheus to store TSDB data	Any path string	${FTPSHARE_DIR}/mmg/monitor/prometheus/data	The installer creates this directory. It must be writable and should have enough disk space.

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Table 5-3 (Cont.) Configured Settings in config.sh

Setting	What it controls	Allowed values	Default	Impact / behavior
MMG_NODE_EXPORTER_PORT	Port used by Node Exporter	Provide a free TCP port	9100	Changes the Node Exporter listen port. The same port is written into the generated Prometheus scrape target.
MMG_MONITORING_ENABLED	Replaces the following parameters: • MMG_PROMETHEUS_ENABLED • MMG_NODE_EXPORTER_ENABLED • MMG_ORACLEDB_EXPORTER_ENABLED This parameter controls controls whether the monitoring tools are enabled/ disabled	true, false	false	When set to true, Prometheus, Node Exporter, and OracleDB Exporter are started. When set to false, these tools are not started; as a result, monitoring data is not collected and the Health tab does not display updated information.
MMG_MONITORING_SSL_CRT	Mandatory if MMG_SSL_ENABLED is set to true.	Valid path to PEM certificate file	No default value. User needs to set the value to true.	The ports exposed by Prometheus, Node Exporter, and OracleDB Exporter are now TLS protected.
MMG_MONITORING_SSL_KEY	Mandatory if MMG_SSL_ENABLED is set to true.	Valid path to PEM certificate file	No default value. User needs to set the value to true.	The ports exposed by Prometheus, Node Exporter, and OracleDB Exporter are now TLS protected.
MMG_ORACLEDB_EXPORTER_PORT	Port used for the Oracle DB Exporter scrape target	Provide a free TCP port	9161	This value is written into the generated Prometheus scrape target. In the current scripts, it is not passed as a startup argument to the `oracledb_exporter` process.

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Table 5-3 (Cont.) Configured Settings in config.sh

Setting	What it controls	Allowed values	Default	Impact / behavior
MMG_ORACLEDB_EXPORTER_LOG_ENABLED	Oracle DB Exporter log disable flag	0, 1	0	Written to the exporter config as `log.disable.`*1* disables exporter logging in that config; *0* leaves it enabled.

Oracle DB Exporter Prerequisite

If `MMG_ORACLEDB_EXPORTER_ENABLED=true`, the OFS MMG config schema must have *read* access to the Oracle dynamic performance and DBA views used by the exporter. These privileges may be granted individually, or through an existing role such as `SELECT_CATALOG_ROLE`, if that role already provides the required access.

```
GRANT SELECT ON SYS.GV_$SESSION TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.GV_$RESOURCE_LIMIT TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.GV_$ASM_DISKGROUP_STAT TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.GV_$INSTANCE TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.GV_$DATAFILE TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.GV_$SYSSTAT TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.GV_$PROCESS TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.GV_$SYSTEM_WAIT_CLASS TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.GV_$PARAMETER TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.GV_$DATABASE TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.GV_$SQLSTATS TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.GV_$SYSMETRIC TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.DBA_TABLESPACE_USAGE_METRICS TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.DBA_TABLESPACES TO <MMG_CONFIG_SCHEMA>;
GRANT SELECT ON SYS.DBA_TEMP_FREE_SPACE TO <MMG_CONFIG_SCHEMA>;
```


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5.5 Configure the configForEST.sh file

To configure the `configForEST.sh` file:

1. Log in to the server as a Non-root user.
2. Navigate to the following path: `/installation directory/OFS_STSA/bin/directory`.

   For example, `/scratch/ofsaaweb/EST_HOME/OFS_STSA/bin`
3. Edit the applicable `configForEST.sh` attributes as shown here.

   Sample configForEST.sh file

```
#!/bin/sh

## Common properties
export  EST_WALLET_LOCATION=<WALLET_LOCATION_PATH>
export EST_TNS_ADMIN_PATH=<TNS_ADMIN_PATH>
export  EST_CONF_WALLET_ALIAS=<CONFIG_WALLET_ALIAS>
export  EST_META_WALLET_ALIAS=<ATOMIC_WALLET_ALIAS>
export LOG_HOME=<LOG_DIRECTORY_PATH>
export FTPSHARE_PATH=<FTPSHARE_DIRECTORY_PATH>
## with no '/' at end and no http:// or https://
export HOST_NAME=<HOST_NAME_OR_IP>

## Path up to directory where all bin, conf, lib, mmg-ui folders are
present
export MMG_INSTALLATION_PATH=<MMG_INSTALLATION_PATH>

## Application properties
export EST_SERVICE_SERVER_PORT=31101
export EST_UI_SERVICE_SERVER_PORT=31102
export EST_UI_SERVER_PORT=31103
export EST_SCHEMA_CREATOR_PORT=31104
export AAI_CONNECTION_ISMULTITENANT=true
export  AAI_CONNECTION_MAXPOOLSIZE_OVERRIDE=4
export SPRING_MASTERDATASOURCE_WALLETENABLED=true
export
SPRING_MASTERDATASOURCE_WALLETURL=jdbc:oracle:thin:@<CONFIG_WALLET_ALIAS>
export SPRING_MASTERDATASOURCE_DRIVER_CLASS_NAME=oracle.jdbc.OracleDriver
export SPRING_MVC_PATHMATCH_MATCHING_STRATEGY=ant-path-matcher
export EST_SERVER_SERVLET_CONTEXT_PATH=estservice
export LOCALE=en-us
export ofs_tenant_id=<TENANT_ID>
export ofs_service_id=<SERVICE_ID>
export ofs_app_id=est
export ofs_cor_id=<CORRELATION_ID>

export FEIGN_CLIENT_CONFIG_DEFAULT_CONNECTTIMEOUT=160000000
export FEIGN_CLIENT_CONFIG_DEFAULT_READTIMEOUT=160000000
```


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```
## MMG Keys location
export EST_MMG_KEYS_LOC=<MMG_KEYS_PATH>

# PMF Keys
export spring_main_allow_circular_references=true

# Open Metadata Keys start
export  OPENMETADATA_URL=http://<OPENMETADATA_HOST>:<PORT>
export OPENMETADATA_VERSION=v1
export OPENMETADATA_TOKEN=<TOKEN>
export  OPENMETADATA_ADMINUSERNAME=<OM_ADMIN_USERNAME>
export  OPENMETADATA_ADMINPASSWORD=<OM_ADMIN_PASSWORD>
export OPENMETADATA_SHOULDUSETOKEN=true
export OPENMETADATA_TOKENGENERATIONTIME=36000
# Set OPENMETADATA_IDCS_URL to blank if using token-based authentication
# (OPENMETADATA_SHOULDUSETOKEN=true). Provide the IDCS URL only if using
SSO
# (OPENMETADATA_SHOULDUSETOKEN=false).
export OPENMETADATA_IDCS_URL=
export OPENMETADATA_IDCS_APPLICATION_CLIENT_ID=<IDCS_CLIENT_ID>
export OPENMETADATA_IDCS_APPLICATION_CLIENT_SECRET=<IDCS_CLIENT_SECRET>
# Open Metadata Keys end

# SSL Configurations
export SERVER_SSL_KEY_STORE_TYPE=PKCS12
export  SERVER_SSL_KEY_STORE=<KEYSTORE_PATH>
export SERVER_SSL_KEY_STORE_PASSWORD=<KEYSTORE_PASSWORD>
export SERVER_SSL_KEY_ALIAS=<KEY_ALIAS>
export SERVER_SSL_ENABLED=false

# est-ui
export AAI_COOKIE_DOMAIN=<COOKIE_DOMAIN>
export LOGGING_LEVEL_ROOT=DEBUG
export SPRING_MVC_VIEW_PREFIX=/
export  SPRING_MVC_VIEW_SUFFFIX=.html
export SERVER_MAX_HTTP_HEADER_SIZE=32KB

# Remove this line if deprecated:
# export DATAPIPELINE_URL_FOR_UI=<URL>  # (Remove if no longer used)

export DATACATALOG_BASE_URL=http://<DATACATALOG_HOST>:<PORT>/
<CONTEXT_PATH>/

export TOKEN_CLIENT_ID=<CLIENT_ID>
export  TOKEN_SECRET=<CLIENT_SECRET>

export AAI_CONFIG_WALLET_ALIAS=<CONFIG_WALLET_ALIAS>

## BI REPORT
export BI_REPORT_URL=http://<BI_REPORT_HOST>:<PORT>/dv

## Log level for DI
export EST_DI_LOG_LEVEL=DEBUG
export EST_DI_DATEFORMAT=MM/dd/YYYY
#Path to pub and priv keys
export SSH_KEYS_PATH=##SFTP_SSH_KEYS_PATH##
```


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Table 5-4 Details of attributes in the configforEST.sh file

Parameter	Description	Is Mandatory	Comments
##EST_WALLET_LOCATION##	The location where the oracle wallet is created. For more information, see the Configuring Password Store with Oracle Wallet.	YES	`/scratch/users/wallet`
##EST_TNS_ADMIN_PATH##	The folder that contains the `tnsnames.ora` file.	YES	`/scratch/users/tns`
##EST_CONF_WALLET_ALIAS##	The wallet alias name configured for the STSA application configuration schema.	YES	`STSA_CONFIG` **Note**: Ensure that this and alias name mentioned in config.sh file are the same.
##EST_META_WALLET_ALIAS##	The wallet alias name configured for the STSA application META schema. **Note:** The value is same as **##EST_CONF_WALLET_ALIAS##**.	YES	`STSA_CONFIG`
##LOG_HOME##	A writable folder designated for storing application and liquibase logs	YES	`scratch/users/logs`
#FTPSHARE_PATH#	This can be any writable folder accessible to the process owner. Grant `0775` permission	YES	`/scratch/users/ftpshare` Ensure that an ftpshare folder is created before installation.
##HOST_NAME##	Hostname on which the all services run. Use the same hostname wherever applicable. **Note:** Do not add any protocol to host IP or Fully Qualified Domain Name (FQDN).	YES	HostIP or FQDN Example: `<hostname>.xyz.com`
##MMG_INSTALLATION_PATH##	Path where MMG is installed that contains (bin, mmg-ui, mmg-service and so on) folders. Required only when existing MMG is used and is already installed in the same environment.	NO	Example: `<MMG_INSTALLATION_DIRECTORY>/OFS_MMG`
##EST_SERVICE_SERVER_PORT##	Port number where the backend service (estservice) is running.	YES	`3101`
##EST_UI_SERVICE_SERVER_PORT##	Port number where the UI service (estui service) is running.	YES	`3102`
##EST_UI_SERVER_PORT##	Port number where the UI ojet service (estui) is running.	YES	`3103`
##EST_SCHEMA_CREATOR_PORT##	Port number where the schema creator for STSA is running.	YES	`3104`

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Table 5-4 (Cont.) Details of attributes in the configforEST.sh file

Parameter	Description	Is Mandatory	Comments
##AAI_CONNECTION_ISMULTITENANT##	This is the connection library to enable multi tenant connection. The default value is set to `true`. **Note:** Retain the value as is given in the configuration file.	YES	NA
##AAI_CONNECTION_MAXPOOLSIZE_OVERRIDE##	This is a connection pool size across the services. The default value is set to `4`. **Note:** Retain the value as is given in the configuration file.	YES	NA
##SPRING_MASTERDATASOURCE_WALLETENABLED##	Boolean property indicating if you have to use the wallet for the masterdatasource connection. The default value is set to `true`. **Note:** Retain the value as is given in the configuration file.	YES	NA
##SPRING_MASTERDATASOURCE_WALLETURL##	This is the jdbc url to connect to the wallet alias. Replace the placeholder with wallet alias name of configuration schema.	YES	`jdbc:oracle:thin:@STSA_CONFIG`
##SPRING_MASTERDATASOURCE_DRIVER_CLASS_NAME##	This is the class name of the JDBC driver that you use to communicate with the database. The default value is set as `oracle.jdbc.OracleDriver`. The value is same as ##EST_CONF_WALLET_ALIAS## attribute. **Note:** Retain the value as is given in the configuration file.	YES	NA
##SPRING_MVC_PATHMATCH_MATCHING_STRATEGY##	Choice of strategy for matching request paths against registered mappings. The default value is `ant-path-matcher` . **Note:** Retain the value as is given in the configuration file.	YES	NA
##EST_SERVER_SERVLET_CONTEXT_PATH##	Context path of the application. The default value is `estservice`.	YES	NA
##LOCALE##	This is the property that defines the users language. The default value is `en-us`. **Note:** Retain the value as is given in the configuration file.	YES	NA

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Table 5-4 (Cont.) Details of attributes in the configforEST.sh file

Parameter	Description	Is Mandatory	Comments
##ofs_tenant_id##	This is the default tenant id value. The default value is `MMG1`. **Note:** Retain the value as is given in the configuration file.	YES	NA
##ofs_service_id##	This is a default service id value. The default value is `OFSAA`. **Note:** Retain the value as is given in the configuration file.	YES	NA
##ofs_app_id##	This is a default application id. The default value is `est`. **Note:** Retain the value as is given in the configuration file.	YES	NA
##ofs_cor_id##	This is a default corelation id value. The default value is `TXN_523`. **Note:** Retain the value as is given in the configuration file.	YES	NA
FEIGN_CLIENT_CONFIG_DEFAULT_CONNECTTIMEOUT	The connection timeout prevents blocking the caller due to the long server processing time. The default value is `160000000` MilliSeconds (ms). **Note:** Retain the value as is given in the configuration file.	YES	`< STSA Installation Path> /OFS_STSA/conf`
FEIGN_CLIENT_CONFIG_DEFAULT_READTIMEOUT	The read timeout is applied from the time of connection establishment and is triggered when returning the response time takes too long. The default value is `1600000000` ms. **Note:** Retain the value as is given in the configuration file.	YES	NA
##EST_MMG_KEYS_LOC##	Provide the absolute path of the MMG public and private keys. MMG keys are generated in the MMG setup steps. See the mmg keys location in the <mmg configuration file> (MMG_KEYS_LOC property).	YES	`< MMG Installation Path> /OFS_MMG/conf`
spring_main_allow_circular_references	This parameter checks whether to allow circular references between beans and automatically tries to resolve them. The default value is set to `true`. **Note:** Retain the value as is given in the configuration file.	YES	NA

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Table 5-4 (Cont.) Details of attributes in the configforEST.sh file

Parameter	Description	Is Mandatory	Comments
##OPENMETADATA_VERSION##	Version of the Openmetadata application. Ensure that this value is v1.	YES	Example: `v1`
##OPENMETADATA_TOKEN##	Token for validating api calls made to openmetadata application.	YES	NA
##OPENMETADATA_ADMINUSERNAME##	Administrator username for OM Application. If the OPENMETADATA_SHOULDUSETOKEN attribute is set to `true`, then this parameter is mandatory.	YES	admin
##OPENMETADATA_ADMINPASSWORD##	Administrator password for OM Application. If the OPENMETADATA_SHOULDUSETOKEN attribute is set to `true`, then this parameter is mandatory.	YES	admin
##OPENMETADATA_SHOULDUSETOKEN##	Set this value to `true` if you are using token based authentication. Set this value to `false` if you are using SSO based authentication.	YES	Example: `true`
##OPENMETADATA_TOKENGENERATIONTIME##	Token regeneration time for authentication. If the OPENMETADATA_SHOULDUSETOKEN attribute is set to `false`, then this parameter is mandatory. **Note:** If you do not set any value, the default value is taken from OM.	YES	Example: `360000 ms`

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Table 5-4 (Cont.) Details of attributes in the configforEST.sh file

Parameter	Description	Is Mandatory	Comments
#OPENMETADATA_IDCS_URL#	The IDCS URL for OpenMetadata if authentication is configured through SSO. If the OPENMETADATA_SHOULDUSETOKEN attribute is set to `false`, then this parameter is mandatory.	NO	**Note** Set this value to blank if you are using token-based authentication (`OPENMETADATA_SHOULDUSETOKEN=true`). This field is required only when SSO-based authentication is configured (`OPENMETADATA_SHOULDUSETOKEN=false`).
#OPENMETADATA_IDCS_APPLICATION_CLIENT_ID#	The IDCS client ID from IDCS configuration for Openmetadata if authentication is configured through SSO. If the OPENMETADATA_SHOULDUSETOKEN attribute is set to `false`, then this parameter is mandatory.	YES	
#OPENMETADATA_IDCS_APPLICATION_CLIENT_SECRET#	The IDCS SECRET(TOKEN) from IDCS configuration for OpenMetadata if authentication is configured through SSO. If the OPENMETADATA_SHOULDUSETOKEN attribute is set to `false`, then this parameter is mandatory.	YES	
##SERVER_SSL_KEY_STORE_TYPE##	The value passed in the command for keystore creation for -storetype. The values can be either `JKS` or `PKCS12`.	YES	Example: `PKCS12`
##SERVER_SSL_KEY_STORE##	Absolute path for the keystore file. Ensure to enter the same path as MMG SSL_KEYSTORE attribute value.	YES	Include the file name in the path. `../conf/server.keystore`
##SERVER_SSL_KEY_STORE_PASSWORD##	The password for the keystore file is same as SSL_KS_SECRET.	YES	
##SERVER_SSL_KEY_ALIAS##	The value for the alias is same as SSL_KS_ALIAS.	YES	Example: `demoalias`

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Table 5-4 (Cont.) Details of attributes in the configforEST.sh file

Parameter	Description	Is Mandatory	Comments
##SERVER_SSL_ENABLED##	Enables or disables the SSL protocol for the application.	YES	Example: `true`
##AAI_COOKIE_DOMAIN##	The domain of the server.	YES	Example: `in.xyz.com`
##LOGGING_LEVEL_ROOT##	Base level set for type of logs that are available in log file. The value options are: info, debug, and warn.	YES	Example: `DEBUG`
##SPRING_MVC_VIEW_PREFIX##	It applies a prefix to the view name and then looks for a physical resource with that path in the servlet context. The default value is `\`. **Note:** Retain the value as is given in the configuration file.	YES	`\`
##SPRING_MVC_VIEW_SUFFFIX##	It applies a suffix to the view name and then looks for a physical resource with that path in the servlet context. The default value is `.html`. **Note:** Retain the value as is given in the configuration file.	YES	`.html`
##SERVER_MAX_HTTP_HEADER_SIZE##	Property to modify the max HTTP response header size in KB. Retain the value provided in configuration file.	YES	Example: 32KB
##DATACATALOG_BASE_URL##	This is the base URL to datacatalog application for UI.	YES	Format: `http(s)://<HOST_NAME>:<EST_SERVICE_SERVER_PORT>/<EST_SERVER_SERVLET_CONTEXT_PATH>`
##TOKEN_CLIENT_ID##	Client ID used for token generation for authentication. The value is `ofsauser`.	YES	Example: `ofsauser`
##TOKEN_SECRET##	Secret (Pass) used for token generation for authentication. Ensure that this value is `secret`.	YES	Example: `secret`
##AAI_CONFIG_WALLET_ALIAS##	Provide the wallet alias for configuration schema of production OFSAA application.	YES	`OFSAACNF`
##BI_REPORT_URL##	The URL to view BI reports after running the project.	YES	`http(s)://BI_HOST_NAME:BI_PORT/dv`
##EST_DI_LOG_LEVEL##	The Log level to specify what level of Direct Ingestion logs are to be produced.	NO.	If no level specified default logs will be of INFO level.
##EST_DI_DATEFORMAT##	The date format that will be used by Direct Ingestion utility to fetch records from external datasource	NO	If no format specified then default will be MM/dd/YYYY

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Table 5-4 (Cont.) Details of attributes in the configforEST.sh file

Parameter	Description	Is Mandatory	Comments
##SSH_KEYS_PATH##	Specify the path to the public and private SSH keys used for connecting to remote machines. If the keys do not exist, generate them using the following command: `ssh-keygen -t rsa -b 4096 -f ~/.ssh/id_rsa` Copy the generated key pair to a different folder and provide the path to that folder.	Yes	<STSA Installation Path>/SSH_KEYS This property can be `<STSA Installation Path>/OFS_STSA/MMG/OFS_MMG/conf` .

5.6 Run the STSA Installer

To run the installer, follow these steps:

1. Navigate to following path:

   Go to `<STSA_INSTALLATION_PATH>/bin` directory.

2. Run the following command from the `OFS_STSA/bin path`:

   ```
   ./deploy.sh
   ```

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

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

A message similar to following means a successful startup:

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

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

<MMG_INSTALLATION_PATH>/OFS_MMG/est-pipeline/pipeline

PIPELINE_HOME: <MMG_INSTALLATION_PATH>/OFS_MMG/est-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 ...

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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

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

> **Note**
>
> To check for installation logs, navigate to the `installation.log` file present in the following path: `OFS_STSA/bin`

> **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 STSA application is installed with or without OFSAA, depending on the configuration provided in the `config.sh` file.

Sample Console Messages During Installation:

