

Oracle Financial Services Crime and Compliance Studio

Installation Guide

Release 8.0.8.3.0

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ORACLE
Financial Services

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OFS Crime and Compliance Studio Installation Guide

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Document Control

Version Number	Revision Date	Change Log
8.0.8.3.0	August 2022	<p>Updated with note information for CDH in the following sections:</p> <ul style="list-style-type: none"> • Hardware and Software Requirements (Big Data) • Download the Big Data Files (Additional Jars) • Appendix C – Additional Jars – PGX • Appendix D – Additional Jars – Batch Service <p>Updated with correct reference topics in Configure the Extract Transfer and Load (ETL) Process section.</p> <p>Updated SQL statements in Cleanup for Upgrade section.</p>
8.0.8.3.0	March 2022	<ul style="list-style-type: none"> • Updated Configure the Spark Interpreter section. • Added Sample spark-default.conf Configuration File section.
8.0.8.3.0	June 2021	<p>Updated the Assign Grants for the Database Schemas section.</p> <p>Added a new Revoke Permissions for the Database Schemas section in following sections:</p> <ul style="list-style-type: none"> • Post-installation Steps when OFSAA is Installed • Post-installation Steps when OFSAA is Not Installed
8.0.8.3.0	May 2021	<p>Updated the following sections:</p> <ul style="list-style-type: none"> • New parameters added to the Configure the config.sh File Generate Studio Server for Elastic Search. • Configuring Infer and Training API • Added a Note in the Run the FCC Studio Installer • New parameters added to the PGX config.sh table, Install the PGX Service • New section Create Credential Keystore for Elastic Search is added. • New section Generate an Encrypted Password for Elastic Search is added. • Updated the section Copying and Adding Files for Elastic search. • Updated the section Place Files in the Installation Directories for Elastic search. • Updated the Elastic Search version • Updated the section Frequently Asked Questions (FAQs) and Error Dictionary to add point 12.

Version Number	Revision Date	Change Log
8.0.8.2.0	January 2021	<p>Added the following sections:</p> <ul style="list-style-type: none"> • Loading Analysis Data to Elastic Search • Integration with MMG • Placing the Files for MMG • Integration with MMG (SAML) • SSO Token Generation • Add Synonyms and Keyword files in Elastic Search • Generate Studio Server SSL Configuration Mandatory File • Configuring Infer and Training API • Create the Hive Schema <p>Updated the following section:</p> <ul style="list-style-type: none"> • Cleanup for Upgrade • Place Files in Wallet • Generate the Key Store File for Secure Batch Service • New parameters added to the Configure the config.sh File for SSL.
8.0.8.0.0	September 2020	Revamped the Installation Guide.

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1 Preface

This section provides information about the Oracle Financial Services (OFS) Crime and Compliance Studio (FCC Studio) Installation and Configuration Guide.

1.1 Audience

OFS FCC Studio Installation and Configuration Guide is intended for System Engineers who are responsible for installing and maintaining the application.

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

- UNIX commands
- Database concepts
- Big Data concepts

1.2 Access to Oracle Support

OFS FCC Studio Installation and Configuration Guide is intended for System Engineers who are responsible for installing and maintaining the application.

Oracle customers have access to electronic support through [My Oracle Support](http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info). For information, visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info>

Or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing-impaired.

1.3 Related Documents

We strive to keep this, and all other related documents updated regularly; visit the [OHC Documentation Library](#) to download the latest version available there. The list of related documents is provided here.

- Oracle Financial Services Crime and Compliance Studio Installation Guide (Using Kubernetes)
- Oracle Financial Services Crime and Compliance Studio Administration Guide
- Oracle Financial Services Crime and Compliance Studio User Guide
- Oracle Financial Services Crime and Compliance Studio Data Model Guides
- Oracle Financial Services Crime and Compliance Studio Release Notes and Readme

1.4 Conventions

The following text conventions are used in this document.

Table 1: Document Conventions

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

1.5 Abbreviations

The following table lists the abbreviations used in this document.

Table 2: Abbreviations

Abbreviation	Meaning
OFS	Oracle Financial Services
FCC Studio	Financial Crime and Compliance Studio
OFSAA	Oracle Financial Services Analytical Application
BD	Behavior Detection
FCDM	Financial Crime Data Model
ICIJ	International Consortium of Investigative Journalists
IDCS	Oracle Identity Cloud Service
MMG	Model Management and Governance
SSO	Single Sign-On
SSH	Secure Shell

2 Introduction

This chapter provides the information required to understand the installation of the Oracle Financial Services (OFS) Crime and Compliance Studio (FCC Studio) application.

This release (v8.0.8.3.0) of FCC Studio can be used for the following:

- To install a new instance of FCC Studio as follows:
 - FCC Studio with OFSAA (Oracle Financial Services Analytical Application). Here, with OFSAA is with Behavior Detection (BD) or Enterprise Case Management (ECM).
 - FCC Studio without OFSAA
- To upgrade an existing instance of FCC Studio as follows:
 - Upgrade FCC Studio from v8.0.7.1.0 onwards to v8.0.8.2.0 with OFSAA.
 - Upgrade FCC Studio from v8.0.7.4.0 onwards to v8.0.8.2.0 without OFSAA.
 - Upgrade FCC Studio from v8.0.7.4.0 onwards to v8.0.8.3.0 without OFSAA.

Topics:

- [Installation Check List when Studio is Installed with OFSAA](#)
- [Installation Check List when Studio is Installed without OFSAA](#)

2.1 Installation Check List when Studio is Installed with OFSAA

To complete the installation process, you must perform the steps listed in the following Checklist. Use this checklist to verify whether these steps are completed or not. Click the reference link to go to the topic.

Table 3: Installation Check List

Sl. No.	Activity
Pre-installation Steps	
1	Install all the prerequisite hardware and software.
2	Setup the environmental settings.
3	Download the files for Big Data
4	Configure the Elastic Search Component
5	Configure the Interpreter Settings
6	Create the Studio Schema
7	Assign Grants for the Database Schemas

8	Setup Password Stores with Oracle Wallet.
9	Create the Credential Keystore
10	Download the installer kit.
Installation Steps	
1	Extract the installer kit.
2	Place files in the Installation Directories
3	Generate an Encrypted Password
4	Generate the Public Key and Private Key
5	Generate the Key Store File for Secure Batch Service
6	Add the Batch Service (SSL) to PGX Trust Store
7	Configure the Extract Transfer and Load (ETL) Process
8	Configure the config.sh File
9	Run the FCC Studio Installer
10	Install the PGX Service
Post-Installation Steps	
1	Verify the Installation
2	Configure the SSH Connection
3	Add the Python Packages to FCC Studio
4	Configure the Schema Creation
5	Configure the ICIJ Data
6	Access the FCC Studio Application
7	Perform the OFSAA Configuration for Batch Execution
8	Configure and Run Published Notebooks

2.2 Installation Check List when Studio is Installed without OFSAA

To complete the installation process, you must perform the steps listed in the following Checklist. Use this checklist to verify whether these steps are completed or not. Click the reference link to go to the topic.

Table 4: Installation Check List

Sl. No.	Activity
Pre-installation Steps	
1	Install all the prerequisite hardware and software.
2	Setup the environmental settings.
3	Download the files for Big Data
4	Configure the Elastic Search Component
5	Configure the Interpreter Settings
6	Create the Studio Schema
7	Assign Grants for the Database Schemas
8	Setup Password Stores with Oracle Wallet.
9	Create the Credential Keystore
10	Download the installer kit.
Installation Steps	
1	Extract the installer kit.
2	Place files in the Installation Directories
3	Generate an Encrypted Password
4	Generate the Public Key and Private Key
5	Generate the Key Store File for Secure Batch Service
6	Add the Batch Service (SSL) to PGX Trust Store
7	Configure the Extract Transfer and Load (ETL) Process
8	Configure the config.sh File
9	Run the FCC Studio Installer
10	Install the PGX Service
Post-Installation Steps	
1	Verify the Installation
2	Add the Python Packages to FCC Studio
3	Access the FCC Studio Application

3 Pre-installation

This chapter provides information about the tasks that must be performed before installing FCC Studio. To install FCC Studio with OFSAA, ensure the Behavior Detection (BD) or the Enterprise Case Management (ECM) application pack is installed.

Topics:

- [Hardware and Software Requirements](#)
- [Prerequisite Environmental Settings](#)
- [Change Port Numbers for the Applicable Services](#)
- [Download the Big Data Files](#)
- [Validation Checklist](#)
- [Configure the Elastic Search Component](#)
- [Configure the Interpreter Settings](#)
- [Create the Studio Schema](#)
- [Assign Grants for the Database Schemas](#)
- [Setup Password Stores with Oracle Wallet](#)
- [Create the Credential Keystore](#)
- [Download the Installer Kit](#)

3.1 Hardware and Software Requirements

The following hardware and software are required for this version of FCC Studio. The installation environment or setup must have these requirements for an application to run smoothly and efficiently.