```
STARTING STSA INSTALLATION Started
STSA Schema Creator execution
```


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```
EST Schema Creator executed successfully
STSA Installation Complete
```

These messages help track installation progress. Ensure no errors appear in the console; otherwise, review the installation logs.

5.7 Modify the Logging Level

The log rotation policy in the default OFS MMG setup is set to create a new log file whenever the size crosses 5MB and also to retain the last 5 log files. This feature is customizable. Additionally, the logging level can be modified to mmg-service, mmg-ui, mmg-studio etc.

The log config file for each service is present at the following locations. A backup can be taken and updates can be performed on the same:

- <MMG_INSTALLATION_PATH>/mmg-service/conf/log4j2.xml
- <MMG_INSTALLATION_PATH>/mmg-ui/conf/log4j2.xml
- <MMG_INSTALLATION_PATH>/mmg-studio/conf/log*.xml
- <MMG_INSTALLATION_PATH>/mmg-gateway/conf/log4j2.xml

Sample 1 (Size based rolling)

```
<Appenders>
 <RollingFile name="RollingFile">
  <FileName>##LOG_HOME##/services/mmg-service.log</FileName>
  <FilePattern>##LOG_HOME##/services/mmg-service.%i.log.zip</FilePattern>
  <PatternLayout pattern="%d{dd-MM-yyyy HH:mm:ss.SSS}{##LOG_TIMEZONE##}
[%18.18t] %-5p [%c{1}] - %m%n"/>
  <Policies>
   <!-- New log once the current size crosses 10MB -->
   <SizeBasedTriggeringPolicy size="10MB"/>
  </Policies>
   <!-- keep last 20 log files -->
  <DefaultRolloverStrategy max="20"/>
 </RollingFile>
 <RollingFile name="HealthCheckFile">
  <FileName>##LOG_HOME##/services/mmg-health.log</FileName>
  <FilePattern>##LOG_HOME##/services/mmg-health.%i.log.zip</FilePattern>
  <PatternLayout pattern="%d{dd-MM-yyyy HH:mm:ss.SSS}{##LOG_TIMEZONE##}
[%18.18t] %-5p - %m%n"/>
  <Policies>
   <!-- New log once the current size crosses 12MB -->
   <SizeBasedTriggeringPolicy size="12MB"/>
  </Policies>
  <!-- keep last 15 log files -->
  <DefaultRolloverStrategy max="15"/>
 </RollingFile>
 <Console name="Console" target="SYSTEM_OUT">
  <PatternLayout pattern="%d{dd-MM-yyyy HH:mm:ss.SSS}{##LOG_TIMEZONE##}
[%18.18t] %-5p [%c{1}] - %m%n"/>
 </Console>
</Appenders>
```


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Sample 2 (Day based logs rolling at midnight)

```
<Appenders>
 <RollingFile name="RollingFile"
             fileName="##LOG_HOME##/services/mmg-service.log"
             filePattern="##LOG_HOME##/services/mmg-service-%d{yyyy-MM-
dd}.log.gz">
 <PatternLayout pattern="%d{dd-MM-yyyy HH:mm:ss.SSS}{##LOG_TIMEZONE##}
[%18.18t] %-5p [%c{1}] - %m%n"/>
 <Policies>
  <!-- rollover at midnight -->
  <TimeBasedTriggeringPolicy interval="1" modulate="true"/>
 </Policies>
 <!-- keep last 10 daily logs -->
 <DefaultRolloverStrategy max="10"/>
 </RollingFile>
 <RollingFile name="HealthCheckFile"
             fileName="##LOG_HOME##/services/mmg-health.log"
             filePattern="##LOG_HOME##/services/mmg-health-%d{yyyy-MM-
dd}.log.gz">
  <PatternLayout pattern="%d{dd-MM-yyyy HH:mm:ss.SSS}{##LOG_TIMEZONE##}
[%18.18t] %-5p - %m%n"/>
  <Policies>
  <!-- rollover at midnight -->
  <TimeBasedTriggeringPolicy interval="1" modulate="true"/>
 </Policies>
  <!-- keep last 15 daily logs -->
  <DefaultRolloverStrategy max="15"/>
 </RollingFile>
 <Console name="Console" target="SYSTEM_OUT">
   <PatternLayout pattern="%d{dd-MM-yyyy HH:mm:ss.SSS}{##LOG_TIMEZONE##}
[%18.18t] %-5p [%c{1}] - %m%n"/>
 </Console>
</Appenders>
```


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Sample 3 (Hourly log files)

```
<Appenders>
  <RollingFile name="RollingFile"
               fileName="##LOG_HOME##/services/mmg-service.log"
               filePattern="##LOG_HOME##/services/mmg-service-%d{yyyy-MM-dd-
HH}.log.gz">
    <PatternLayout pattern="%d{dd-MM-yyyy HH:mm:ss.SSS}{##LOG_TIMEZONE##}
[%18.18t] %-5p [%c{1}] - %m%n"/>
    <Policies>
      <!-- rollover every hour on the clock -->
      <TimeBasedTriggeringPolicy interval="1" modulate="true"/>
    </Policies>
    <!-- keep last 10 hourly logs -->
    <DefaultRolloverStrategy max="10"/>
  </RollingFile>
  <RollingFile name="HealthCheckFile"
               fileName="##LOG_HOME##/services/mmg-health.log"
               filePattern="##LOG_HOME##/services/mmg-health-%d{yyyy-MM-dd-
HH}.log.gz">
    <PatternLayout pattern="%d{dd-MM-yyyy HH:mm:ss.SSS}{##LOG_TIMEZONE##}
[%18.18t] %-5p - %m%n"/>
    <Policies>
      <!-- rollover every hour on the clock -->
      <TimeBasedTriggeringPolicy interval="1" modulate="true"/>
    </Policies>
    <!-- keep last 15 hourly logs -->
    <DefaultRolloverStrategy max="15"/>
  </RollingFile>
  <Console name="Console" target="SYSTEM_OUT">
    <PatternLayout pattern="%d{dd-MM-yyyy HH:mm:ss.SSS}{##LOG_TIMEZONE##}
[%18.18t] %-5p [%c{1}] - %m%n"/>
  </Console>
</Appenders>
```


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5.8 Starting STSA Services

To start the STSA service, run the following command:

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

  To check if the UI service comes up correctly check the following log file:
  `<INSTALLATION_PATH/OFS_STSA>/est-ui-service/bin/nohup.out`

  To check for any issues in MMG services, check the following log folder:

  `<Logs_Directory>/services`

  After a successful startup, the following message is displayed:
  `INFO Tomcat started on port(s): <est-ui-port> (http) with context path '//estservice'`

  To check if the backend service is up, check the following log folder:
  `<INSTALLATION_PATH/OFS_STSA>/est-service/bin/nohup.out`

  After a successful startup, the following message is displayed:
  `INFO Started AaiESTServiceApplication in 17.774 seconds (JVM running for 19.879)`

  After this, the application is installed and all the application services are started successfully.

> **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 STSA hosted server details.

Sample Console Messages When Starting Services:

```
Starting STSA Services...
STSA Service <service_name> started successfully
```

If any service fails to start, the console will display a message such as:

```
Service <service_name> failed to start. Check error logs at: <log_path>
```


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> **Note**
>
> Review the log files at the provided location to troubleshoot startup issues.

5.9 Stopping STSA Services

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

5.10 Additional Installations

The following installations are optional for the STSA application but are required to use the full range of MMG application features.

5.10.1 Installing 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*.

5.10.2 Installing Python Library

This section provides detailed steps to install the Python Library.

5.10.2.1 Prerequisites

- Python 3.10.x and above

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> **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`

> **Note**
>
> In order to download the latest python packages after MMG upgrade, the pip cache in the server user home directory needs to be cleared.
> Path: `$HOME/.cache/pip`

> **Note**
>
> Documentation of Mandatory Parameter to be passed as part of Python environment install.sh Installation
> Now, parameters is supported as below for python-env-install.sh file:
>
> The user needs to be passed in case the packages has to be installed at a user level. The above is not required in case of CONDA environment. In this case make sure the Python3 is pointed to proper Conda environments.

5.10.2.2 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
   ```

   The following parameter is supported for python-env-install.sh file:

   --user need to be passed in case the packages has to be installed at user level.

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This is not required in case of Conda environment but python3 must be configured to the appropriate Conda environments.

> **Note**
>
> Expose Python variables/functions to derive File Path when saving files directly from Notebook script (without using Save Widget).

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
   ```


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> **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.

5.10.3 Generate GRAPH-KEYSTORE.P12

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

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

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

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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/

5.10.4 Setting up the Environment for Hive Data Sourcing

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

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

Hive Source Connection Requirements:

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

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

MMG-Studio/conf: kbank.keytab, krb5.conf and hive-jdbc-driver.jar

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> **Note**
>
> The Datastudio placement of jars are for creating a connection from python library and the other is from java, for data sourcing.

Configure the Hive Jars and Configuration Files

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

zookeeper-3.4.9.jar

woodstox-core-5.0.3.jar

stax2-api-3.1.4.jar

slf4j-log4j12-1.7.25.jar

slf4j-api-1.7.25.jar

re2j-1.1.jar

log4j-1.2.17.jar

libthrift-0.9.3.jar

libfb303-0.9.3.jar

httpcore-4.4.4.jar

httpclient-4.5.2.jar

htrace-core4-4.1.0-incubating.jar

hive-service-3.1.2.jar

hive-metastore-3.1.2.jar

hive-jdbc-3.1.2.jar

hive-exec-3.1.2.jar

hadoop-hdfs-client-3.1.1.jar

hadoop-common-3.1.1.jar

hadoop-auth-3.1.1.jar

curator-client-2.12.0.jar

commons-logging-1.0.4.jar

commons-io-2.4.jar

commons-configuration2-2.1.1.jar

commons-collections-3.2.2.jar

commons-cli-1.2.jar

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

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5.10.5 Remote MMG Studio Configuration

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

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

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

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

```
export DATASTUDIO_URL=##DATASTUDIO_URL##

export SSL_KEYSTORE=##SSL_KEYSTORE##

export SSL_KS_SECRET=##SSL_KS_SECRET##

export SSL_KS_TYPE=##SSL_KS_TYPE##

export SSL_KS_ALIAS=##SSL_KS_ALIAS##
```

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

```
export DS_TNS_ADMIN_PATH=##DS_TNS_ADMIN_PATH##

export DS_WALLET_LOCATION=##DS_WALLET_LOCATION##
```

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

```
export MMG_TNS_ADMIN_PATH=##MMG_TNS_ADMIN_PATH##

export MMG_LIB_WALLET_ALIAS=##MMG_LIB_WALLET_ALIAS##
```

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

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

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5.10.6 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-25.4.0
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.

5.10.6.1 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
   ```


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```
export PGX_PORT=##PGX_PORT##

export PGX_CONTEXT_PATH=##PGX_CONTEXT_PATH##

export PGX_SSL_ENABLED=##PGX_SSL_ENABLED##

export PGX_SSL_KEYSTORE=##PGX_SSL_KEYSTORE##

export PGX_SSL_KS_SECRET=##MMG_SSL_KS_SECRET##

export PGX_SSL_KS_TYPE=## PGX_SSL_KS_TYPE ##

export PGX_SSL_KS_ALIAS=## PGX_SSL_KS_ALIAS##

export GRAPH_SERVICE_URL=## GRAPH_SERVICE_URL##

export GRAPH_KEYSTORE_PASSWORD=## GRAPH_KEYSTORE_PASSWORD##

export LOG_HOME=##LOG_HOME##

export LOG_LEVEL=##LOG_LEVEL##
```

Table 5-5 Config.sh file of PGX

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

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

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Table 5-5 (Cont.) Config.sh file of PGX

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

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5.10.6.2 Starting PGX Server

To start the PGX Server, run the following command:

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

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

  A message similar to following means a successful startup:

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

  This will start the successful installation of PGX Server.

5.10.6.3 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.

5.10.7 R Interpreter

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

5.10.7.1 Installing Oracle R Distribution

https://docs.oracle.com/en/database/oracle/machine-learning/oml4r/2.0.0/oread/install-oracle-r-distribution-linux.html

- Check installation:
  1. R --version

5.10.7.2 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

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e. sudo ln -s /opt/R/${R_VERSION}/bin/R /usr/bin/R

2. Check installation:
   a. R --version

5.10.7.3 MMG Connection Objects Library Setup

This section describes the MMG Connection Objects Library Setup.

For detailed description on installation and installation of Oracle R Enterprise Client libraries (ROracle, and so on), check following link:

https://docs.oracle.com/cd/E83411_01/OREAD/installing-ORE-client.htm#OREAD167

5.10.7.3.1 Installing ROracle Library

Prerequisites

DBI is one of the dependencies for using this library.

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

Procedure

To install ROracle Library, follow these steps:

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

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

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

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

5.10.7.3.2 Installing RODBC Library

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

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

- **For R 4.1.2**
  1. curl -O https://cran.r-project.org/src/contrib/Archive/RODBC/RODBC_1.3-16.tar.gz
  2. R CMD INSTALL RODBC_1.3-16.tar.gz

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

5.10.7.4 Installing the IRkernel

To configure IRkernel, follow these steps:

1. The IRkernel requires jupyter installed. Create a conda environment with the IRkernel dependencies:

   ```
   conda create -p <PATH TO YOUR CONDA ENV> -y --override-channels -c
   <CHANNEL URL> jupyter_client==7.2.2 grpcio protobuf
   ```


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2. Install the IRkernel in R: Open your R REPL (R does not have to be installed with conda) and run:

```
install.packages('IRkernel')
```

3. Softlink `jupyter` and register IRkernel:

```
ln -s <PATH TO YOUR CONDA ENV> /usr/bin/jupyter && R -e
"IRkernel::installspec(user = FALSE)"
```

5.10.7.5 Configuring R Interpreter

Make sure to configure the interpreter config and set the correct path for R binary `(zeppelin.R.cmd)` and the path to Python environment which has the IRkernel installed `(zeppelin.python)`.

In config.sh there is a new parameter:

export R_PYTHON_HOME=##R_PYTHON_HOME##

This is the Python Conda environment path till `<PATH TO YOUR CONDA ENV>/bin/`python created following steps mentioned in 5.9, which will set the `zeppelin.python property` in `mmg-studio/server/builtin/interpreters/r.json` file.

The other property mentioned for R binary `(zeppelin.R.cmd)` is also set in above path the default value is R so make sure that the user starting the services has access to R and alias is set or change the property according to the path of R binary.

> **Note**
>
> **Steps to enable TLS during R Interpreter Installation**
> Steps to enable TLS during R Interpreter Installation:

1. Download `Rserve_1.8-10.tar.gz` from this link: https://cran.r-project.org/src/contrib/Archive/Rserve/
2. Install openssl-devel - [yum install openssl-devel]
3. Execute below cmd:
   `R CMD INSTALL --configure-args="--with-ssl-headers=/usr/include --with-ssl-libraries=/usr/lib64" Rserve_1.8-10.tar.gz`

The below steps can be executed from R session to check that Rserve configuration is working before starting the services:

Start R from Terminal/Putty and execute the below commands:

- `library(Rserve)`
- `Rserve(args="--RS-conf <Rserve.conf file location including file name> --no-save")`

5.10.7.6 Using MMG Studio to Oracle Connection Objects

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

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5.10.7.6.1 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")
   ```

5.10.7.6.2 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

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5.10.8 Kafka Installation

Windows

Apache Zookeeper (Download the bin tar):
https://shaaslam.medium.com/installing-apache-zookeeper-on-windows-45eda303e835#.fgofwm6n6

Apache Kafka:
https://shaaslam.medium.com/installing-apache-kafka-on-windows-495f6f2fd3c8

Linux

Method 1(Using separate zookeeper)

Apache Zookeeper

1. Download Apache Zookeeper bin files from https://www.apache.org/dyn/closer.lua/zookeeper/zookeeper-3.7.1/apache-zookeeper-3.7.1-bin.tar.gz
2. Untar `apache-zookeeper-3.7.1-bin.tar.gz tar -zxvf apache-zookeeper-3.7.1-bin.tar.gz`
3. In conf folder, rename `zoo-sample.cfg to zoo.cfg`
4. Make a folder named `data in /scratch/users/ofsaa/zookeeper/apache-zookeeper-3.7.1-bin`
5. Change the value of `dataDir in zoo.cfg to dataDir=/scratch/users/ofsaa/zookeeper/apache-zookeeper-3.7.1-bin/data`
6. Open a terminal and set the below values:
   ```
   export ZOOKEEPER_HOME=/scratch/users/ofsaa/zookeeper/apache-zookeeper-3.7.1-bin

   export PATH=/scratch/users/ofsaa/zookeeper/apache-zookeeper-3.7.1-bin/bin:$PATH
   ```
7. Start the zookeeper server:`cd /scratch/users/ofsaa/zookeeper/apache-zookeeper-3.7.1-bin/bin ./zkServer.sh start`

A few commands for zookeeper server:

- `./zkServer.sh start`
- `./zkServer.sh start-foreground`
- `./zkServer.sh stop`
- `./zkServer.sh status`

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Apache Kafka

- Download Apache Kafka bin files
  `wget https://downloads.apache.org/kafka/3.3.1/kafka_2.13-3.2.0.tgz`
- Untar `kafka_2.13-3.2.0.tgz`
  `tar -zxvf kafka_2.13-3.2.0.tgz`
- Make a folder "`logs`" in the directory `/scratch/users/ofsaa/kafka/kafka_2.13-3.2.0/.`
- Go to config folder in Apache Kafka and edit `server.properties` using any text editor. Change value of `logs.dir` to `log.dirs=/scratch/users/ofsaa/kafka/kafka_2.13-3.2.0/logs in server.properties`
- Go to `config` folder in Apache Kafka and edit `zookeeper.properties` using any text editor. Change value of `dataDir dataDir=/scratch/users/ofsaa/zookeeper/apache-zookeeper-3.7.1-bin/data`
- Start Apache Kafka broker
  `cd /scratch/users/ofsaa/kafka/kafka_2.13-3.2.0/bin/`

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

Method 2(Using zookeeper shipped with Apache Kafka)

Apache Zookeeper and Kafka

- Download Apache Kafka bin files
  `wget https://downloads.apache.org/kafka/3.3.1/kafka_2.13-3.2.0.tgz`
- Untar `kafka_2.13-3.2.0.tgz`
  `tar -zxvf kafka_2.13-3.2.0.tgz`
- Go to config folder in Apache Kafka and edit `zookeeper.properties` using any text editor. Change value of `dataDir` to `dataDir=/scratch/users/ofsaa/zookeeper/apache-zookeeper-3.7.1-bin/data` or any folder where the snapshot of zookeeper metadata can be stored.
- Make a folder "`logs`" in the directory `/scratch/users/ofsaa/kafka/kafka_2.13-3.2.0/.`
- Go to `config` folder in Apache Kafka and edit `server.properties` using any text editor. Change value of `logs.dir` to `log.dirs=/scratch/users/ofsaa/kafka/kafka_2.13-3.2.0/logs` in `server.properties`.
- **Start Apache Zookeeper**
  `cd /scratch/users/ofsaa/kafka/kafka/kafka_2.13-3.2.0`

  `bin/zookeeper-server-start.sh config/zookeeper.properties`
- **Start Apache Kafka Broker**
  `cd /scratch/users/ofsaa/kafka/kafka_2.13-3.2.0`

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

Create Keys and Certificates

- `keytool -keystore kafka.server.keystore.jks -alias localhost -keyalg RSA -validity 365 -genkey -storepass oracle123 -keypass oracle123 -ext SAN=DNS:ofss-mum-1035.snbomprshared1.gbucdsint02bom.oraclevcn.com`
- `openssl req -new -x509 -keyout ca-key -out ca-cert -days 365`

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- `keytool -keystore kafka.client.truststore.jks -alias CARoot -storepass oracle123 -keypass oracle123 -importcert -file ca-cert keytool -keystore kafka.server.truststore.jks -alias CARoot -storepass oracle123 -keypass oracle123 -importcert -file ca-cert`
- `keytool -keystore kafka.server.keystore.jks -alias localhost -storepass oracle123 -keypass oracle123 -certreq -file cert-file`
- `openssl x509 -req -CA ca-cert -CAkey ca-key -in cert-file -out cert-signed -days 365 -CAcreateserial -passin pass:oracle123`
- `keytool -keystore kafka.server.keystore.jks -alias CARoot -storepass oracle123 -keypass oracle123 -importcert -file ca-cert keytool -keystore kafka.server.keystore.jks -alias localhost -storepass oracle123 -keypass oracle123 -importcert -file cert-signed`

Converting Keystore file from jks to pem

- `keytool -exportcert -alias localhost -keystore kafka.server.keystore.jks -rfc -file certificate.pem -storepass oracle123`
- `keytool -v -importkeystore -srckeystore kafka.server.keystore.jks -srcalias localhost -keystore cert_and_key.p12 -storetype PKCS12 -storepass oracle123 -srcstorepass oracle123`
- `openssl pkcs12 -in cert_and_key.p12 -nodes -nocerts -out key.pem -passin pass:oracle123`
- `keytool -exportcert -alias CARoot -keystore kafka.server.keystore.jks -rfc -file CARoot.pem -storepass oracle123`

Inside the Kafka/config path we have to create client-ssl.properties and server-ssl.properties.

The client-ssl.properties file contains the following:

- `security.protocol=SSL`
- `ssl.truststore.location=/scratch/mmg8133/kafka/ssl/kafka.server.truststore.jks`
- `ssl.truststore.password=oracle123`
- `ssl.keystore.location=/scratch/mmg8133/kafka/ssl/kafka.server.keystore.jks`
- `ssl.keystore.password=oracle123`
- `ssl.key.password=oracle123`

server-ssl.properties contains the same content as server.properties, but we have to update the ssl parameters in it.

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5.10.9 Configuring Interpreters

This section provides information on configuring interpreters.

5.10.9.1 Spark Interpreter

> **Note**
>
> Java 21 supports the Spark3.4+ version, excluding the 4.0.0 series.

5.10.9.2 Spark Configuration and Execution in Python

The following sections provide information on the Spark configurations and executions in Python.

5.10.9.2.1 Set the Hadoop Clusters

Configure `$ORACLE_HOME, $HADOOP_HOME` to validate the installation directories.

1. Copy the following required Oracle JDBC/security JARS to HDFS.
2. Execute the following commands that need to be run on the Hadoop cluster:
   - `$HADOOP_HOME/hdfs dfs -mkdir -p /spark/jars/`
   - `$HADOOP_HOME/bin/hdfs dfs -put $ORACLE_HOME/lib/ojdbc8.jar /spark/jars/`
   - `$HADOOP_HOME/bin/hdfs dfs -put $ORACLE_HOME/jlib/oraclepki.jar /spark/jars/`
   - `$HADOOP_HOME/bin/hdfs dfs -put $ORACLE_HOME/jlib/osdt_core.jar /spark/jars/`
   - `$HADOOP_HOME/bin/hdfs dfs -put $ORACLE_HOME/jlib/osdt_cert.jar /spark/jars/`
3. Verify that the jars are copied by executing the following command:
   `hdfs dfs -ls /spark/jars`

5.10.9.2.2 Configuration on the OFS MMG Instance Server

Perform the following steps to complete the configurations on the OFS MMG instance server.

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1. Create a local folder on the OFS MMG install server, for example, `hive_conf_dir`:
   - `/scratch/ofsaaapp/spark-lib/hive_conf_dir/yarn-site.xml (suggested some edits now to make the code work)`
   - `/scratch/ofsaaapp/spark-lib/hive_conf_dir/mapred-site.xml`
   - `/scratch/ofsaaapp/spark-lib/hive_conf_dir/hdfs-site.xml`
   - `/scratch/ofsaaapp/spark-lib/hive_conf_dir/core-site.xml`
   - `/scratch/ofsaaapp/spark-lib/hive_conf_dir/hive-site.xml`
   - `/scratch/ofsaaapp/spark-lib/hive_conf_dir/kbank.keytab`
   - `/scratch/ofsaaapp/spark-lib/hive_conf_dir/krb5.conf`
2. Configure the `yarn-site.xml` file with the following property:

```
<property>
<name>yarn.nodemanager.keytab</name>
<value>”path to keytab”/<keytabfile>.keytab</value>
</property>
<property>
<name>yarn.resourcemanager.address</name>
<value>”cluster IP/hostname”:8032</value>
</property>
<property>
<name>yarn.resourcemanager.scheduler.address</name>
<value>”cluster IP/hostname”:8030</value>
</property>
<property>
<name>yarn.resourcemanager.resource-tracker.address</name>
<value>”cluster IP/hostname”:8031</value>
</property>
```

> **Note**
>
> Ensure that the Hadoop cluster and the OFS MMG instance are configured to run on the same Java version.

5.10.9.2.3 Set Apache Spark in the OFS MMG Installed Server

Perform the following steps to set Apache Spark in the OFS MMG installed server:

1. Download Apache Spark from the Apache site and copy it to the OFS MMG installed server:
   `https://archive.apache.org/dist/spark/spark-3.5.0/spark-3.5.0-bin-hadoop3.tgz`
2. Unzip the downloaded file by executing the following command:
   `gunzip spark-3.5.0-bin-hadoop3.tgz`

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3. Untar the file with the relevant command.
4. Restart the OFS MMG services after placing the configs and installing Spark.

5.10.9.2.4 Code Snippet to Create the Spark Dataframe and Trigger Executions in to Spark Cluster (with PySpark)

You must perform the following steps to create the Spark Dataframe and trigger the executions in the Spark cluster with PySpark

1. Log in to the OFS MMG application
2. Navigate to the **Notebook** tab of the Model pipeline.
3. Create and execute following paragraphs:
   a. Environment Configuration
   b. Connection
   c. Spark Session
   d. Sample Query

5.10.9.2.4.1 Environment Configuration

```
%python

import sys, os

jdk_path = "/usr/java/jdk1.8.0_401" # Hadoop supports Java 1.8 and Java 11. Refer matrix for actual versions. Both cluster and client must be in same version

spark_path = "<Path of spark installed location in MMG Server>" # This is spark3.5.5 + hadoop3.