Table 5: Hardware and Software Requirements

Hardware or Software Category	Component Version
Browser	Chrome 57.x
Java Version	Java 8
Processing Server	<ul style="list-style-type: none"> • RHEL 7.4+ • SFTP • Oracle JRE Standard Edition 1.8.x(with JCE)

Database Server	<ul style="list-style-type: none"> • Oracle Database Server 12c Release 2 (12.2.0.1+) Enterprise Edition • Oracle R Enterprise 1.5.1 with Oracle R Distribution 3.3.0 <p>Note: Studio is certified on 12.2 and 19c DB versions.</p>
PGX (Graph) Server	<ul style="list-style-type: none"> • RHEL 7.4+ • Minimum gcc library v4.8.2
Elastic Search	elastic search 7.9.2
Elastic Search Hadoop Jars	Elastic search 7.9.2 version is also supported. and mention the link from where ES 7.9.2 can be downloaded from Elastic Search .
Big Data	
Hadoop and Spark	<p>NOTE: Kerberos authentication must be enabled for Big Data.</p> <ul style="list-style-type: none"> • Apache Hadoop Version 3.0.0 • Apache Hive Version 2.1.1 • Apache Spark Version 2.4.0 • Apache Sqoop Version 1.4.7 • The .profile file must be present with the SPARK_HOME and PYTHON_HOME parameters already set. <p>NOTE: The product is certified for Apache-Hadoop, and any vendor-specific Hadoop distributions have to confirm compliance with Apache-Hadoop standards, and if not, the vendor the customer chooses to work with for Hadoop should ensure compliance to Apache-Hadoop standards. Any issue raised on vendor-specific distributions will be fixed only if the issue is reproducible on Apache-Hadoop, Apache-Hive, and Apache-Spark.</p>
Hive Connectors	Hive JDBC Connectors V 2.5.15
Hadoop Security Protocol	<ul style="list-style-type: none"> • Kerberos R release 1.6.1 • Sentry-1.4.0

NOTE If Cloudera is not installed, the following versions are required:

- Hadoop Version 3.0.0
- Hive Version 2.1.1
- Spark Version 2.4.0
- Sqoop Version 1.4.7

Kerberos authentication must be enabled for Big Data.

3.1.1 Prerequisite Environmental Settings

The following prerequisite environmental settings must be set before beginning the installation of FCC Studio. These settings are the configuration that a system must have for an application to run smoothly and efficiently.

Table 6: Prerequisite Environmental Settings

Category	Expected Value
PGX Settings	<p>PGX version 20.2.3</p> <p>Set the following paths in the environment variables in the .profile file:</p> <ul style="list-style-type: none"> • PGX_HOME: Indicates the path of the server where PGX client is installed. For information on the installation steps, see Install the PGX Service. • PGX_TMP_DIR: Indicates the path of the PGX temporary directory. • WARNING: Set the PGX_HOME and PGX_TMP_DIR paths after installing Studio. • SPARK_HOME: Indicates the path where SPARK_HOME is installed by the client.
Java Settings	<p>PATH in the .profile file must be set to include the Java Runtime Environment (Java 8) absolute path.</p> <p>NOTE:</p> <p>Ensure the absolute path to JRE/bin is set at the beginning of the PATH variable. For example: PATH=/usr/java/jre1.8/bin:\$PATH</p> <p>Ensure no SYMBOLIC links to Java installation are set in the PATH variable.</p>
PGX Server	<p>The following packages must be installed or present in the server where PGX service is installed:</p> <ul style="list-style-type: none"> • krb5-libs • krb5-workstation • procps-ng • nc <p>Execute the following command to install the above-mentioned packages:</p> <pre>yum install -y krb5-libs krb5-workstation procps-ng nc</pre>
Oracle Database Settings	<p>NOTE:</p> <p>This setting is required only if the Wallet has to be created on the same server as that of the FCC Studio server.</p> <p>Oracle Processing Server</p> <ul style="list-style-type: none"> • ORACLE_HOME must be set in the .profile file pointing to the appropriate Oracle DB Client installation. • PATH in the .profile file must be set to include the appropriate \$ORACLE_HOME/bin directory.
Download Directory	<p>Indicates the directory where the product installer zip file is downloaded or copied. The user permission must be set to 755 for this directory.</p>
Installation Directory	<p>Indicates the directory where the product installer zip file is extracted, and the installation files are placed. The user permission must be set to 755 for this directory.</p>

	<p>NOTE: The Installation and the Download Directory can be the same if the product installer zip file is not copied separately to another directory.</p>
OS Locale	<p>Linux: en_US.utf8 Execute the following command to check the locale: locale -a grep -i 'en_US.utf' The locale is displayed.</p>

3.1.2 Change Port Numbers for the Applicable Services

To change the port number, changes the number in the applicable files as shown in the following sections.

3.1.2.1 Server

To change the port number for the server, go to the application.yml file in the <Studio_Installed_path>/datastudio/server/conf/ directory and edit the following values with the new port, for example, 7008:

- authserviceUrl: "http://<hostname>:7041/authservice"
- metaserviceUrl: "http://<hostname>:7045/metaservice"
- sessionserviceUrl: "http://<hostname>:7051"
- batchserviceUrl: "https://<hostname>:7043/batchservice"

3.1.2.2 Authservice, Batchservice, Metaservice, and Sessionservice

To change the port number for the Authservice server, go to the server-config.properties file in the <Studio_Installed_path>/authservice/conf/ directory and edit the following values with the new port.

- server.http.port:7041
- server.shutdownPort:7042

Follow this step to make the same changes to the Batchservice, Metaservice, and Sessionservice server.

3.1.2.3 Interpreter Service

To change the port number for the Interpreter service, follow these steps:

1. Go to the start-fcc-jdbc-interpreter.sh file in the <Studio_Installed_path>/interpreters/bin/ directory and edit java -DlogFileName=fcc-jdbc -Dfile.encoding=UTF-8 \${JAVA_OPTS} \${FCC_JDBC_INTERPRETER_OPTS} oracle.datastudio.interpreterserver.ZeppelinRemoteInterpreterServer \${1:-7010} > \$DIR/../../logs/fcc-jdbc.log with the new port, for example, 7008.
2. Go to the <Studio_Installed_path>/interpreters/conf/ directory and update the JSON files with the modified port number.

3.1.2.4 PGX Service

To change the port number for the PGX service, go to the `server.conf` file in the `<PGX installation Path>/server/conf/` directory and update the new port number as 7007.

3.1.2.5 Matching Service

To change the port number for the matching service, go to the `application.yml` file in the `<Studio_Installed_path>/matching-service/conf` directory and update the new port number as 7049.

3.1.2.6 Entity Resolution Service

To change the port number for the entity resolution service, go to the `application.yml` file in the `<Studio_Installed_path>/entity-resolution/conf` directory and update the new port number as 7051.

3.1.3 Download the Big Data Files

Download the following configuration files from the Cloudera installation setup:

NOTE These files must be kept ready and provided in the following file structure that is used during FCC Studio installation.

Table 7: Required File Structure

File Category	File Names
Hadoop Cluster	<ul style="list-style-type: none"> • core-site.xml • hive-env.sh • hive-site.xml • hadoop-env.sh • hdfs-site.xml • mapred-site.xml • yarn-site.xml • redaction-rules.json • log4j.properties • ssl-client.xml • topology.map • topology.py
Kerberos Files	<ul style="list-style-type: none"> • krb5.conf • keytab file name as mentioned in the config.sh file. <p>NOTE: Ensure to rename your .keytab file to <code>fccstudio.keytab</code>.</p>

Additional Jars	<ul style="list-style-type: none"> • hive-exec-*.jar. • HiveJDBC4.jar. • hive-metastore-*.jar.. • hive-service-*.jar. <p>NOTE:</p> <ul style="list-style-type: none"> • The version of the jars is client or user-specific. These jars can be obtained from the existing jars of the Cloudera installation. • The HiveJDBC4.jar file is not available in the Cloudera installation setup. You must download the same from the Cloudera website. This is applicable only for Cloudera Cluster. • For additional jars, refer the Appendix C – Additional Jars – PGX and Appendix D – Additional Jars – Batch Service
ES-Hadoop Jars	<p>elasticsearch-spark-20_2.11-7.9.2.jar</p> <p>To download the elasticsearch-spark-20_2.11-7.9.2.jar file, follow these steps:</p> <ol style="list-style-type: none"> 1. Download the ZIP file from Elasticsearch 7.9.2. 2. Extract the downloaded file. 3. Navigate to the dist directory and download the elasticsearch-spark-20_2.11-7.9.2.jar file.

3.1.4 Validation Checklist

The Validation Checklist section provide you the information about the parameters that you can validate to avoid installation issues. This section explains the validation and actions that can be taken for some of the common parameters that are used in the config.sh file for the installation. The parameters that can be validated are as follows:

Table 8: Required File Structure

Parameters	Validation
External Service (OFSAA_SERVICE URL)	The OFSAA_Service URL can be validated by clicking the URL for verification.
DB Details for Studio Schema	You can login to SQL developer and verify the DB Details for Studio Schema.
BD Config Schema	You can login to SQL developer and verify the BD Config Schema.
Studio BE Wallet Details	You can verify the Wallet details by reviewing the steps in Verify the Connectivity of the Wallet .
Atomic Wallet Details	You can verify the Wallet details by reviewing the steps in Verify the Connectivity of the Wallet .

SQL Scripts	You can login to FCC Studio using SQL developer and validate the Studio_DBLINK_BD, if link type is DBLINK, if Schema is not DBLINK, there is no validation required.
Cloudera	You can verify the Cloudera details and validate it by reviewing the steps in Create the Credential Keystore .
Cloudera (SSH Connection)	Run the command <code>ssh <hostname of the Cloudera machine></code> . You must run this command from the host where the Studio is installed.
Cloudera (Keytab)	Run the command <code>kinit -V <KERBEROS_PRINCIPAL> -k -t <KEYTAB_FILEPATH></code> to verify the keytab.

3.1.5 Configure the Elastic Search Component

To configure the Elastic Search component, follow these steps:

NOTE

- Ensure that a minimum of 4GB free RAM space is available for elastic search. If RAM is low, the shards of the elastic search fails and correct result is not fetched.
- You must manually clean the cache if facing performance issue.
- Make sure to have Elastic Search cluster with 3 nodes.

1. Navigate to the `elasticsearch-7.9.2/config` directory.
2. Configure the `elasticsearch.yml` with the following variables:

Table 9: elasticsearch.yml File

Interaction Variable Name	Significance
<code>cluster.name</code>	Indicates the name of the cluster.
<code>node.name</code>	Indicates the name given for the node.
<code>node.master</code>	Indicates whether the node is a master.
<code>node.data</code>	Indicates the node data.

path.data	Indicates the directory where you want to store the data.
path.logs	Indicates the directory where you want to store the logs.
network.host	Indicates the hostname of the machine where you want to install the elastic search service.
http.port	Indicates the port number where the elastic search service is installed.
discovery.seed_hosts	(Optional) Indicates the hostnames of the nodes of the cluster.
cluster.initial_master_nodes	(Optional) Indicates the number given to the nodes of the cluster.
indices.breaker.total.use_real_memory	<ul style="list-style-type: none"> Indicates the static setting to determine whether the parent breaker must consider the real memory usage into account or only consider the amount that is reserved by the child circuit breakers. This setting is used to prevent the OutOfMemory error.

3. Configure the jvm.options file as follows:

Table 10: elasticsearch.yml File

Interaction Variable Name	Significance
-Xms1g	<ul style="list-style-type: none"> Set the value for these parameters. The maximum value set can be up to 50% of the RAM size of the machine. Recommended value: Less than 32GB.
-Xmx1g	

4. Enter the URL in the following format into the browser:

`http://<network.host>:<http.port>`

The following output is displayed to indicate successful installation of the Elastic Search service.

```
{
  "name" : "node-1",
  "cluster_name" : "my-application",
  "cluster_uuid" : "_D-2qEGGSgKQPd3i-UtgWQ",
  "version" : {
```

```

    "number" : "7.3.2",
    "build_flavor" : "oss",
    "build_type" : "tar",
    "build_hash" : "1c1faf1",
    "build_date" : "2019-09-06T14:40:30.409026Z",
    "build_snapshot" : false,
    "lucene_version" : "8.1.0",
    "minimum_wire_compatibility_version" : "6.8.0",
    "minimum_index_compatibility_version" : "6.0.0-beta1"
  },
  "tagline" : "You Know, for Search"
}

```

3.1.6 Configure the Interpreter Settings

You must configure the interpreter settings for the following interpreters before installing FCC Studio.

NOTE Ensure to configure the settings only for the interpreters that you require.

Table 11: Pre-installation Interpreter Settings

Interpreter	Prerequisite Settings
fcc-jdbc	For the required configuration, see Configure the fcc-jdbc Interpreter . NOTE: The FCC Studio application installed without OFSAA can use the Vanilla jdbc interpreter instead of the fcc-jdbc interpreter to connect to the Studio schema.
fcc-ore	For the required configuration, see Configure the fcc-ore Interpreter .
fcc-pyspark	<ul style="list-style-type: none"> • Install the py4j package in the Spark cluster. • Install the Livy server (0.5.0) on the master node of the Big Data cluster.
fcc-python	For the required configuration, see Configure the fcc-python Interpreter .
fcc-spark-scala	Install the Livy server (0.7.0) on the master node of the Big Data cluster.

fcc-spark-sql	Install the Livy server (0.7.0) on the master node of the Big Data cluster.
jdbc	No additional configuration is required.
md	No additional configuration is required.
pgql	No additional configuration is required.
pgx-algorithm	No additional configuration is required.
pgx-java	No additional configuration is required.
pyspark	For the required configuration, see Configure the PySpark Interpreter .
spark	For the required configuration, see Configure the Spark Interpreter .

Topics:

- [Configure the fcc-jdbc Interpreter](#)
- [Configure the fcc-ore Interpreter](#)
- [Configure the fcc-python Interpreter](#)
- [Configure the Spark Interpreter](#)
- [Configure the PySpark Interpreter](#)

3.1.6.1 Configure the fcc-jdbc Interpreter

To create context for the fcc-jdbc interpreter, follow these steps:

1. Log in to Oracle Database as a SYSDBA user.
2. Grant Execute permission to the user using the following command:

```
grant execute dbms_ols to <Studio_DB_Username>;
```

The Execute permission is granted to user.
3. Grant Create permission to the context using the following command:

```
grant create any context to <Studio_DB_Username>;
```

The Create permission is granted to context.

3.1.6.2 Configure the fcc-ore Interpreter

To configure the fcc-ore interpreter, you must install the Oracle R Distribution (ORD), enable the addons and optional_latest channels in yum as shown in the following code:

```
```bash
(root)# yum-config-manager --enable ol7_addons
(root)# yum-config-manager --enable ol7_optional_latest
```
```

After completing the previous step, pull ORD from the yum repository using the following command:

```
```bash
(root)# yum install R.x86_64 R-core-extra
```
```

To install ORD, see https://docs.oracle.com/cd/E83411_01/OREAD/installing-R-for-ORE.htm#OREAD129.

3.1.6.3 Configure the fcc-python Interpreter

FCC Studio supports any version of Python. The FCC Studio installer is also packaged with the following Python 3.6 libraries:

- pandas 0.25.3
- numpy 1.17.4
- scipy 1.3.2
- scikit-learn 0.21.3
- matplotlib-lib 3.1.1
- seaborn 0.9.0
- cx-oracle 7.2.2
- sqlalchemy 1.3.11
- xgboost==1.0.1
- imbalanced-learn==0.6.2

Based on your preference, you can choose to install either the Python 3.6 libraries or different versions or packages of Python.

NOTE You can provide appropriate memory to python pod to avoid out of memory issue.

3.1.6.3.1 Prerequisites for Installing Python Libraries

Following are the prerequisites to install Python libraries:

- FCC Studio supports any-version of Python with the following required conditions:
- The preferred Python version is installed on the Processing Server (Studio Notebook Server) and is accessible to the Linux user of FCC Studio.
- The Python Library (py4j) package is present for the preferred Python version.
- The prerequisites to install the Python 3.6 libraries that are packaged with the FCC Studio Installer are as follows:
- The Python3.6 version is installed on the Processing Server (Studio Notebook Server) and is accessible to the Linux user of FCC Studio.
- The Python Library (py4j) package is installed and is accessible to the Linux user of FCC Studio.

3.1.6.3.2 Install the Python 3.6 Libraries

To install the Python 3.6 libraries, follow these steps:

1. Navigate to the `<Studio_Installation_Path>/python-packages/bin` directory.
2. Execute the following command:

```
chmod 0755 *
```

3. Install the Python 3.6 library packages that are packaged with the FCC Studio Installer using the following command:

```
./install.sh
```

The Python 3.6 libraries that are packaged with the FCC Studio Installer are installed.

NOTE

- Execute the `./remove.sh` command to remove the Python 3.6 libraries that are already installed.
- To install additional Python libraries, contact System Administrator to install the same on the Processing Server (Studio Notebook Server).
- To change the default Python version in the Interpreters, see the Changing Python Version in the fcc-python Interpreter section in the OFS Crime and Compliance Studio Administration Guide.

3.1.6.4 Configure the Spark Interpreter

3.1.6.4.1 Prerequisites for using the Spark Interpreter

To configure Spark Interpreter, you must download the desired spark distribution from [Spark's official website](#).

For example: `spark-2.4.0-bin-hadoop2.7.tgz` from the [website](#).

[Spark interpreter](#) can be used in several situations as follows:

- Connecting to remote spark cluster
 - With/without Kerberos

- Custom Hadoop client configuration
- Custom libraries
- Spark in local mode.