# Ensure that spark version from the above matches with the pyspark installed in this python runtime.

# Also ensure that hadoop version from the above matches with the hadoop version of cluster

hadoop_conf_dir = "<Path to Hadoop xml directory which is copied local to MMG Server>" # Local Path containing hadoop XMLs. Ensure that yarn-site has the correct addresses for resourcemanager.

krb5_conf = "<Path_To_krb5.conf>krb5.conf" # Conf file for hive connectivity

default_service_principal = "<service>/<fully-qualified-hostname>@<KERBEROS_REALM>" # Service Principal, not the user. Needed while doing impersonation.

default_keytab_file = "<Path_To_Keytab file copied local to the MMG server>" # Keytab file for initializing connection

default_user_principal = "<service>/<fully-qualified-hostname>@<KERBEROS_REALM>"

"""Setup environment variables for Spark and Hadoop."""

os.environ["JAVA_HOME"] = jdk_path

os.environ["SPARK_HOME"] = spark_path
```


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```
os.environ["PYSPARK_PYTHON"] = sys.executable

os.environ["PYSPARK_DRIVER_PYTHON"] = sys.executable

os.environ["KRB5_CONFIG"] = krb5_conf

os.environ["HADOOP_CONF_DIR"] = hadoop_conf_dir

os.environ["YARN_CONF_DIR"] = hadoop_conf_dir

os.environ["PATH"] = f"{jdk_path}/bin:{spark_path}/bin:" + os.environ["PATH"]

os.environ["SPARK_SUBMIT_OPTS"] = f"-Djava.security.krb5.conf={krb5_conf}" # If
we still get "KrbException: Cannot locate default realm", then this property
needs to be added in .profile

print("Environment Configured")
```

5.10.9.2.4.2 Connection

```
%python

from pyspark.sql import SparkSession

def get_yarn_connection(conn_type='kerberos',
user_principal=default_user_principal, keytab_file=default_keytab_file,
extraConfigs=None, hive_support=False):

extraConfigs = extraConfigs or {}

if not isinstance(extraConfigs, dict):

raise TypeError("extraConfigs must be a dict")

if conn_type.lower() == 'kerberos':

builder = (

SparkSession.builder

.appName("MMGYarnKerberos")

.master("yarn")

.config("spark.submit.deployMode", "client")

.config("spark.kerberos.principal", user_principal)

.config("spark.kerberos.keytab", keytab_file)

)

elif conn_type.lower() == 'impersonation':

builder = (

SparkSession.builder

.appName("MMGYarnImpersonate")

.master("yarn")

.config("spark.submit.deployMode", "client")
```


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```
.config("spark.sql.hive.thriftServer.singleSession", "true")

.config("spark.hadoop.hive.server2.proxy.user", user_principal) # Proxy/
Impersonated user. Ensure proxy login is enabled in HIVE.

.config("spark.hadoop.hive.metastore.kerberos.principal",
default_service_principal) # Service principal

.config("spark.hadoop.hive.metastore.kerberos.keytab.file", keytab_file) # Should
be the keytab of service principal, not the user

.config("spark.hadoop.hive.metastore.sasl.enabled", "true")

.config("spark.sql.catalogImplementation", "hive")

)

else:

raise ValueError(f"Unsupported connection mode {conn_type} to get YARN
connection.")

for k, v in extraConfigs.items():

builder = builder.config(k, v)

if hive_support:

builder = builder.enableHiveSupport()

spark =builder.getOrCreate()

return spark
```

5.10.9.2.4.3 Spark Session

```
%python

spark = get_yarn_connection(conn_type='kerberos')

sc = spark.sparkContext

print("Spark app name:", sc.appName)

print("Spark app ID:", sc.applicationId)

print("Spark master :", sc.master)

print("Local Spark URL :", sc.uiWebUrl)
```

5.10.9.2.4.4 Sample Query

```
%python

spark.sql("show databases").show()

spark.sql("SHOW TABLES IN default").show()
```


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> **Note**
>
> The example above uses Spark's Hive support (Metastore).

5.10.10 Interpreter Configuration

For JDBC

Update the below proeprty in jdbc.json underOFS_MMG/mmg-studio/server/builtin/interpreters

"propertyName": "default.url"

"defaultValue": "<JDBC_URL>"

For example: jdbc:oracle:thin:@ofss-mum-1033.snbomprshared1.gbucdsint02bom.oraclevcn.com:15 21/MMG19PDB

"propertyName": "default.user",

"defaultValue": "<schameusername>"

For example: The schema user to which you want to connect, for example: datastudio schema name,

"propertyName": "default.password",

"defaultValue": "<schemapassword>"

For example: Password of the provided schema user.

Start the jdbc interpreter by executing below command under //OFS_MMG/mmg-studio/interpreter-server/jdbc-interpreter-22.4.3/bin ./

jdbc-interpreter

If the jdbc interpreter needs to be included in the datastudio startup script remove the below entry from /OFS_MMG/mmg-studio/bin/startup.sh --jdbc -1.

For Spark

Configuration with Kerberos enabled remote spark cluster:

1. Copy the configured Spark directory from hadoop cluster to <MMG Studio>/interpreter-server/spark-interpreter/extralibs. For example: spark-2.4.8-bin-hadoop2.7
2. Copy the below files to the <MMG Studio>/interpreter-server/spark-interpreter/extralibs krb5.conf <keytabfile>.keytab
3. To run Spark in yarn-client mode, configure the following parameters in this file OFS_MMG/mmg-studio/server/builtin/interpreters/spark.json
   spark.master = yarn-client

   spark.driver.bindAddress = 0.0.0.0

   spark.driver.host = <host> -> Apache Spark host

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> **Note**
>
> When using the Kubernetes interpreter lifecycle, <host> can be the IP address or hostname of any node in your Kubernetes cluster. When using the Host interpreter lifecycle, <host> should be the IP address or hostname of the node that runs the Spark interpreter.

> **Note**
>
> When connecting to a YARN cluster, the Spark driver authenticates as the UNIX user that runs the Spark interpreter. You can set the HADOOP_USER_NAME environment variable to make the Spark driver authenticate as a different user. If you use the Host interpreter lifecycle, then you can do this by exporting the HADOOP_USER_NAME environment variable before starting the Spark interpreter process. If you us the Kubernetes interpreter lifecycle, then you can do this by setting the HADOOP_USER_NAME environment variable in the resource manifest (spark.yml).

4. Update file spark-defaults.conf keytab location to the location where <keytabfile>.keytab file is copied
5. Update file spark-env.sh with the krb5.conf location to the location where krb5.conf file is copied.
   For example: Djava.security.krb5.conf=/OFS_MMG/mmg-studio/interpreter-server/spark-inte rpreter-22.4.2/extralibs/krb5.conf".

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6
Post-installation Steps

On successful installation of the application, refer to the below topics for post-installation procedures.

6.1 Access the Application

To access the application, follow these steps:

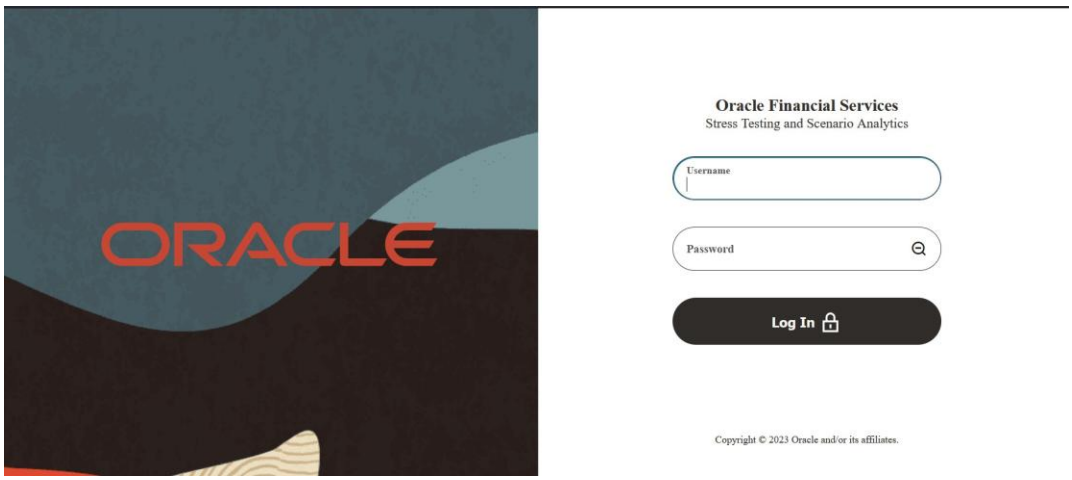
- Open a browser and enter the URL in the following format:

  `http(s)://est service host name: <MMG_GATEWAY_PORT>/<context_path>/home`

  For example:

  `https://xyz.com:4155/mmgservice/`

Figure 6-1 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 setup before starting to use the application. 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.

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Note

Run the following scripts manually for the user user-group mapping/unmapping in OFS AAI:
The following two flags must be added in the configuration table of the config schema:

```
MERGE INTO CONFIGURATION a USING (SELECT 1 FROM DUAL) b ON ( a.PARAMNAME=
'ENB_CSTM_GRP' ) WHEN NOT MATCHED THEN INSERT ( a.PARAMNAME,
a.PARAMVALUE,a.DESCRIPTION) VALUES ('ENB_CSTM_GRP','true','Enable  custom
group creation during JIT')

/

MERGE INTO CONFIGURATION a USING (SELECT 1 FROM DUAL) b ON ( a.PARAMNAME=
'ENB_GRP_SYNC' ) WHEN NOT MATCHED THEN INSERT ( a.PARAMNAME,
a.PARAMVALUE,a.DESCRIPTION) VALUES ('ENB_GRP_SYNC','true','Enable
unmapping operation during JIT')

/
```

Two new flags are introduced in configuration table:

- **ENB_CSTM_GRP** - If this flag is set as *true*, then custom groups can be created. If this flag is set as *false*, then the user will not be able to create custom groups and assign it to the user.
- **ENB_GRP_SYNC** - If this flag is set as *true*, then the unmapping of users and groups are enabled. If this flag is set as *false*, then the user will not be able to unmap groups and users.

Based on these flags, unmapping of users with groups on user login is enabled.

Table 6-1 Seeded User Groups

User Group Name	User Group Description
MDLREV	The Modeling Reviewer Group. Users mapped to this group have access to the menu items in the OFS MMG Application that are related to model review activities.
MDLAPPR	The Modeling Approver Group. Users mapped to this group have the rights to approve models created by the users.
MDLBATCHUSR	The Modeling Batch User. Scheduler can use this Group for executing batches.
WKSPADMIN	The Workspace Administrator Group. Users mapped to this group have access to all the menu items in the OFS MMG Application. Additionally, they have authorization rights to create and populate workspaces.
MDLUSR	The Modeling User Group. Users mapped to this group have access to all the menu items in the OFS MMG Application that is related to model creation.

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Table 6-1 (Cont.) Seeded User Groups

User Group Name	User Group Description
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. The following roles are mapped to this group and enables view/edit/delete of the import/export UIs and its definitions in the MMG UI: • OMEXADVND • OMEXPHTM • OMEXREAD • OMEXWRITE • OMIMADVND • OMIMPHTM • OMIMREAD • OMIMWRITE
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 the application home page is accessible only if the below seeded groups are mapped to the user:

- IDNTYADMN
- IDNTYAUTH

6.4 .PEM file creation for Model Service

After installing the application, for the model serve to work, if the `server.pem` file is not present then you must create it.

It must be created from `server.keystore` in the same path where the `server.keystore` file is present by using the following command:

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


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For Example:

```
openssl pkcs12 -in

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

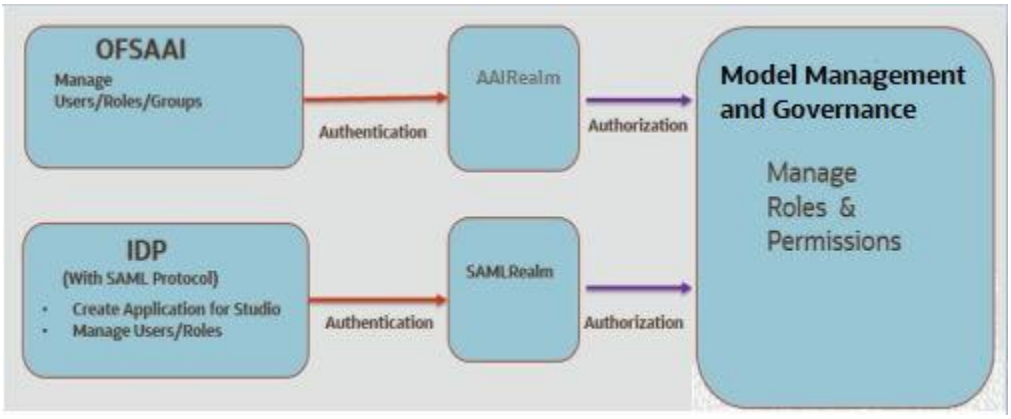
/scratch/users/ofsaa/dev_home/config/server.pem -nodes
```

6.5 Access and Permissioning Management

The application 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 Application is accessed using the following realms that you have selected during the installation of the 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 application by 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 application by using the Permission feature.

Figure 6-2 Authentication and Authorization process in the application



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6.5.1 Access MMG using AAI Realm

This section provides information on creating users who can access MMG using the AAI Realm 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. Configure 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. In OFSAA Application, **Allow user to log in from multiple machines** option must be enabled.

   REST API Calls
   There is need for Model Scripts to access input parameters passed by REST API Calls:

   a. The REST API optional parameters are mapped to runtime parameters , this mapping needs to be documented. It is not apparent from runtime parameter section.

   b. The mapped simple params can be accessed with script segment like below , but it is not supporting base64 encoding and/or json hp = '${hyperparams}' cnf = '${conf}' 3.the enhancement against json is retracted as we can do base64 encrypted value passing

   ```
   {
   "RUN_ID": 2,
   "RUN_CODE": 200440,
   "PARAM_SET": {
   ```


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```
"CALL_TYPE": "PASS_THROUGH_RATE",
"BOLLINGER_PERIOD": 3,
"BOLLINGER_COEFFICIENT": 1,
"DATA_SNAP_FREQ": 1,
"DATA_SNAP_FREQ_MULTIPLIER": "D",
"MISSING_VALUE_TECH": "inpol",
"MISSING_THRESHOLD_PERCENTAGE": 30,
"START_DATE": 20230131,
"END_DATE": 20230431,
"EXECUTED_BY": "TESTUSR",
"REFRESH_DATA": "Yes"
},
"SLICE": [
{
"SEQ": 1,
"LOGICAL_PARTITION_NAME": "DEFAULT",
"TABLE_NAME":"FSI_I_NM_MLSTAGE"
}
],
"OUTPUT_DATA": {
"PLOTS_TAB": "FSI_O_NM_PLOTS",
"MILESTONE_TAB": "FSI_O_NM_MILESTONE",
"SCORE_TAB": "FSI_O_NM_MODEL"
}
}
```