In case you want to connect to remote spark cluster, then obtain following files:

- Hadoop or Hive client configuration as per your use case
- Kerberos files (if applicable)
 - `krb5.conf`
 - `keytab` file

3.1.6.4.2 Setting up spark-interpreter

The spark interpreter requires spark distribution to start.

The spark interpreter requires spark distribution to start. If you do not intend to use a spark-interpreter, disable the interpreter by performing the following steps:

NOTE If you do not intend to use a spark interpreter, disable the interpreter. You can perform the following steps.

1. Navigate to `<STUDIO_INSTALLATION_PATH>/bin` directory.
2. Open the `config.sh` file and set `export SPARK_ENABLED=false`.

The default configuration of Spark is configured for yarn deployment mode with Kerberos enabled remote spark cluster. For local mode skip this section and follow below.

3.1.6.4.3 Spark Interpreter with remote spark cluster

The Spark Interpreter with remote spark cluster can be performed for the following:

- Configuration with Kerberos enabled remote spark cluster:
 - **krb5.conf**
 - ***.keytab** (For example, **fccstudio.keytab**)
- Configuration with Kerberos disabled remote spark cluster

Configuration with Kerberos enabled remote spark cluster

1. Move the obtained Kerberos files to `<Studio Installation path>/batchservice/user/conf` directory.

NOTE These are the same Kerberos files used for ETL.

2. Place the `spark-<version>-bin-hadoop<version>` files to `<STUDIO_INSTALLATION_PATH>/interpreters/interpreter/spark/extralibs` directory.

For example, `spark-2.4.0-bin-hadoop2.7`

3. Create a `conf` folder in the `<STUDIO_INSTALLATION_PATH>/interpreters/interpreter/spark/extralibs`.
4. Place the Hadoop or Hive client configuration files to `<STUDIO_INSTALLATION_PATH>/interpreters/interpreter/spark/extralibs/conf` directory.

NOTE Do not remove the `spark-env.sh` file.

5. Create `spark-default.conf` and update the spark configurations accordingly. See the [Sample spark-default.conf Configuration File](#) section for more information.
6. Update `spark.yarn.dist.files` and `spark.executorEnv.PYTHONPATH`.

NOTE The path must be the same as the path given for the downloaded spark distribution. For example: path for `spark-2.4.0-bin-hadoop2.7` spark distribution.

7. Update the `spark.driver.host`.
8. Update the `spark.yarn.keytab`.
9. Update the `spark.yarn.principal`.
10. If required, you can add an additional spark configuration.

Configuration with Kerberos disabled remote spark cluster:

1. Place the Hadoop or Hive client configuration files to `<STUDIO_INSTALLATION_PATH>/interpreters/interpreter/spark/extralibs/conf` directory.

NOTE Do not remove the `spark-env.sh` file.

2. Create `spark-default.conf` and update the spark configurations accordingly. See the [Sample spark-default.conf Configuration File](#) section for more information.
3. Update `spark.yarn.dist.files` and `spark.executorEnv.PYTHONPATH`.

NOTE The path must be the same as the path given for the downloaded spark distribution. For example: path for `spark-2.4.0-bin-hadoop2.7` spark distribution.

4. Update the `spark.driver.host`.
5. Navigate to `<STUDIO_INSTALLATION_PATH>/interpreters/interpreter/spark/extralibs/conf` directory.
6. Open `spark-default.conf` file and update `spark.driver.defaultJavaOptions` by removing:

```

--Dsun.security.krb5.debug=false -
Djavax.security.auth.useSubjectCredsOnly=false -
Djava.security.krb5.conf=<STUDIO_INSTALLATION_PATH>/batchservice/user/conf/krb5.conf"

```

3.1.6.4.4 Spark Interpreter in local mode

1. Navigate to `<STUDIO_INSTALLATION_PATH>/interpreters/interpreter/spark/extralibs/conf` directory.
2. Create `spark-default.conf` and update the spark configurations accordingly. See the [Sample spark-default.conf Configuration File](#) section for more information.
3. Open `spark-default.conf` file and update **spark.driver.defaultJavaOptions** by removing:


```

--Dsun.security.krb5.debug=false -
Djavax.security.auth.useSubjectCredsOnly=false -
Djava.security.krb5.conf=<STUDIO_INSTALLATION_PATH>/batchservice/user/conf/krb5.conf"

```
4. Set `spark.master` as `local[*]` in interpreter configuration file.

3.1.6.4.5 Configuration

The Spark interpreter configuration can be divided into the following categories:

- Configuration related to deployment

These properties can be set either in the Spark libraries, for example, the `spark-defaults.conf` file, or through the system environment variable, **SPARK_CONF**.

For example, `SPARK_CONF="--conf spark.driver.memory=2g"`.

NOTE These properties cannot be changed when the Spark interpreter is running.

- Configuration related to Spark runtime control

These properties can be set from the Interpreters page of the Compliance Studio application UI. This includes properties such as a `spark.executor.memory`.

NOTE The properties related to the driver cannot be set during runtime and are considered deployment configuration. The properties related to the executors can be set during runtime. Hence, the latter option of runtime control configuration is preferred.

A list of possible properties is available in the [Spark Official Documentation](#). All the properties prefixed with the term "zeppelin" listed in the [Zeppelin Spark Configuration Document](#) can also be set from the Interpreters page of the Compliance Studio application UI.

3.1.6.5 Configure the PySpark Interpreter

3.1.6.5.1 Prerequisites

The PySpark interpreter has the same prerequisites as that as the Spark Interpreter. For more information, see [Configure the Spark Interpreter](#). Also, all Spark components must be configured to use the same Python version.

3.1.6.5.2 Configuration

The PySpark interpreter can be configured through the Spark interpreter with the only exception being the Python version used. By default, the Python version is set to 3, that can be changed either in the interpreter JSON files before the startup or from the **Interpreters** page of the FCC Studio application UI during runtime by changing the following properties:

- In the **Spark Interpreter Settings** page of the FCC Studio application UI (or spark.json file), change the value of the spark.pyspark.python property to the path of the Python executable that is to be used by the Spark executors.
- In the **PySpark Interpreter Settings** page of the FCC Studio application UI (or pyspark.json file), change the value of the zeppelin.pyspark.python property to the path of the Python executable that is to be used by the Spark driver.

3.1.6.5.3 Use the Python Virtual Environments with PySpark

To ensure that the two Python versions match, in case your components run on different machines, you must use the Python virtual environments with PySpark.

To use Python Virtual Environments with PySpark, follow these steps:

1. [Create a Virtual Environment with Conda](#)
2. [Update the Interpreter Properties](#)

Create a Virtual Environment with Conda

NOTE You can also use virtualenv to create your virtual environment instead of conda.

To create a virtual environment with Conda, follow these steps:

1. Ensure that you have conda and conda-Pack installed.
2. Create your virtual environment using the following command:

```
conda create -y -n <environment-name> python=<python-version>  
<additional-packages>
```

NOTE The `<environment-name>` can be chosen freely and subsequently has to be substituted in further commands.

3. Activate your virtual environment using the following command:

```
conda activate <environment-name>
```

4. Execute the following to obtain the path to your virtual environment:

```
which python
```

The obtained result is referred to as `<environment-abs-path>`.

5. Compress your virtual environment using the following command:

```
conda pack -n <environment-name> -o <environment-abs-path>/<environment-name>.tar.gz
```

Update the Interpreter Properties

The interpreter properties can either be configured in the interpreter JSON files or from the Interpreters page of the FCC Studio application UI after starting the FCC Studio application.

- In the **Spark Interpreter Settings** page of the FCC Studio application UI (or `spark.json`), change the following:
 - Change the value of the `spark.yarn.dist.archives` property to `<environment-abs-path>/<environment-name>.tar.gz#<environment-name>`
 - Change the value of the `spark.pyspark.python` property to `./<environment-name>/bin/python`
- In the **PySpark Interpreter Settings** page of the FCC Studio application UI (or `pyspark.json`), change the value of the `zeppelin.pyspark.python` parameter to `<environment-abs-path>/bin/python`.

3.1.7 Create the Hive Schema

To create hive schema, perform the following steps:

1. Login to the server where **cloudera/hive** is installed.
2. Open a hive session in the command prompt.

```
hive
```

3. Create a new hive schema using the following script:

```
create database <hive schema name>;
```

4. Use the hive schema that is created by the following command:

```
Use <hive schema name>
```

A new hive schema is created.

3.1.8 Create the Studio Schema

To create studio schema, create a new Oracle Database schema user using the following script:

```
CREATE USER <Studio Schema Username> IDENTIFIED BY <Password>;
```

A new Oracle Database schema (Studio schema) is created.

3.1.9 Assign Grants for the Database Schemas

Grant the following permissions to the newly created Oracle Database Schema:

- GRANT create session TO <Studio Schema User>;
- GRANT create table TO <Studio Schema User>;
- GRANT create view TO <Studio Schema User>;
- GRANT create any trigger TO <Studio Schema User>;
- GRANT create any procedure TO <Studio Schema User>;
- GRANT create sequence TO <Studio Schema User>;
- GRANT execute on dbms_ols TO <Studio Schema User>;
- GRANT execute on sys.dbms_session TO <Studio Schema User>;
- ALTER USER <Studio Schema User> QUOTA 100M ON users;
- GRANT create sequence TO <Studio Schema User>;
- GRANT create SYNONYM TO <Studio Schema User>;
- GRANT create any context TO <BD or ECM Schema User>;
- GRANT execute on dbms_ols TO <BD or ECM Schema User>;
- GRANT ALL privileges TO <Studio Schema User>;

Some of the above permissions are needed only during installation and can be revoked in case of any concerns. For more information on revoke permissions, see **Revoke Permissions for the Database Schemas** section in the following chapters:

- [Post-installation Steps when OFSAA is Installed](#)
- [Post-installation Steps when OFSAA is Not Installed](#)

3.2 Setup Password Stores with Oracle Wallet

As part of an application installation, administrators must set up password stores for database user accounts using Oracle Wallet. These password stores must be installed on the application database side. The installer handles much of this process, the administrators must perform some additional steps.

A password store for the application and application server user accounts must also be installed; however, the installer takes care of this entire process.

Topics:

- Setup the Password Stores for Database User Accounts
- Verify the Connectivity of the Wallet

3.2.1 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.

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

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.

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.

Figure 1: Wallet Creation

```

-bash-4.1$ pwd
/
-bash-4.1$ mkstore -wrl                               -create
Oracle Secret Store Tool : Version 12.1.0.2
Copyright (c) 2004, 2014, Oracle and/or its affiliates. All rights reserved.

Enter password:
Enter password again:
-bash-4.1$ mkstore -wrl                               -createCredential Studio_808
Oracle Secret Store Tool : Version 12.1.0.2
Copyright (c) 2004, 2014, Oracle and/or its affiliates. All rights reserved.

Your secret/Password is missing in the command line
Enter your secret/Password:
Re-enter your secret/Password:
Enter wallet password:
Create credential oracle.security.client.connect_string1
-bash-4.1$ mkstore -wrl                               -createCredential aif_
Oracle Secret Store Tool : Version 12.1.0.2
Copyright (c) 2004, 2014, Oracle and/or its affiliates. All rights reserved.

Your secret/Password is missing in the command line
Enter your secret/Password:
Re-enter your secret/Password:
Enter wallet password:
Create credential oracle.security.client.connect_string2
-bash-4.1$ mkstore -wrl                               -createCredential aif_
Oracle Secret Store Tool : Version 12.1.0.2
Copyright (c) 2004, 2014, Oracle and/or its affiliates. All rights reserved.

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

```

4. Create the database connection credentials for the studio schema alias using the following command:

```
mkstore -wrl <wallet_location> -createCredential <alias-name>
<database-user-name>
```

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.

5. Create the database connection credentials for the atomic schema alias using the following command:

```
mkstore -wrl <wallet_location> -createCredential <alias-name>
<database-user-name>
```

NOTE Creating an atomic schema is not required when you install FCC Studio without OFSAA.

6. Create the database connection credentials for the config schema alias using the following command:

```
mkstore -wrl <wallet_location> -createCredential <alias-name>
<database-user-name>
```


NOTE Creating a config schema is not required when you install FCC Studio without OFSAA.

In this manner, create a wallet and associated database connection credentials for all the database user accounts.

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](#).


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

Figure 2: Location of the Created Wallet Folder

| Name | Size | Changed | Rights | Owner |
|-----------------------|------|---------------------|----------|------------|
| wallet_808_██████████ | | 12-08-2020 14:52:49 | rwx----- | ██████████ |

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

7. Move the wallet folder to the <Studio_Installed_Path>/<alias-name> directory.
8. In the <wallet_location> directory, configure the tnsnames.ora file to include the entry for each alias name to be set up.

Figure 3: Location of the Created Wallet Folder

```
Studio 808 ██████████ =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP) (HOST = ██████████) (PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = ██████████)
    )
  )
)
aif_██████████ =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP) (HOST = ██████████) (PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = ██████████)
    )
  )
)
aif_██████████ =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP) (HOST = ██████████) (PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = ██████████)
    )
  )
)
)
```

NOTE

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

3.2.2 Verify the Connectivity of the Wallet

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

1. 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
```

2. Test the connectivity using the following command:

NOTE

The ORACLE_HOME used with the wallet must be the same version or higher than what the wallet was 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>"
```

3.2.3 Create the Credential Keystore

Credential keystore must be created for the Behavior Detection (BD) or Enterprise Case Management (ECM) Atomic schema and FCC Studio Schema. To create a credential keystore, follow these steps:

1. Login as HDFS Superuser.

2. Create a credential keystore on HDFS using the following command:

```
hadoop credential create mydb.password.alias -provider
jceks://hdfs/user/root/oracle.password.jceks
```

3. Verify the credential keystore file using the following command:

```
hadoop credential list -provider
jceks://hdfs/user/root/oracle.password.jceks
```

4. Grant Read permission to the keystore file using the following command:

```
hadoop fs -chmod 744 /user/root/oracle.password.jceks
```

NOTE Ensure the credential keystore file path and the alias are correctly mentioned in the `config.sh` file.

3.2.3.1 Copying and Adding Files

To copy the jar files, follow these steps:

1. Create the folder in the `GRAPH_FILES_PATH` parameter in a node of the big data cluster.
2. Create a folder called `jars` inside the folder that is created in the previous step..
3. Navigate to the `<STUDIO_INSTALLED_PATH>/ficdb/etlJars` directory and copy all the jars present in this directory into the big data node inside the folder `jars`.
4. Perform this step if `https` is enabled for Elastic Search:
 - a. Create a new folder with the name as `conf` in the `GRAPH_FILES_PATH` parameter in a node of the big data cluster.
 - b. Place the `es_truststore.jks` file in the `conf` folder.

NOTE To use the ES-Hadoop connector, [download](#) the `commons-httpclient-3.0.1.jar` and `elasticsearch-spark-20_2.11-7.9.2.jar` (depending on which Elastic version is used) files and place them in the `jars` folder.

3.2.3.2 Create Credential Keystore for Elastic Search

Credential keystore must be created for the Elastic Search if `https` is enabled for Elastic Search.

To create a credential keystore, follow these steps:

1. Login as HDFS Superuser.
2. Create a credential keystore on HDFS using the following command:

```
hadoop credential create elastic.password.alias -value <Elastic search
password> \
-provider jceks://hdfs/user/fccstudio/elastic/elastic.password.jceks
```

```
hadoop credential create elastic.keystore.password.alias -value  
password \  
-provider jceks://hdfs/user/fccstudio/elastic/elastic.password.jceks
```

Where,

- `elastic.password.alias` is the elastic search password alias name
 - `elastic.keystore.password.alias` is the elastic search keystore password alias name
 - `<Elastic search password>` is elastic search password
 - `password` is elastic search keystore password
 - `hdfs/user/fccstudio/elastic/elastic.password.jceks` is the file path of the credential keystore
3. Verify the credential keystore file using the following command:

```
hadoop credential list -provider jceks://  
hdfs/user/fccstudio/elastic/elastic.password.jceks
```

4. Grant Read permission to the keystore file using the following command:

```
hadoop fs -chmod 744 /user/fccstudio/elastic/elastic.password.jceks
```

NOTE

Ensure the credential keystore file path and the alias are correctly mentioned in the `config.sh` file.

3.2.4 Download the Installer Kit

To download the software as a .zip folder, download the mandatory one-off patch 32858929 from [My Oracle Support \(MOS\)](#).

4 Installation

Perform the following steps to complete the installation:

- [Extract the Installer Kit](#)
- [Place Files in the Installation Directories](#)
- [Generate an Encrypted Password](#)
- [Generate the Public and Private Keys](#)
- [Generate the Key Store File for Secure Batch Service](#)
- [Configure the Extract Transfer and Load \(ETL\) Process](#)
- [Configure the config.sh File](#)
- [Run the FCC Studio Installer](#)
- [Install the PGX Service](#)

4.1 Extract the Installer Kit

After downloading the .zip folder, follow these steps to extract the folder contents:

1. Extract the contents of the installer archive file in the download directory using the following command:

```
unzip -a <FCC_Studio_Installer_Archive_File>.zip
```

The FCC Studio installer file is extracted and the `OFS_FCCM_STUDIO` directory is obtained and is referred to as `<Studio_Installation_Path>`.

WARNING Do not rename the application installer directory name after extraction from the archive.