For example: base64 encryption

3. Restart the WebLogic webserver.

6.5.2 Access MMG using SAML Realm

This section provides information on managing users who can access MMG with Identity Provider (IdP or IDP). 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 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 SAML Realm. To integrate MMG with IdP as the SSO Provider, follow these steps:

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> **Note**
>
> When SAML Realm is used and `aai.enable.fetchgroups=true`, then OFS MMG authenticates the user through the SAML Identity Provider (for example, IDCS) and fetches the user's group memberships from AAI (OFSAA). In this configuration, each user must be explicitly assigned or mapped to the SAML application in the Identity Provider, group membership alone is not enough for accessing the application.
>
> If a user is not mapped to the SAML application, the SAML login may succeed but the user will not be authorized to access OFS MMG.

1. Create the following roles in the IDP System:

   For MMG:

   - 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 or 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 configuration schema to create the required metadata.

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Ensure that you run this script multiple times against each username. Additionally, generate the merge scripts accordingly.

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

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

Sample Commands:

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

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

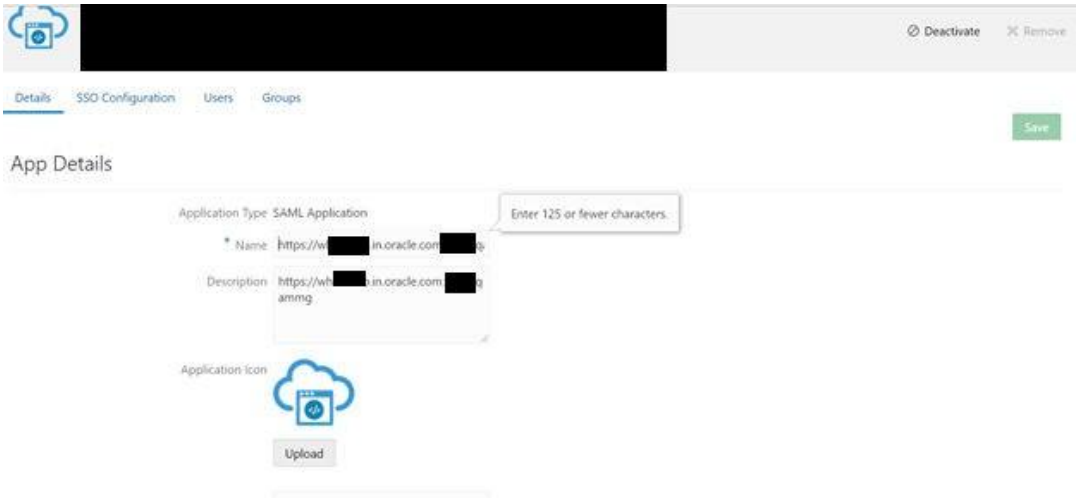
OFSAAAIINFO EMFLD
```

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:

Figure 6-3 IDCS Server



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

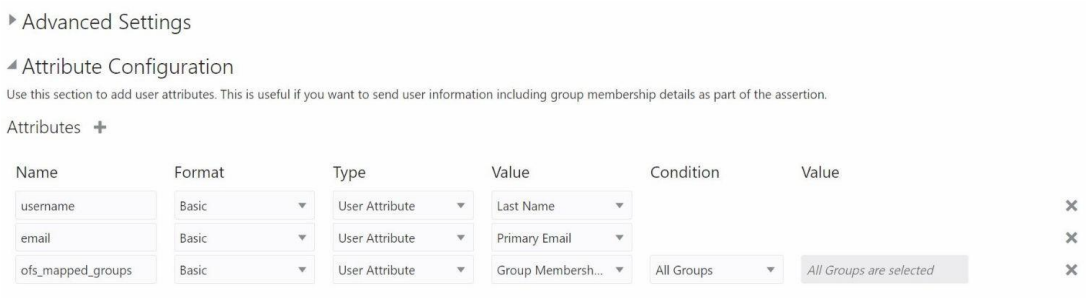
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Figure 6-4 SSO Configuration section



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Figure 6-5 IDCS Server



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

The user has to upload the certificate.

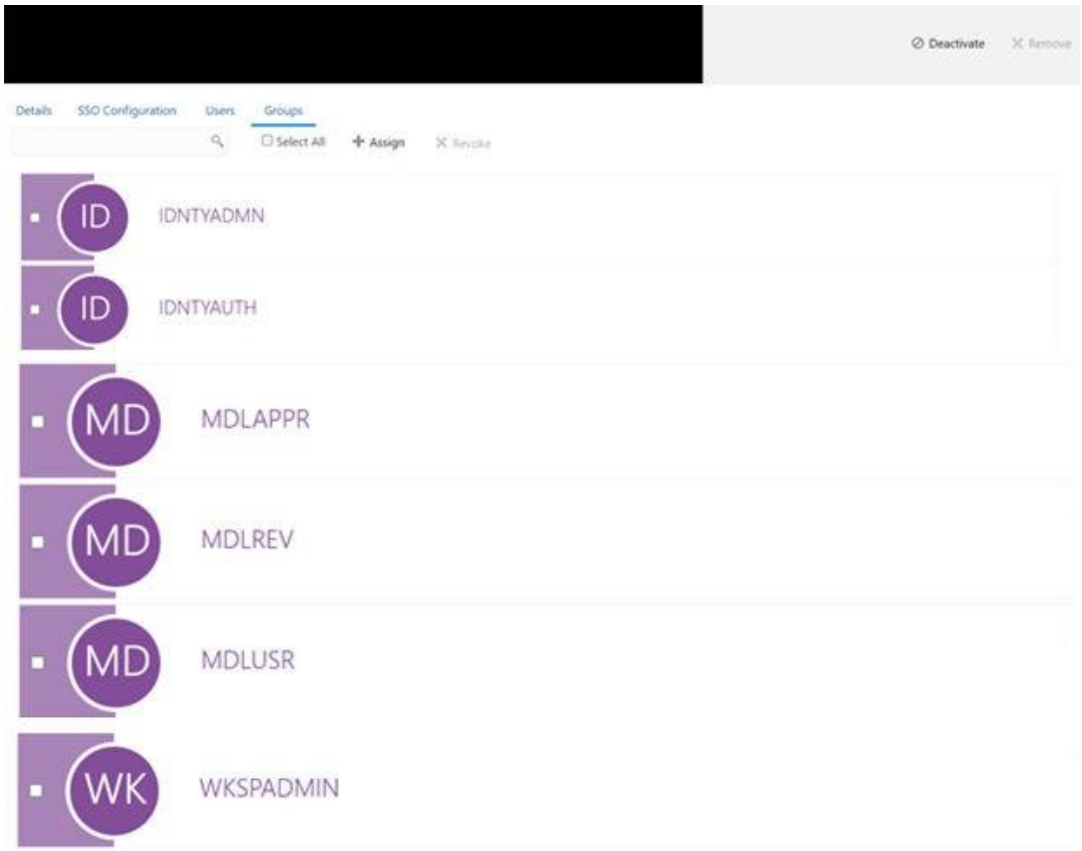
The user can generate the certificate by following these steps:

- Create .cer and .pem file from the below command.
- Upload the same .cer to the idcs Signing certificate option as well:
  openssl req -x509 -nodes -days 365 -newkey rsa:2048 -keyout sp-privatekey.pem -out sp-certificate.cer

4. Navigate to Group section and Configure User Groups.

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Figure 6-6 Configure User Groups in Group section



6.8 BI Multi-Workspace Results Configuration

After installation or upgrade, you must configure Oracle Analytics Server (OAS) to enable BI Multi-Workspace Results. This involves deploying the latest RPD and Catalog files from the STSA installed directory and updating the required connection pool properties in the RPD.

> **Note**
>
> Customers upgrading from Release 8.1.2.6.0 or earlier may already have an older RPD in use. After upgrade, you must replace it with the latest RPD and Catalog from the STSA installed directory and update only the connection pool properties described in this section.

Source Files

Take the following files from the STSA installed directory:

- RPD:
  `<STSA_INSTALLED_DIR>/OFS_STSA/STSABI/OAS 7.0/Repository/Stress Testing and Scenario Analytics.rpd`
- Catalog:
  <STSA_INSTALLED_DIR>/OFS_STSA/STSABI/OAS 7.0/Catalog/Stress Testing and Scenario Analytics.catalog

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6.8.1 Connection Pool Configuration

In the RPD, update only the following connection pool. All other connection pool properties must remain unchanged.

Table 6-2 Connection Pool to Update: OFSAA_EST_PROCESSING_INIT

Property	Value
Data source name	`<customer host>:<port>/<service>`
User name	STSA configuration schema user
Password	STSA configuration schema password

Table 6-3 Connection Pool That Must Remain Unchanged: EST Connection Pool

Property	Value
Data source name	`VALUEOF(NQ_SESSION.DSN)`
User name	`VALUEOF(NQ_SESSION.V_USERNAME)`
Password	`VALUEOF(NQ_SESSION.<decrypted password variable>)`

6.8.2 Required Database Permissions

Grant the following database permissions before deploying:

- Grant *EXECUTE* on *DBMS_CRYPTO* to the STSA configuration schema.
- Grant *EXECUTE* on *DBMS_CRYPTO* to *Sandbox_Schema* if sandbox decryption is used.
- Grant *SELECT* on *STSA_TENANT_CONNECTION_INFO_VW* (in the STSA configuration schema) to *Sandbox_Schema*.

6.8.3 Required Database Objects

Verify that the following objects exist and are populated before deployment:

In the STSA configuration schema:

- `STSA_TENANT_CONNECTION_INFO_VW`
- `AES_JAVA_COMPAT_DECRYPT_FUN`
- `AES_SALT` entry in the `CONFIGURATION` table
- `TENANT_CONNECTION_INFO` table, with rows populated for all workspaces

In `Sandbox_Schema`:

- `STSA_TENANT_CONNECTION_INFO_VW_SYN` (synonym)
- `STSA_TENANT_CONNECTION_INFO_SANDBOX_VW` (view)

6.8.4 Troubleshooting

If BI Multi-Workspace Results is not returning data, verfiy the following:

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Table 6-4 Troubleshooting

Object / Component	Validation Required
CONFIGURATION table	Confirm that *AES_SALT* exists.
TENANT_CONNECTION_INFO table	Confirm that a row exists for the relevant workspace.
STSA_TENANT_CONNECTION_INFO_VW	Confirm that the row is visible.
STSA_TENANT_CONNECTION_INFO_VW_SYN	Confirm that the synonym is valid.
STSA_TENANT_CONNECTION_INFO_SANDBOX_VW	Confirm that the view is queryable.
Sandbox_Schema permissions	Confirm that *Sandbox_Schema* has *SELECT* permission on *STSA_CONFIG_SCHEMA.STSA_TENANT_CONNECTION_INFO_VW*.
Password decryption	Confirm that decryption is functioning correctly.
OFSAA_EST_PROCESSING_INIT connection	Confirm that the test connection is successful.
BI init block	Confirm that the init block is returning *DSN*, username, and decrypted password.

6.8.5 Limitations

- **Password rotation or salt key change:** Whenever the password or *AES_SALT* key is rotated, you must update the *TENANT_CONNECTION_INFO* table using *AESCryptorService*. Failure to do so will break decryption for affected workspaces.
- **AES_SALT consistency:** The *AES_SALT* value in the *CONFIGURATION* table must not be changed after initial setup. Changing this value invalidates all encrypted entries in *TENANT_CONNECTION_INFO* and will cause decryption failures across all workspaces.

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6.9 Model Pipeline Multi-Level Approval Configuration

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 `<installation directory>/MMG/OFSMMG/conf/workflow/model-pipeline/default.yml`

   Following are the default values:
   workflow:

   workflow-name: Default Workflow

   num-approver-levels: 1

   levels:

   - level: 1

   approvers:

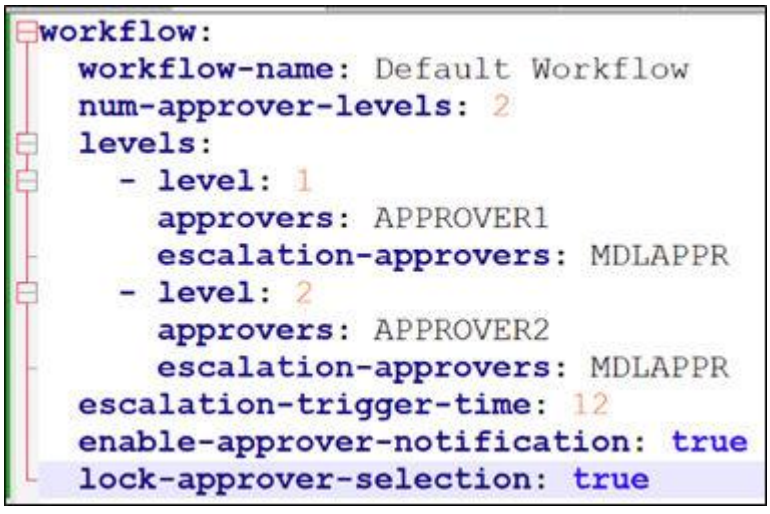
   escalation-approvers:

   escalation-trigger-time: 0

   lock-approver-selection: false

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

Figure 6-7 Multi level approval



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7
Upgrading or Patching STSA

This section describes the steps to upgrade or patch the Oracle Financial Services Stress Testing and Scenario Analytics (STSA) application, including the bundled Model Management and Governance (MMG) components.

You can upgrade STSA in the following scenarios:

- When STSA and MMG are provisioned and upgraded together.
- When MMG is already installed and STSA was provisioned using the `SkipMMG` flag.

7.1 Upgrading STSA and MMG Together

If STSA and MMG are provisioned together, perform the following steps to upgrade both components:

1. Create a backup of the existing installed files. To do so, rename the existing OFS_STSA directory to backup.
2. Copy the new build archive to the server and place the new installer `.zip` file in the same or a different directory.
3. Extract the installer files and unzip the archive and complete all steps required for a fresh installation.
4. Update the configuration files. To do so:
   a. Use the new `ConfigForEST.sh` and `config.sh` files.
   b. Copy values from the existing files, retain previous settings, and provide values for newly introduced properties.
5. Retain critical path and port values. To do so, Ensure that `LOG_HOME`, `FTPSHARE`, `WALLET_LOCATION`, and all port numbers remain consistent with the earlier installation.
6. Generate the keys and token. To do so, complete the MMG prerequisites by generating keys and token, and apply the necessary database grants for Data Pipeline usage if applicable.
7. Run the deployment script. To do so, navigate to the STSA bin directory and run the following command to reinstall the application:

   ```
   ./deploy.sh
   ```

   > **Note**
   >
   > Before running the deployment script, ensure that both STSA and MMG services are shut down.

8. Run the update script to refresh database properties. To do so, execute the following command to update application properties and replace the token in the database:

   ```
   ./deploy.sh -U
   ```


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9. After successfully completing the previous step to upgrade the sandbox schemas with the latest changes, start all services by running `./startup.sh`.
10. After all services are up and running, log in to the application.
11. From the application home page, open **More Options** for the required sandbox.
12. Select **Details** to open the sandbox Details page.
13. Click **Sync Configuration** to start the sandbox upgrade process.
14. Verify that the process completes successfully by confirming the displayed success message.

> **Note**
>
> Sync Configuration also re-runs Enterprise RWA Stress Assessment provisioning for the sandbox. This provisioning is workspace-specific: RWA objects, models, processes, and Data Pipelines are resolved or created in the target workspace and are not copied from the source workspace.
>
> Provisioning runs as an ordered set of stages and stops at the first failed prerequisite; remaining stages are marked Skipped rather than run. A response of HTTP 207 (Multi-Status) indicates a partial completion even though the overall Sync Configuration step may report success. If you see a partial result, review the per-stage status and re-run Sync Configuration to resume the remaining stages.

7.2 Upgrading STSA with Existing MMG (SkipMMG Flag)

Use this procedure if MMG is already installed and STSA was initially provisioned using the SkipMMG flag. In this case, only the STSA components need to be upgraded, while MMG remains unchanged.

1. Back up the existing MMG and STSA installations. To do so, rename both directories or move them to a safe location.
2. Copy the new build archive to a common location. To do so, use a shared directory for the STSA `installer .zip` file.
3. Follow the same upgrade procedure. Complete all the steps described in Upgrading STSA and MMG Together.

> **Note**
>
> Reprovisioning the same version using these steps does not affect the installation.

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8
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.

8.1 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.

8.2 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.

8.3 Configuring Password Store with Oracle Wallet

To configure the password store with Oracle Wallet:

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- 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.

8.4 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##' whereV_URL_NAME in

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

/
```