2. Navigate to the download directory where the installer archive is extracted, and assign execute permission to the installer directory using the following command:

```
chmod 0755 OFS_FCCM_STUDIO -R
```

4.2 Configuring Infer and Incremental Training API

If you want to use the `INFER` and `Incremental Training` API, follow the procedures in the following sections:

- [Prerequisite](#)
- [Configurations](#)

4.2.1 Prerequisite

You need to perform the following based on the Python packages installed as mentioned in the table:

| If Python 3.6 (Specific to Python 3.6) is installed | If Python 3 or any other version installed |
|--|--|
| <ol style="list-style-type: none"> 1. Install Python 3.6. 2. Navigate to <code>./OFS_FCCM_STUDIO/python-packages/packages</code> directory. 3. Verify the list from the packages folder python3.6 -m. 4. Navigate to the <code>./OFS_FCCM_STUDIO/python-packages/bin</code> directory. 5. Run the Install.sh. The packages are installed. | <ol style="list-style-type: none"> 1. Install Python3 or any other version. 2. Install oracle instantclient (basic) latest version. (If required, login with root unzip in <code>/opt/oracle</code> directory give permissions.) 3. Install python3-devel in case it does not exist. 4. Install numpy. <p>Install namepackage whl package (pip3 install <whl package>). This is the python packages folder of fcc-studio.</p> |

4.2.2 Configurations

NOTE The following instructions are applicable if user wants to have incremental training model with ML which is integrated with MMG.

After installing the packages, you must configure the **OFSAA URL** in `config.sh`.

To configure the **OFSAA URL**, perform the following steps:

1. Configure the **OFSAA Service URL** to **MMG URL** and **FCDM Source** as **BD** in the `config.sh` in the `./OFS_FCCM_STUDIO/bin` directory.

NOTE

- It is a mandatory to provide the **OFSAA Service URL** to **MMG URL** and **FCDM Source** as **BD** in the `config.sh` for using the Training API as an incremental model.
- For incremental model, you need to apply the patch (**80805 One-Off Patch**) to MMG if you have already installed MMG.
- For ground up MMG installation, you need to apply the patch (**80805 One-Off Patch**).

2. After installing Studio with **BD/ECM** with **MMG**, Run the utility for updating link of Notebooks in MMG CONFIG Schema from **MMG**.
3. Navigate to `$FIC_HOME/utility/mmgstudio/utility/bin` directory.
4. Run the `linkUtility.sh` by using the following command in putty.

```
./linkUtility.sh USERNAME
```

Where, **USERNAME** is an ofsaa and data studio user. For example: `./linkUtility.sh MMGUSER`

When the Studio Services are up and running. The notebook link are updated to the id in `NEXTGENEMF_MODEL` and `NEXTGENEMF_NOTEBOOK_PARAGRAPHS` tables.

NOTE Make sure that the Link Utility – is added with “iccent.jar” jar file in class path in `linkUtility.sh` file. That is the line number 28:
`_CLASSPATH=$JAR_LIST:$FIC_APP_HOME/icc/lib/iccent.jar`

5. Update the sandbox name in the following tables in order to see the notebooks in MMG UI, whenever the respective sandbox is accessed:
 - Update the **WORKSPACE** column for **Model ID’s** with value **9999999999998** (**NameMatchingIncrementalTraining**) and **9999999999997** (**NameMatchingManualTraining**) in the `nextgenemf_model` table
 - Update the **V_DEST_INFODOM** column with infodom of **MMG/BD** for the respective sandbox in the `mf_sandbox_master` table.

Sample query:

```
update mf_sandbox_master set v_dest_infodom='<Infodom of MMG/BD>'
where v_sandbox_id='<SANDBOX NAME>'
```

6. Navigating to **MMG Application** and open the sandbox that you have used as `INFODOM`, then the sandbox displays **NameMatchingTraining** folder. This folder should display the following notebooks:
 - **NameMatchingIncrementalTraining**
 - **NameMatchingManualTraining**

NOTE The **NameMatchingIncrementalTraining** and **NameMatchingManualTraining** notebooks are available and displayed only if the sandbox is created with the same `INFODOM` as the `INFODOM` provided in the Studio’s `config.sh` file.

4.3 Place Files in the Installation Directories

To place the required jars and Kerberos files in the required locations, follow these steps:

1. To place the additional jar files, follow these steps:
 - a. Navigate to the `<Studio_Installation_Path>/batchservice/user/lib` directory.
 - b. Place the following additional jar files:
 - `hive-exec-*.jar`. For example, `hive-exec-1.1.0.jar`.
 - `HiveJDBC4.jar`
 - `hive-metastore-*.jar`. For example, `hive-metastore-1.1.0.jar`.

— hive-service-*.jar. For example, hive-service-1.1.0.jar.

For additional jars, see the [Appendix C – Additional Jars – PGX](#) and [Appendix D – Additional Jars – Batch Service](#) sections.

NOTE

- The version of the jars is client or user-specific. These jars can be obtained from the existing jars of the Cloudera installation.
- The HiveJDBC4.jar file is not available in the Cloudera setup. You must download the same from the [Cloudera](#) website.

2. To place the Kerberos files, follow these steps:
 - a. Navigate to the `<Studio_Installation_Path>/batchservice/user/conf` directory.
 - b. Place the following Kerberos files:
 - krb5.conf
 - keytab file name as mentioned in the config.sh file.
3. For synonyms and stopwords, navigate to `<Studio_Installation_Path>/matching-service/conf/analysis` directory.

There are 8 text files in this directory as follows:

- Country
- Gender
- Organisation_strip
- Organisation_suffix
- Name_synonym
- Title
- Namestop
- Cardinal_ordinal

You can add contents to these files.

NOTE

- User can decide to provide any data in the Stopword or Synonym files.
- Each stopword must be provided in a separate line.
- All related synonyms must be provided in the same line separated by a comma.
- All the synonyms must be provided in the same line and ensure that there are no repetitions of the synonym. For Example: rob, robi, robie, roby, robbi.

- **Title.txt** file should contain Name Tiles and organization Stopwords.

4. If you want to perform MMG integration steps with Studio, see the [Placing the Files for MMG](#).
5. Perform this step if https is enabled for Elastic Search:
 - a. Copy **es_truststore.jks** file from <Elastic_Search_Installation_Path>.
 - b. Place the **es_truststore.jks** file in <FCC_Studio_Installation_Path>/OFS_FCCM_STUDIO/configmaps/matching-service/conf directory.

NOTE Generate the **es_truststore.jks** file in the <Elastic_Search_Installation_Path> before performing this step. This file contains Keystore certificates.

4.4 Add Synonyms and Keyword files in Elastic Search

To consider the similarity when performing the elastic search, you can add the synonyms and keyword files in Elastic search.

To add synonyms and keyword files in Elastic search, perform the following steps:

1. Create a folder in the name of “analysis” in the <Elastic Search Installation path>/config directory.
2. You can add your synonyms and stop words to these files and place the files in the analysis folder:
 - Title.txt
 - Synonym.txt
 - Organisation_suffix.txt
 - Organisation_strip.txt
 - Gender_OLD.txt
 - Gender.txt
 - Country.txt
 - Cardinal_ordinal.txt

4.5 Place Files in Wallet

To place the files in wallet in the required locations, follow these steps:

1. To place the files in wallet, follow these steps:

- a. Navigate to the `<Studio_Installation_Path/wallets` directory.
- b. Navigate to the wallet location.
- c. Place the following files:

```
— tnsnames.ora
— ewallet.p12
— cwallet.sso
— ewallet.p12.lck
— cwallet.sso.lck
```

2. Place the **sqlnet.ora** file into wallet and update the path for the current wallet location.

```
WALLET_LOCATION =
    (SOURCE =
        (METHOD = FILE)
        (METHOD_DATA =
            (DIRECTORY = <wallet location>)
        )
    )
SQLNET.WALLET_OVERRIDE = TRUE
```

4.6 Generate an Encrypted Password

To generate an encrypted password, follow these steps:

1. Set the export `FIC_DB_HOME` path in the `<Studio_Installation_Path>/ficdb` directory.
2. Run the `echo $FIC_DB_HOME` command.
3. Go to the `<Studio_Installation_Path>/ficdb/bin` directory and run the `./FCCM_Studio_Base64Encoder.sh <password to be encrypted>` command.

4.6.1 Generate an Encrypted Password for Elastic Search

If Elastic Search provides authentication then generate encrypted password for Elastic Search password.

To generate an encrypted password, follow these steps:

1. Set the export `FIC_DB_HOME` path in the `<FCC_Studio_Installation_Path>/OFS_FCCM_STUDIO/ficdb` directory.
2. Run the `echo $FIC_DB_HOME` command.
3. Go to the `<FCC_Studio_Installation_Path>/OFS_FCCM_STUDIO/ficdb/bin` directory.
4. Run the `./FCCM_Studio_Base64Encoder.sh <Elastic search password to be encrypted>` command.

4.7 Generate the Public and Private Keys

The Public and Private keys are JSON Web Tokens (JWT) that are generated for PGX Authentication from FCC Studio.

To generate the keys, follow these steps:

NOTE The following steps are mandatory for the first time FCC Studio installation.

1. Navigate to the `<Studio_Installation_Path>/ficdb/bin` directory.
2. Run the Shell Script `FCCM_Studio_JWT_Keygen.sh` from the directory.

The Public and Private Keys are generated and available in the `<Studio_Installation_Path>/ficdb/conf` directory.

3. Copy the “private.key” and “public.key” files to the following paths:
 - `<Studio_Installation_Path>/OFS_FCCM_STUDIO/datastudio/server/conf` directory
 - `<Studio_Installation_Path>/OFS_FCCM_STUDIO/batchservice/conf` directory
 - `<Studio_Installation_Path>/OFS_FCCM_STUDIO/pgx/server/conf` directory

After generating the key store file and adding the batch service to the PGX trust store, configure the user mapping for GDPR and Redaction changes in the database.

4.8 Apply GDPR and Redaction Changes for FCC Studio

The General Data Protection Regulation (GDPR) is a regulation in EU law on data protection and privacy in the European Union and the European Economic Area. You can apply the GDPR changes that is required for FCC Studio.

To apply GDPR and Redaction, you must configure the following:

- [Generate the Key Store File for Secure Batch Service](#)
- [Generate Studio Server SSL Configuration Mandatory File](#)
- [Add the Batch Service \(SSL\) to PGX Trust Store](#)

4.8.1 Generate the Key Store File for Secure Batch Service

Generating the Key Store file for Secure Batch Service is a process of generating the key store parameters and changing the key store parameters from HTTP to HTTPS protocol.

NOTE The following steps are only applicable if the user wants to create a self signed certificate.

To configure the Key Store file for Secure Batch Service, follow these steps:

1. Run the `keytool -genkey -alias batchservice -keyalg RSA -keysize 2048 -keystore <Studio_Installation_Path>/OFS_FCCM_STUDIO/batchservice/conf/<Keystore file name>.jks` command in the Studio Server.

When generating the keytool ensure to provide the hostname in first name. For example:

Question: What is your first and last name?

Answer: Provide the fully qualified studio server hostname.

For example, <hostname>.<domain name>

2. Specify the keystore password. The <Keystore file name>.jks file is created in the path <Studio_Installation_Path>/OFS_FCCM_STUDIO/batchservice/conf directory.
3. Specify the following parameters in the config.sh file.
 - `export KEYSTORE_FILE_NAME=<Keystore file name>.jks`
 - `export KEYSTORE_PASS=password`

4.8.2 Generate Studio Server SSL Configuration Mandatory File

To generate the Studio Server SSL Configuration Mandatory File, perform the following steps:

NOTE The following steps are only applicable if the user wants to create a self signed certificate.

1. Run the following jks command in the Studio Server:

```
keytool -genkey -alias <alias> -keyalg RSA -keystore <alias>.jks
```

NOTE You must use the same **password** and **alias** that is provided in the config.sh file.

2. Specify the keystore password.
3. When generating the keytool ensure to provide the hostname in first name. For example:

Question: What is your first and last name?

Answer: Provide the fully qualified studio server hostname.

For example, <hostname>.<domain name>
4. Specify the any name for the other questions.
5. Specify the keystore password. The jks file is created in the Studio Server.

NOTE You must use the same **password** and **alias** that is provided in the config.sh file.

6. Run the following jks command in the Studio Server;

```
keytool -importkeystore -srckeystore <alias>.jks -destkeystore
<alias_name>.p12 -srcalias <alias> -srcstoretype jks -deststoretype
pkcs12
```

7. Specify the keystore password. The .p12 file is created in the Studio Server.
8. Copy the .jks and .p12 files and place in the <Studio Installation path>/datastudio/server/conf directory.

4.8.3 Add the Batch Service (SSL) to PGX Trust Store

Adding the Batch Service (SSL) to PGX Trust Store facilitates you to apply redaction on the graph batch service and connect with PGX.

To add the Batch Service to PGX Trust Store, follow these steps:

1. Copy the <Keystore file name>.jks file to the <PGX Server path>/server/conf directory. To create a .jks file, see [Generate the Key Store File for Secure Batch Service](#).
2. Navigate to the <PGX Server path>/server/bin directory.
3. Open the start-server file in <PGX Server path>/server/bin directory and add the following lines in export JAVA_OPTS:
 - Djavax.net.ssl.trustStore=<PGX Server path>/conf/<Keystore file name>.jks
 - Djavax.net.ssl.trustStorePassword=<Keystore file password>

The code snippet shows an example of the file when the code is added:

```
#!/bin/bash

export HADOOP_EXTRA_CLASSPATH="$APP_HOME/hdfs-
libs/*:$APP_HOME/conf/hadoop_cluster"

export CLASSPATH="$APP_HOME/shared-lib/common/*:$APP_HOME/shared-
lib/server/*:$APP_HOME/shared-lib/embedded/*:$APP_HOME/shared-
lib/third-party/*:$APP_HOME/conf:$APP_HOME/shared-
memory/server/*:$APP_HOME/shared-memory/common/*:$APP_HOME/shared-
memory/third-party/*:$HADOOP_EXTRA_CLASSPATH"

export JAVA_OPTS="-Dpgx.max_off_heap_size=$PGX_SERVER_OFF_HEAP_MB -
Xmx${PGX_SERVER_ON_HEAP_MB}m -Xms${PGX_SERVER_ON_HEAP_MB}m -
XX:MaxNewSize=${PGX_SERVER_YOUNG_SPACE_MB}m -
XX:NewSize=${PGX_SERVER_YOUNG_SPACE_MB}m -
Dsun.security.krb5.debug=false -
Djavax.security.auth.useSubjectCredsOnly=false -
Djava.security.krb5.conf=$APP_HOME/conf/kerberos/krb5.conf -
Dpgx_conf=$APP_HOME/conf/pgx.conf -
Djavax.net.ssl.trustStore=/scratch/fccstudio/OFS_FCCM_STUDIO/pgx/server
/conf/keystore.jks -Djavax.net.ssl.trustStorePassword=password"

java -cp "$CLASSPATH" -Dfile.encoding=UTF-8 $JAVA_OPTS
oracle.pgx.server.Main $APP_HOME/shared-memory/server/pgx-webapp-*.war
$APP_HOME/conf/server.conf
```

After generating the key store file and adding the batch service to PGX trust store, in the database you must configure the user mapping for the changes made. For more information about how to configure user mapping, see the *FCC Studio Administration Guide*.

4.9 Configure the Extract Transfer and Load (ETL) Process

Extract Transfer and Load (ETL) is the procedure of copying data from one or more sources into a destination system which represents the data differently from the source or in a different context than the source. Data movement and graph loading is performed using ETL.

NOTE In case you have 8.0.7.4.0 installed and the spark cluster has both `batchservice-8.0.7.*.0.jar` and `elasticsearch-spark-20_2.11-7.*.jar` files installed; you must remove them from the spark class path.

To configure the Data Movement and Graph Load, copy the applicable `FCCM_Studio_SqoopJob.sh` files from the `<Studio_Installation_Path>/ficdb/bin` directory and add in the `<FIC_HOME of OFSAA_Installed_Path>/ficdb/bin` directory.

For information, see the **Configure ETL** and **Execute ETL** sections in the [OFS Crime and Compliance Studio Administration Guide](#).

NOTE Before you run the sqoop job, ensure that the `serverconfig.properties` file from the `<Studio_Installed_Path>/batchservice/conf` directory has the correct values.

4.10 Loading Analysis Data to Elastic Search

NOTE Before running Bulk execution for the first time, after graph job, you must remove `fcc_idx_lookup*` entries if available from ES screen and need to run `FCCM_Studio_LoadAnalysisData.sh`. It will update the entries in Elastic Search

To load the synonyms and stop words to elastic search, perform the following steps:

1. Set the export `FIC_DB_HOME` path in the `<Studio_Installation_Path>/ficdb` directory.
2. Run the `echo $FIC_DB_HOME` command.
3. Once, the contents are finalized, before running the similarity edge script, in the `<Studio_installation_path>/ficdb/bin` path, execute the following shell script with no parameters.

```
./FCCM_Studio_LoadAnalysisData.sh
```

4.11 Integration with MMG

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

As a Model Management and Governance toolkit, it enables institutions to implement their IT policies while providing flexibility and freedom that Data Scientists and Statistical Modelers desire.

To know more about MMG roles, sandbox creation and publishing, see the [MMG User Documentation](#).

NOTE

- To integrate FCC Studio with MMG, you must provide the data source, atomic and config schema parameters of MMG.
- The MMG config schema's "**NEXTGENEMF_CONFIG**" table, must be included with the following parameters.