8.5 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.

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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'

/
```

8.6 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.

8.7 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_ALIAS##' where
   V_PROPERTY_NAME = 'WALLET_ALIAS' and V_DB_NAME = '##DATASOURCE NAME##'

   /
   ```

8.8 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.

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For more details, see Updating the Host Details.

8.9 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`

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9
Additional Configuration

9.1 RPD and Catalog Deployment

9.1.1 Deploying STSA RPD File

To deploy the RPD, follow these steps:

Before deploying and configuring the RPD, ensure all of the following conditions are met:

- The STSA_TENANT_CONNECTION_INFO_VW view must be available in the config schema as well as in all data sandboxes. The view data must be identical across all schemas.
- Ensure that all data sandboxes and the config schema are up and running before proceeding with deployment.

1. Unzip `stsa-installer.zip` to extract the ESTBI component, which contains `Stress Testing and Scenario Analytics.rpd` and `Stress Testing and Scenario Analytics.catalog`.
2. Copy the `Stress Testing and Scenario Analytics.rpd` and `Stress Testing and Scenario Analytics.catalog` files to a folder on the server where OAS is installed.
3. Open the extracted Stress Testing and Scenario Analytics.rpd file in offline mode using the Oracle Analytics Administration Tool, and configure the required database connections. To do so:

> **Note**
>
> The Oracle Analytics Administration Tool requires a 64-bit Windows operating system.

   a. In the **Oracle Analytics Administration Tool**, go to the **File** menu and select **Open** > **Offline**.
   b. Select the `Stress Testing and Scenario Analytics.rpd` file.
   c. Enter the repository password to access the file.

> **Note**
>
> - The RPD file uses a default password for the initial login. Refer to the applicable My Oracle Support (MOS) document for the password.
> - To change the password, select **File** > **Change Password**, then enter the current and new passwords.

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4. Modify the connection pools in the RPD. To do so:
   a. In the Physical layer, expand the OFSAA_EST_Results Database.

      > **Note**
      >
      > No updates are required for the EST Connection Pool

   b. Double-click OFSAA_EST_PROCESSING_INIT Connection Pool.
   c. Update the following fields:

Table 9-1 Modifying the connection pools

Field	Description
Data source name	Enter the TNS entry name of the EST Config Schema database instance. **Note** You can find these details in the STSA wallet configured in Setup the Password Stores for Database User Accounts.
Username	Enter the EST Config schema username.
Password	Enter and confirm the EST Config schema password.

   d. Click **OK** to save the changes.
   e. From the **File** menu, select **Save** to save the RPD file. When the "**Do you wish to check global consistency**" dialog box appears, click **No**.
5. Upload the RPD file to the Oracle Analytics Server:
   a. Open a terminal window on the server where OAS is installed.
   b. Navigate to the following directory:
      `<OAS_DOMAIN_HOME>/bitools/bin`
   c. Run the following command to upload the RPD file:
      ```
      ./datamodel.sh uploadrpd -I "<RPD Path>/Stress Testing and Scenario Analytics.rpd" -SI ssi -U weblogic -P <weblogic password>
      ```
   d. When prompted, enter the RPD file password to complete the upload.

9.1.2 Deploying the STSA Catalog File

To deploy the STSA Catalog file"

1. Paste the copied catalog files into a local folder.
2. Open the Oracle Analytics Server (OAS) URL in a browser and log in using your server credentials:

   `http://<ipaddress>:<port>/analytics`

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3. Click the Catalog link in the top-right corner.
4. Once the catalog opens, a directory structure displays on the left-hand side. Do the following:
   a. Select Catalog Root, then choose Shared Folders in the left-hand tree structure.
   b. From the **File** menu, select **Unarchive**.
   You will be prompted to provide the file path.
   c. Use the **Browse** button to locate the archived catalog file in your local directory, and click **OK**.

> **Note**
>
> Ensure that the catalog is extracted into the **Shared Folders** directory for the reports to display correctly. A success message will be shown upon completion.

5. 5. Open the Data Visualization (DV) interface using the following URL: `http://<ipaddress>:<port>/dv/ui`.
6. Log in using your environment-specific credentials and verify that the reports are available.

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10

Frequently Asked Questions (FAQs) and Error Dictionary

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

Topics:

Related Topics

- Frequently Asked Questions
- Frequently Asked Questions (FAQs) and 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 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.

10.1.1 Frequently Asked Questions

1. Why does my console show an unsuccessful message during wallet creation?
   Please check if you have run the following commands correctly. For more information on wallet creation, see Setup Password Stores with Oracle Wallet.
   a. `mkstore -wrl <wallet_location> -create` //creates a wallet in the specified location.
   b. `mkstore -wrl <wallet_location> -createCredential <alias-name> <database-user-name>` //creates an alias in the Studio Schema.
   c. `mkstore -wrl <wallet_location> -createCredential <alias-name> <database-user-name>` //creates an alias in the Atomic Schema.
   d. `mkstore -wrl <wallet_location> -createCredential <alias-name> <database-user-name>` //creates an alias in the configuration schema.

   If your issue is still not resolved, contact My Oracle Support (MOS).
2. Where can I find my created wallet?
   Your wallet will be in the directory you have set as your wallet location.

   If your issue is still not resolved, contact My Oracle Support (MOS).
3. When should I create a Database link, and if yes, how do I do it?
   Create a Database link to connect the Atomic and Configuration Database Schemas to the Studio Database Schema if the databases are different. You must create the link in the Studio Database.

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

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

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

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

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

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

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

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

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

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

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

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


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

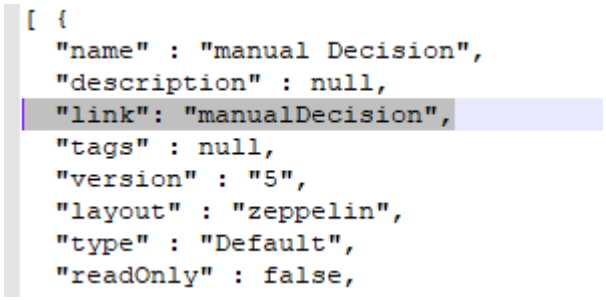
Then, perform the below steps as a workaround -

Export the "Manual Decision" Notebook

Add the link parameter just below Description

for Ex - "link": "manualDecision",

Figure 10-1 Manual Decision



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

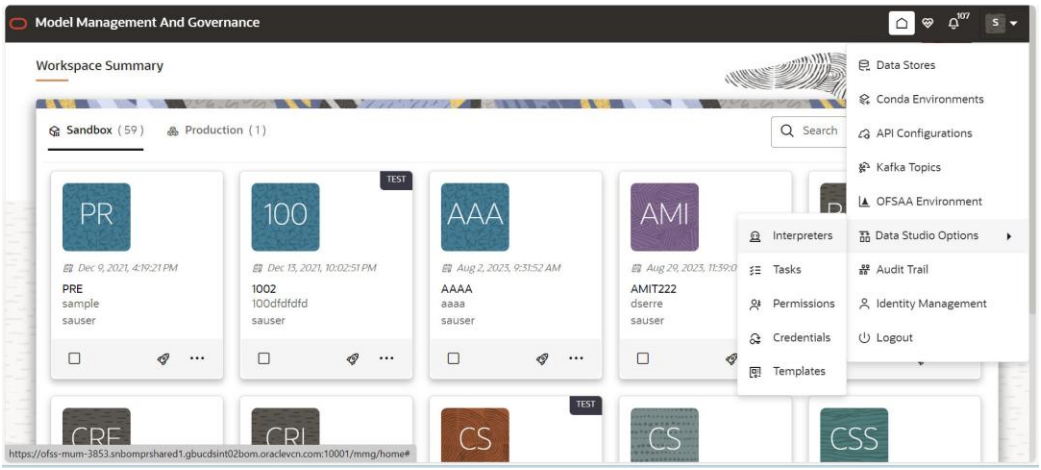
Truncate the table “fcc_er_paragraph_manual" in Studio Schema. Import the modified notebook again.

13. How do I increase **ZEPPELIN_LIMIT_INTERPETER_OUTPUT** in the Python Interpreter? Perform the following steps to increase **ZEPPELIN_LIMIT_INTERPETER_OUTPUT** in the Python Interpreter:

    a From UI: Using Wizard screen
    Go to Interpreters screen in MMG-Studio from Datastudio Options tab.

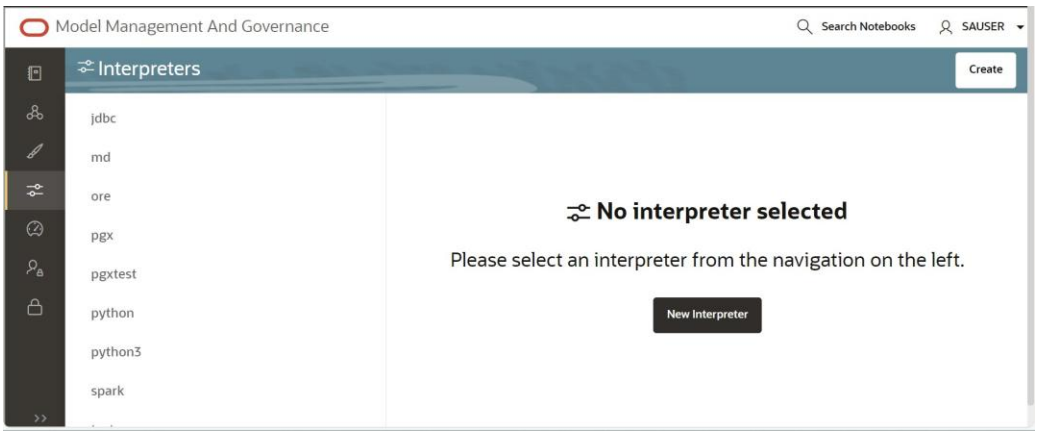
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Figure 10-2 Datastudio Options tab



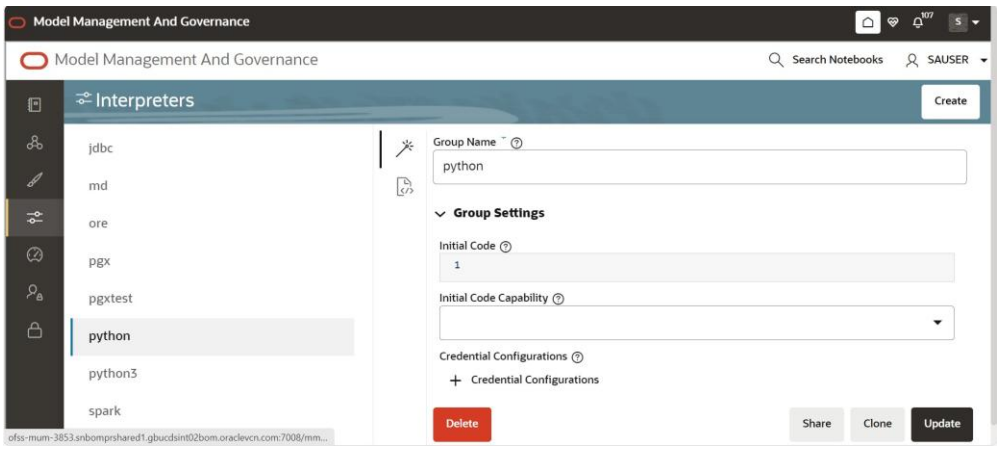
b Once on the interpreters option screen select the Python Interpreter for which we want to configure the zeppelin.limit.interpreter.output.

Figure 10-3 Interpreter screen



c Select python from the LHS options.

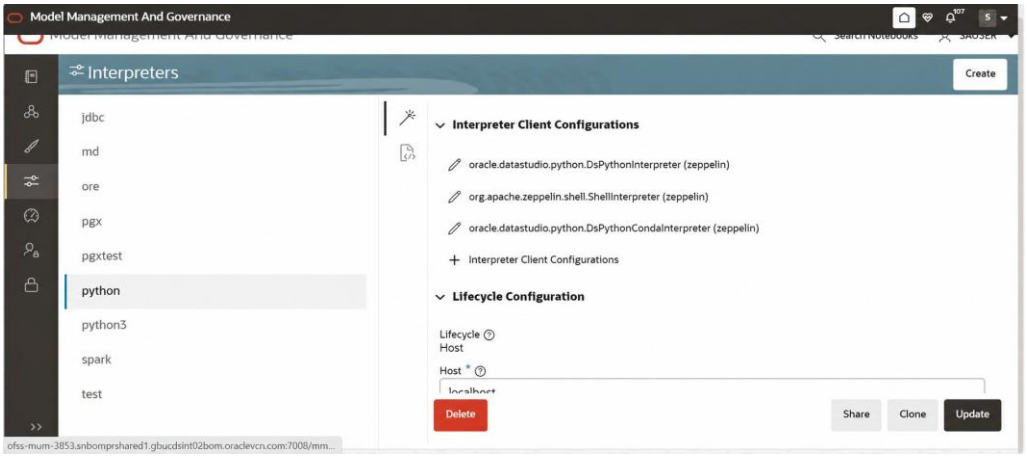
Figure 10-4 Python Interpreter



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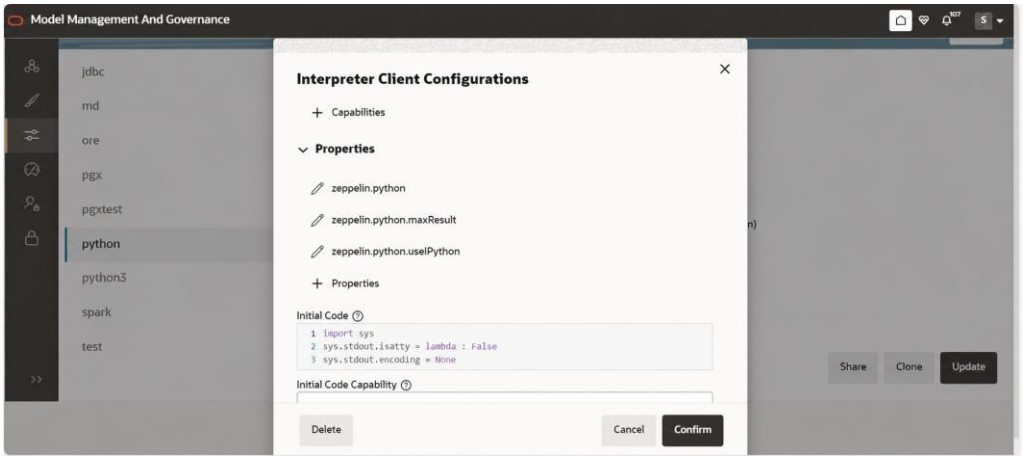
d Now scroll down in the RHS side and click on the oracle.datastudio.python.DsPythonInterpreter under Interpreter Client Configurations it will open a popup.

Figure 10-5 Interpreter Client Configurations



e In the popup scroll down and click on + Properties under Properties as shown:

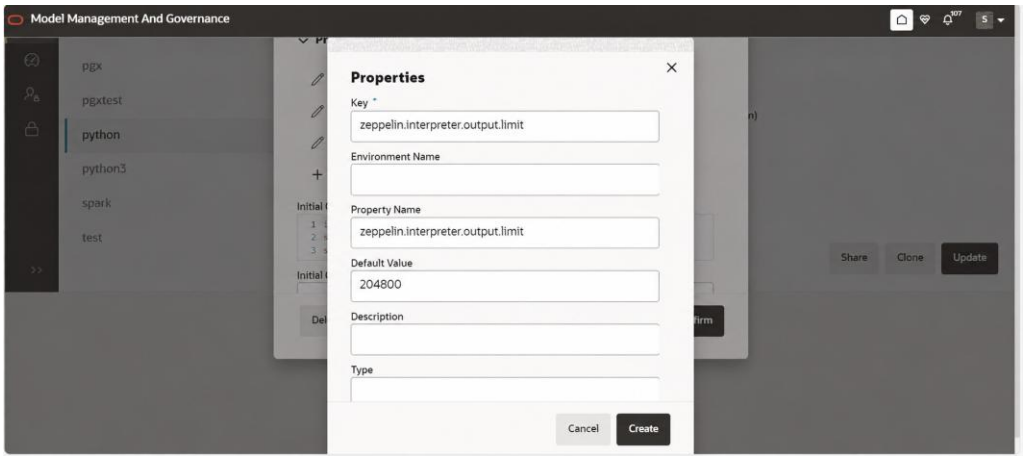
Figure 10-6 Properties screen



f Another popup will open fill the options as shown and set the default value according to your needs if you are not able to see the Create and Cancel button, click on the part of the popup pointed by red arrow. The default value for zeppelin.interpreter.output.limit if not set is 102400 (in bytes).

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Figure 10-7 Popup box



> **Note**
>
> Increasing the default option from 102400 to some bigger value will slow down the rendering of outputs of python paragraphs.

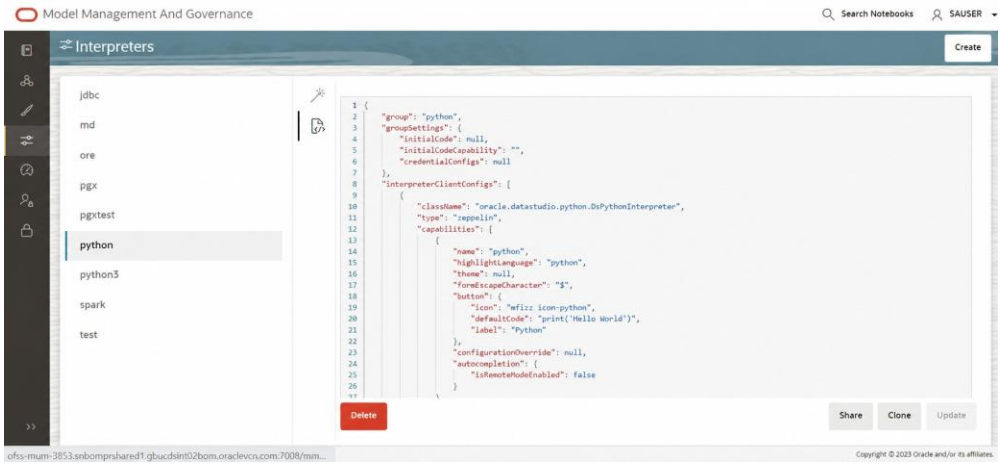
g. Once filled click on Create (you will see zeppelin.interpreter.output.limit under the Properties section), then click on **Confirm** (if you are not able to see the Confirm button on the UI, either click on the same shaded area on popup as highlighted in above image or zoom out in UI of browser) and then click on Update in the lower right side of the screen.

h. After following all the above steps, restart the MMG-Studio for changes to reflect.

a. Using JSON screen

i. Follow the steps i, ii and iii from above, then click on the following icon on UI pointed by red arrow and following json config view will open.

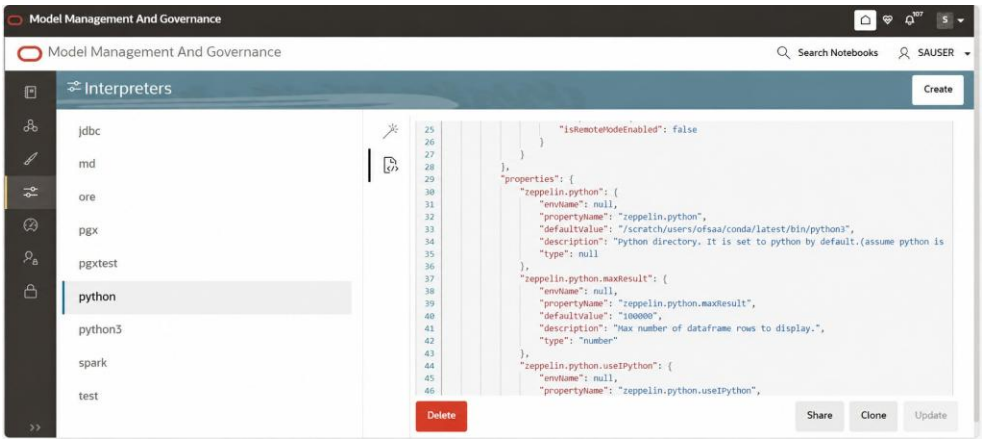
Figure 10-8 JSON Config View



ii. Scroll down under interpreterClientConfigs with className oracle.datastudio.python.DsPythonInterpreter you will find following properties section with bunch of zeppelin configurations.

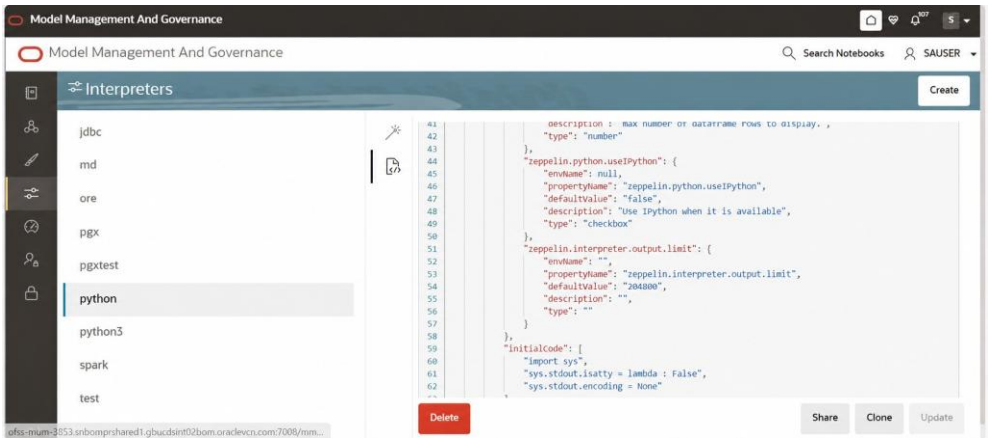
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Figure 10-9 Interpreter Client Config



iii. After the last entry in properties add the zeppelin.interpreter.output.limit also as shown in the following image:

Figure 10-10 Properties screen



iv. After doing the change the Update button will get enabled in the bottom right corner click on it, you will get a message as “python interpreter updated”.

v. Now restart the MMG-Studio service for changes to reflect.

b. From filesystem: (Datastudio version 23.4.x onwards)

i. Go to the Python Interpreter option as pointed out in From UI using wizard screen option above, if you have already ran the MMG services before you will see the python interpreter listed there. Delete it, if you are running the MMG Application for the first time on a fresh schema then you do not need to do this step.

ii. After deleting the Python Interpreter or if start has not been done yet, go to filesystem inside mmg-home/mmg-studio/server/builtin/interpreters, open python.json in a text editor.

iii. Scroll down under interpreter ClientConfigs with className oracle.datastudio.python.DsPythonInterpreter you will find following properties section with bunch of Zeppelin configurations. After the last entry in properties add the Zeppelin Interpreter.output.limit also as shown in step iii) of 1) From UI b) using JSON screen (last image of From UI way). Save the python.json with the desired default value and the changes done.

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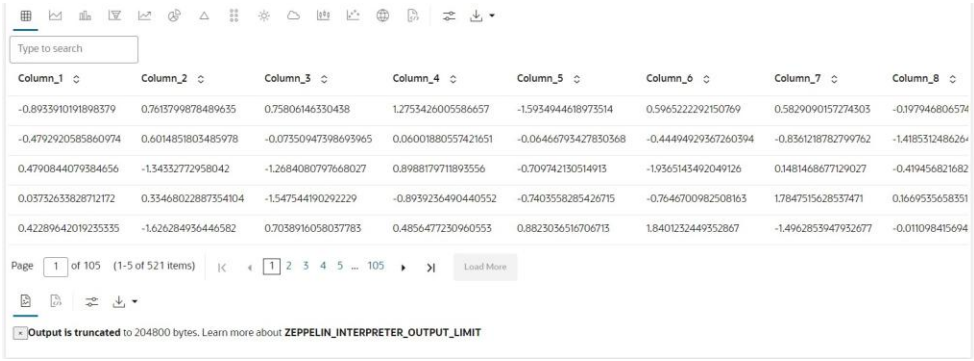
iv. Now restart/start the MMG-Studio for your changes to reflect.

> **Note**
>
> If you have configured the python environment for MMG-Studio (basically you have installed pandas and numpy which are subset of libraries required by MMG as pre-req), you can run the below script on python paragraph.

```
%python
import pandas as pd
import numpy as np
# Create 1000 rows of random data for 20 columns
data = np.random.randn(1000, 20)
# Create column names columns = [f"Column_{i+1}" for i in range(20)]
# Create DataFrame df = pd.DataFrame(data, columns=columns)
# Display the DataFrame
z.show(df)
```

Output in table view

Figure 10-11 Output in table view



You can see the ZEPPELIN_INTERPRETER_OUTPUT_LIMIT value as warning if the table content is more than the set default value for zeppelin.interpreter.output.limit and accordingly you can modify the default value for same.

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.

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Figure 10-12 Zeppelin Interpreter



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.config.ConfigMapPropertySource - Can't read configMap with name: [<Service Name>] in namespace:[null]. Ignoring.io.fabric8.kubernetes.client.KubernetesClientException: Operation: [get] for kind: [ConfigMap] with name: [<Service Name>] in namespace: [null] failed. at io.fabric8.kubernetes.client.KubernetesClientException.launderThrowable(KubernetesClientException.java:64) ~[kubernetes-client-4.4.1.jar!/:?] at io.fabric8.kubernetes.client.KubernetesClientException.launderThrowable(KubernetesClientException.java:72) ~[kubernetes-client-4.4.1.jar!/:?] at io.fabric8.kubernetes.client.dsl.base.BaseOperation.getMandatory(BaseOperation.java:229) ~[kubernetes-client-4.4.1.jar!/:?] at io.fabric8.kubernetes.client.dsl.base.BaseOperation.get(BaseOperation.java:162) ~[kubernetes-client-4.4.1.jar!/:?] at org.springframework.cloud.kubernetes.config.ConfigMapPropertySource.getData(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.

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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 should you do when UI pages does not load due to less network speed?
The default time to load all the modules of OJET/REDWOOD page is 1 minute. Reload the page to view the UI pages.

19. 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)

20. 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

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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.

21. 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.

22. 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.
    ```

23. What should I do to reconfigure DS Studio server port and its interpreter's default port to available ports?
You can configure the DS Studio server port and its interpreter's default port via the config.sh file. See the Configure the config.sh file topic.

24. Dataset issue with the latest version of pydantic package (2.18.7)
Pydantic package (2.18.7) is incompatibile with MMG functionality. So, when you reinstall the package the uninstall and reinstall pydantic package version 1.10.13.

    - python3 -m pip uninstall pydantic
    - python3 -m pip install pydantic==1.10.13 --user

25. How do I install OFS MMG Python dependencies from a local repository (Artifactory)?
In order to install the Python dependencies from the MMG tarball (`mmg-<version>.tar.gz`) by using a local repository, run: (Replace `<version>` with your OFS MMG build version.)

    ```
    python3 m pip install mmg<version>.tar.gz \
    --index-url http://artifactory.XYZ.com/artifactory/api/pypi/XYZ-py-local/simple \
    --trusted-host artifactory.XYZ.com
    ```

    Add an extra index URL if they are differentL

    ```
    python3 m pip install mmg<version>.tar.gz \
    --index-url http://artifactory.XYZ.com/artifactory/api/pypi/XYZ-py-local/simple \
    --extra-index-url http://artifactory.XYZ.com/artifactory/api/pypi/XYZ-py-local/simple \
    --trusted-host artifactory.XYZ.com
    ```


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26. MMG Configuration steps for Interpreters

    a **For JDBC**

    Update the below proeprty in jdbc.json underOFS_MMG/mmg-studio/server/builtin/interpreters

    "propertyName": "default.url"

    "defaultValue": "<JDBC_URL>"

    For example: jdbc:oracle:thin:@ofss-mum-1033.snbomprshared1.gbucdsint02bom.oraclevcn.com:15 21/MMG19PDB

    "propertyName": "default.user",

    "defaultValue": "<schameusername>"

    For example: The schema user to which you want to connect, for example: datastudio schema name,

    "propertyName": "default.password",

    "defaultValue": "<schemapassword>"

    For example: Password of the provided schema user.

    Start the jdbc interpreter by executing below command under //OFS_MMG/mmg-studio/interpreter-server/jdbc-interpreter-22.4.3/bin ./

    jdbc-interpreter

    If the jdbc interpreter needs to be included in the datastudio startup script remove the below entry from /OFS_MMG/mmg-studio/bin/startup.sh --jdbc -1.

For Spark

Configuration with Kerberos enabled remote spark cluster:

a. Copy the configured Spark directory from hadoop cluster to <MMG Studio>/interpreter-server/spark-interpreter/extralibs. For example: spark-2.4.8-bin-hadoop2.7

b. Copy the below files to the <MMG Studio>/interpreter-server/spark-interpreter/extralibs krb5.conf <keytabfile>.keytab

c. To run Spark in yarn-client mode, configure the following parameters in this file OFS_MMG/mmg-studio/server/builtin/interpreters/spark.json
spark.master = yarn-client

spark.driver.bindAddress = 0.0.0.0

spark.driver.host = <host> -> Apache Spark host

> **Note**
>
> When using the Kubernetes interpreter lifecycle, <host> can be the IP address or hostname of any node in your Kubernetes cluster. When using the Host interpreter lifecycle, <host> should be the IP address or hostname of the node that runs the Spark interpreter.

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> **Note**
>
> When connecting to a YARN cluster, the Spark driver authenticates as the UNIX user that runs the Spark interpreter. You can set the HADOOP_USER_NAME environment variable to make the Spark driver authenticate as a different user. If you use the Host interpreter lifecycle, then you can do this by exporting the HADOOP_USER_NAME environment variable before starting the Spark interpreter process. If you us the Kubernetes interpreter lifecycle, then you can do this by setting the HADOOP_USER_NAME environment variable in the resource manifest (spark.yml).

d. Update file spark-defaults.conf keytab location to the location where <keytabfile>.keytab file is copied

e. Update file spark-env.sh with the krb5.conf location to the location where krb5.conf file is copied.
For example: Djava.security.krb5.conf=/OFS_MMG/mmg-studio/interpreter-server/spark-inte rpreter-22.4.2/extralibs/krb5.conf".

10.1.2 Application Pack 8.1.3.1.0 FAQs

1. **If the cx_Oracle connection is failing in DS with below error in OEL 8.**
Fail to execute line 4: cx_Oracle.connect(dsn=dsn_alias)\nTraceback (most recent call last):\n File "/tmp/1638454321889-0/zeppelin_python.py", line 163, in <module>\n exec(code, _zcUserQueryNameSpace)\n File "<stdin>", line 4, in <module>\ncx_Oracle.DatabaseError: DPI-1047: Cannot locate a 64-bit Oracle Client library: "libnsl.so.1: cannot open shared object file: No such file or directory". Install the libnsl package as below: yum install libnsl or sudo yum install libnsl

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

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

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

   a Install the compat-openssl10 module on Linux 8.

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

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

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10.2 Configuration Property Names

OFS MMG configuration properties use standardized names and component prefixes, such as MMG_ and AAI_. The MMG 26.2 installation guide describes this naming convention in the context of upgrading to MMG 26.1.0.

When upgrading from a version that uses the older names, supply configuration values under the corresponding new names. Table 10-1 lists the mappings.

Table 10-1 Configuration Property New and Old Names

New Name	Old Name
MMG_LOG_DIR	LOG_HOME
FTPSHARE_DIR	FTPSHARE
MMG_LOG_TIMEZONE	LOG_TIMEZONE
WEB_CONTEXT	CONTEXT_PATH
MMG_API_USERNAME	FCC_API_USER
MMG_SESSION_SECRET	SESSION_TOKEN_CREDENTIALS
MMG_UI_FAVICON_PATH	APPLICATION_FAVICON_PATH
EMAIL_SMTP_HOST	SMTP_HOST
EMAIL_SMTP_PORT	SMTP_PORT
MMG_DB_WALLET_PATH	WALLET_LOCATION
MMG_DB_TNS_ADMIN_PATH	TNS_ADMIN_PATH
MMG_DB_SCHEMA_WALLET_ALIAS	WALLET_ALIAS
GRAPH_DB_SERVER_NAME	MMG_DB_SERVER_NAME
GRAPH_DB_PORT	MMG_DB_PORT
GRAPH_DB_SERVICE_NAME	MMG_DB_SERVICE_NAME
MMG_SERVICE_HOST	BE_HOSTNAME
MMG_SERVICE_PORT	BE_PORT
MMG_UI_PORT	UI_PORT
MMG_SCHEMA_CREATOR_PORT	SCHEMA_PORT
DATAPIPELINE_PIPELINE_UI_SERVICE_PORT	PIPELINE_UI_SERVICE_PORT
DATAPIPELINE_DATA_PIPELINE_UI_SERVICE_PORT	DATA_PIPELINE_UI_SERVICE_PORT
MMG_SSL_ENABLED	SSL_ENABLED
SSL_KEYSTORE_PATH	SSL_KEYSTORE
SSL_KEYSTORE_PASSWORD	SSL_KS_SECRET
SSL_KEYSTORE_TYPE	SSL_KS_TYPE
SSL_CERT_ALIAS	SSL_KS_ALIAS
AUTH_MMG_KEYS_DIR	MMG_KEYS_LOC

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Table 10-1 (Cont.) Configuration Property New and Old Names

New Name	Old Name
MMG_UI_AUTH_TYPE	UI_AUTH_TYPE
DATASTUDIO_AUTH_TYPE	STUDIO_AUTH_TYPE
MMG_SERVICE_AUTH_TYPE	BE_AUTH_TYPE
DATASTUDIO_SHOW_LOGIN	LOGIN_SHOW
DATASTUDIO_SESSION_MODE	SESSION_MODE
DATASTUDIO_AUTH_REALM	STUDIO_REALM
DATASTUDIO_AAI_URL	OFSAA_URL
DATASTUDIO_API_USERNAMES	API_USERS
DATASTUDIO_VALID_ROLES_LIST	VALID_ROLES
IS_USER_AUTHZ_FROM_AAI	AAI_AUTHZ_ENABLED
AUTH_AAI_AUTH_URL	AAI_AUTH_URL
AUTH_AAI_OAUTH_CLIENT_ID	AAI_CLIENT_ID
AUTH_AAI_OAUTH_CLIENT_SECRET	AAI_CLIENT_SECRET
AUTH_AAI_COOKIE_DOMAIN	AAI_COOKIE_DOMAIN
AUTH_SAML_IDP_URL	SAML_IDP_URL
AUTH_SAML_SP_ENTITY_URL	SAML_SP_ENTITY
AUTH_SAML_ACS_URL	SAML_SRV_URL
AUTH_SAML_LOGOUT_URL	SAML_LOGOUT_URL
AUTH_SAML_SIGN_AUTHN_REQ	SAML_SIGN_AUTHN_REQ
AUTH_SAML_SP_KEY_PATH	SAML_PRIVATE_KEY_PATH
AUTH_SAML_SP_X509_CERT_PATH	SAML_SP_X509_CERT_PATH
AUTH_SAML_SIGN_ALGORITHM	SAML_SIGN_ALGORITHM
AUTH_SAML_BINDING_TYPE	AUTH_SAML_REQUEST_TYPE
AUTH_SAML_INCLUDE_SP_CERT	AUTH_SAML_INCLUDE_SP_CERT
AUTH_SAML_DS_ISSUER	SAML_ISSUER
AUTH_SAML_DS_DESTINATION	SAML_DESTINATION
AUTH_SAML_DS_ASSERTION_CONSUMER_URL	SAML_ASSERTION
AUTH_SAML_DS_ROLE_ATTRIBUTE	SAML_ROLE_ATTRIBUTE
AUTH_SAML_DS_STUDIO_LOGOUT_URL	SAML_STUDIO_LOGOUT_URL
AUTH_SAML_DS_COOKIE_DOMAIN	SAML_COOKIE_DOMAIN
AUTH_LDAP_URL	LDAP_URL
AUTH_LDAP_SEARCH_BASE_DN	LDAP_SEARCH_BASE
AUTH_LDAP_USER_FILTER	LDAP_USER_FILTER

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Table 10-1 (Cont.) Configuration Property New and Old Names

New Name	Old Name
AUTH_LDAP_USER_SEARCH_FILTER	LDAP_USER_SEARCH_FILTER
AUTH_LDAP_GROUP_FILTER	LDAP_GROUP_SEARCH_FILTER
AUTH_LDAP_GROUP_BASE_DN	LDAP_GROUP_SEARCH_BASE
AUTH_LDAP_GROUP_MEMBER_ATTR	LDAP_GROUP_MEMBER
DATASTUDIO_SERVER_COOKIE_DOMAIN	SERVER_COOKIE_DOMAIN
DATASTUDIO_SERVER_COOKIE_NAME	SERVER_COOKIE_NAME
DATASTUDIO_SERVER_COOKIE_TIMEOUT	SERVER_COOKIE_TIMEOUT
DATASTUDIO_SERVER_COOKIE_IS_SECURE	SERVER_COOKIE_IS_SECURE
MMG_HTTP_CLIENT_MAX_CONN	MMG_HTTP_MAX_CONN
MMG_HTTP_CLIENT_MAX_CONN_PER_ROUTE	MMG_HTTP_MAX_CONN_PER_ROUTE
MMG_HTTP_CLIENT_CONN_TIMEOUT_MS	MMG_HTTP_CONNECT_TIMEOUT
MMG_HTTP_CLIENT_READ_TIMEOUT_MS	MMG_HTTP_READ_TIMEOUT
MMG_CONFIG_DATASOURCE_MAX_POOL_SIZE	MMG_DATASOURCE_MAX_POOL_SIZE
MMG_CONFIG_DATASOURCE_MIN_IDLE	MMG_DATASOURCE_MINIMUM_IDLE
MMG_CONFIG_DATASOURCE_IDLE_TIMEOUT_MS	MMG_DATASOURCE_IDLE_TIMEOUT
MMG_CONFIG_DATASOURCE_CONN_TIMEOUT_MS	MMG_DATASOURCE_CONN_TIMEOUT
MMG_EXT_DATASOURCE_MAX_POOL_SIZE	EXT_DATASOURCE_MAX_POOL_SIZE
MMG_EXT_DATASOURCE_MIN_IDLE	EXT_DATASOURCE_MINIMUM_IDLE
MMG_EXT_DATASOURCE_IDLE_TIMEOUT_MS	EXT_DATASOURCE_IDLE_TIMEOUT
MMG_EXT_DATASOURCE_CONN_TIMEOUT_MS	EXT_DATASOURCE_CONN_TIMEOUT
DATASTUDIO_LOG_LEVEL	STUDIO_LOG_LEVEL
DATASTUDIO_PYTHON_BINARY	PYTHON_HOME
MMG_PYTHON_INTERPRETER_LIST	MMG_PYTHON_INTERPRETER
DATASTUDIO_R_ENABLED	R_ENABLED
DATASTUDIO_R_PYTHON_BINARY	R_PYTHON_HOME
DATASTUDIO_SPARK_ENABLED	MMG_SPARK_ENABLED
DATASTUDIO_SPARK_HOME	SPARK_HOME
DATASTUDIO_HADOOP_HOME	HADOOP_HOME
DATASTUDIO_SPARK_MASTER	SPARK_MASTER
DATASTUDIO_SPARK_DEPLOY_MODE	SPARK_DEPLOY_MODE
CS_AUTH_SERVICE_URL	AUTH_SERVICE_URL

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Table 10-1 (Cont.) Configuration Property New and Old Names

New Name	Old Name
CS_META_SERVICE_URL	META_SERVICE_URL
CS_ER_SERVICE_URL	ER_SERVICE_URL
CS_BATCH_SERVICE_URL	BATCH_SERVICE_URL
CS_TEMPLATE_CONFIG_PATH	TEMPLATE_CONFIG_PATH
CS_TEMPLATE_DEFAULT_LINK	TEMPLATE_DEFAULT_LINK
CS_MATCHRULE_BASE_URL	MATCHRULE_BASE_URL
CS_LOADGRAPH_BASE_URL	LOADGRAPH_BASE_URL
CS_MATCHSRVC_UI_URL	MATCHSRVC_UI_URL
GRAPH_LOAD_INDEX_UI_URL	LOADINDEX_UI_URL
GRAPH_MATCHING_MECHANISM	MATCHING_MECHANISM
GRAPH_CANDIDATE_SELECTION_SERVICE_URL	CANDIDATE_SELECTION_SERVICE_URL
GRAPH_LOAD_TO_OS_URL	LOAD_TO_OS_URL
GRAPH_MAX_TOTAL_SHARED_DATA_MEMORY_SIZE	MAX_TOTAL_SHARED_DATA_MEMORY_SIZE
GRAPH_MAX_TOTAL_PRIVATE_DATA_MEMORY_SIZE	MAX_TOTAL_PRIVATE_DATA_MEMORY_SIZE
GRAPH_MAX_PER_SESSION_DATA_MEMORY_SIZE	MAX_PER_SESSION_DATA_MEMORY_SIZE
GRAPH_MAX_DATA_MEMORY_SIZE_DSUSRGRP	MAX_DATA_MEMORY_SIZE_DSUSRGRP
GRAPH_MAX_DATA_MEMORY_SIZE_DSBATCH	MAX_DATA_MEMORY_SIZE_DSBATCH
GRAPH_MAX_DATA_MEMORY_SIZE_DSINTER	MAX_DATA_MEMORY_SIZE_DSINTER
GRAPH_MAX_DATA_MEMORY_SIZE_DSAPPROVER	MAX_DATA_MEMORY_SIZE_DSAPPROVER
GRAPH_MAX_DATA_MEMORY_SIZE_DSUSER	MAX_DATA_MEMORY_SIZE_DSUSER
GRAPH_MAX_DATA_MEMORY_SIZE_IHUSRGRP	MAX_DATA_MEMORY_SIZE_IHUSRGRP

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