The "**NEXTGENEMF_CONFIG**" table details are as follows:

- **DATASTUDIO_URL**: The host and port details where Studio is running (`https://<servername>:<port no>`).
- **EMFSTUDIO_SERVICE_URL**: The host and port details where MMG service is running and accepting request (`https://<ofsa web host>:<port>/<context>/rest-api/emf-service/v1`)
- **IS_APPLICATION_AIF**: Configuration for AIF Application. Specify **N** to use Studio.
- **IS_JAVA_ENGINE**: Configuration for java engine. Specify **Y** to use Studio.
- **IS_MULTI_LEVEL_AUTHORIZATION**: These are the level of authorization for Model User groups. Specify N to use Studio. For more information, see [MMG User Documentation](#).

| V_NAME | V_VALUE | V_DESC |
|--------------------------------|--|--|
| 1 IS_APPLICATION_AIF | N | Configuration for AIF Application |
| 2 IS_MULTI_LEVEL_AUTHORIZATION | N | Level of Authorization for Model User groups |
| 3 IS_JAVA_ENGINE | Y | Configuration for java engine. |
| 4 DATASTUDIO_URL | <code>https://<hostname>:<port no></code> | Host and port where MMG Studio is running |
| 5 EMFSTUDIO_SERVICE_URL | <code>http(s)://<ofsa web host>:<port>/<context>/rest-api/emf-service</code> | Host and port where MMG service is running and accepting request |

4.11.1 Placing the Files for MMG

To place the files for MMG integration, perform the following steps:

1. Copy the following jars from **MMG tomcat**, **Weblogic**, or **Webserver** `<WEB-INF>/lib` directory.
 - `aai-client.jar`
 - `aai-common-client.jar`
 - `aai-comonlanding-service.jar`
 - `aai-common-service.jar`

- aai-core.jar
 - AESCryptor.jar
 - FICServer.jar
2. Place the jars in <Studio_Installation_Path>/authservice/user/lib directory. For additional jars, see
 3. Copy following files from the ../FIC_HOME/conf directory.
 - Dynamic.dtd
 - Lookup.dtd
 - AESCryptKey.ext
 - keypair.store
 - keystore.properties
 - ofsaa8xskey.ext
 - LookupServices.xml
 - DynamicServices.xml
 4. Place the files in this path <Studio_Installation_Path>/authservice/conf directory. Perform your Installation.

4.11.2 Integration with MMG (SAML)

To integration with MMG using SAML, you must perform the following:

1. Apply the patch MMG Patch (32281016_GENERIC.zip) from [My Oracle Support \(MOS\)](#).
2. Specify the following details in the **nextgenmf config** table:
 - **STUDIO_AUTH_TYPE**: It is the Data Studio authentication type, in case of SAML, it is **FCC_SSO**.
 - **FCC_API_USER**: Indicates the API User details for FCC Studio, applicable only when **STUDIO_AUTH_TYPE** is **FCC_SSO**.
 - **SSO_TOKEN**: The token that is generated for accessing MMG. For more information , see [SSO Token Generation](#).

| V_NAME | V_VALUE | V_DESC |
|--------------------------------|--|--|
| 1 IS_APPLICATION_AIF | Y | Configuration for AIF Application |
| 2 IS_MULTI_LEVEL_AUTHORIZATION | N | Level of Authorization for Model User groups |
| 3 STUDIO_AUTH_TYPE | DEFAULT | Data Studio authentication type -DEFAULT/FCC_SSO |
| 4 FCC_API_USER | NULL | API User for FCC Studio. Applicable only when STUDIO_AUTH_TYPE is FCC |
| 5 SSO_TOKEN | eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXUEU0hFVWVNFU09.FpHsH_5KvRci0Vl | SSO Token value for Data Studio authentication. Applicable only when S |
| 6 IS_JAVA_ENGINE | Y | Configuration for java engine. |
| 7 DATASTUDIO_URL | https://whf00pab.in.oracle.com:30078 | Host and port where MMG Studio is running |
| 8 EMFSTUDIO_SERVICE_URL | http://whf00bii.in.oracle.com:8310/BD808/rest-api/emf-service/v1 | Host and port where MMG service is running and accepting request |

4.11.2.1 SSO Token Generation

To generate the SSO Token, perform the following steps:

1. Navigate to the <Studio_K8_Installation_Path>/ficdb directory.
2. Export the ficdb contents from the <Studio_K8_Installation_Path>/ficdb directory.

3. Run the `.sh` file `FCCM_Studio_Generate_APIToken.sh` which is present in path `<Studio Installation Path>/ficdb/bin` directory, by using the following command:

```
./FCCM_Studio_Generate_APIToken.sh <API USERS>
```

For example, use the `./FCCM_Studio_Generate_APIToken.sh BATCH_USER`.

4. The token is generated in the command prompt. The generated SSO Token can be used in the `nextgenmf config` table.

4.12 Configure the config.sh File

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

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

A sample `config.sh` file is shown:

Figure 5: Sample Config.sh File

```
#!/usr/bin/env bash
export FCC_STUDIO_INSTALLATION_PATH=<Studio_Installation_Path>/OFS_FCCM_STUDIO
# NON_OFSA: Accepted values: true or false
export NON_OFSA=false
export REALM=com.oracle.ofss.fccm.studio.datastudio.auth.FCCMRealm
export FCDM_SOURCE=BD
export CB_CONFIGURED=true

# SAML realm
export SAML_ISSUER=##SAML_ISSUER##
export SAML_DESTINATION=##SAML_DESTINATION##
export SAML_ASSERTION=##SAML_ASSERTION##
export SAML_ROLE_ATTRIBUTE=##SAML_ROLE_ATTRIBUTE##
export SAML_LOGOUT_URL=##SAML_LOGOUT_URL##
export SAML_COOKIE_DOMAIN=##SAML_COOKIE_DOMAIN##
export API_USERS=##API_USERS##

## IDCS details if REALM=oracle.datastudio.realm.idcs.IdcsRealm
export IDCS_HOST=##IDCS_HOST##
export IDCS_PORT=##IDCS_PORT##
export IDCS_SSL_ENABLED=##IDCS_SSL_ENABLED##
export LOGOUT_URL=##LOGOUT_URL##
export IDCS_TENANT=##IDCS_TENANT##
export IDCS_CLIENT_ID=##IDCS_CLIENT_ID##
export IDCS_CLIENT_SECRET=##IDCS_CLIENT_SECRET##

# Quantifind details
export QUANTIFIND_URL=https://quantifind_URL.com
export ENCRYPTED_QUANTIFIND_TOKEN=bm1l0WdpZWISZVNo0G9oVgh1MGx1aGfoQzdzZWUwUXVlZXk1aWVub2l0YTdJZTNpYTE=
export QUANTIFIND_APPNAME=##QUANTIFIND_APPNAME##
export QUANTIFIND_ENABLED=true
export HTTPS_PROXY_HOST=www-myhost-name.in.oracle.com
export HTTPS_PROXY_PORT=##HTTPS_PROXY_PORT##
export HTTP_PROXY_USERNAME=##HTTP_PROXY_USERNAME##
export HTTP_PROXY_PASSWORD=##HTTP_PROXY_PASSWORD##
```

WARNING

- After you complete the applicable configurations, perform a backup of the `config.sh` file.

- Do not alter the parameter values that are already set in the config.sh file

NOTE

- You must manually set the parameter value in the config.sh file. If a value is not applicable, enter NA and ensure that the value is not entered as NULL.
- Depending on the installation architecture, ensure to provide the correct hostname for URL of PGX service in the config.sh file.
- When you upgrade FCC Studio with OFSAA, ensure to provide the same BD database, Studio schema, Hive schema, wallet related information that you used during the installation of the existing instance FCC Studio.
- When you upgrade FCC Studio without OFSAA, ensure to provide the same Studio schema and wallet related information that you used during the installation of the existing instance of FCC Studio.

Table 12: config.sh file

| Parameter | Significance | Installing with OFSAA (Mandatory) | Upgrading with OFSAA (Mandatory) | Installing without OFSAA (Mandatory) | Upgrading without OFSAA (Mandatory) |
|------------------------------|--|-----------------------------------|----------------------------------|--------------------------------------|-------------------------------------|
| FCC_STUDIO_INSTALLATION_PATH | Indicates the path where the FCC Studio installer file is extracted. | Yes | Yes | Yes | Yes |
| NON_OFSA | To install FCC Studio with OFSAA, enter "false"
To install FCC Studio without OFSAA, enter "true" | Enter false | Enter false | Enter true | Enter true |
| REALM | <p>Realm indicates functional grouping of database schemas and roles that must be secured for an application. Realms protect data from access through system privileges; realms do not give additional privileges to its owner or participants.</p> <p>FCC Studio uses realm based authorization and authentication for its users. For more information, see the Realm Based Authorization for FCC Studio section in the OFS Crime and Compliance Studio Administration Guide.</p> <p>The FCC Studio application can be accessed using the following realms:</p> <p>FCCMRealm
Value=com.oracle.ofss.fccm.studio.datastudio.auth.FCCMRealm</p> <p>IdcsRealm
Value=oracle.datastudio.realm.idcs.IdcsRealm</p> <p>DemoRealm
Value=com.oracle.ofss.fccm.studio.datastudio.auth.DemoRealm</p> <p>FCCSamlRealm
Value=com.oracle.ofss.fccm.studio.saml.FccSamlRealm</p> <p>NOTE:
The DemoRealm is used only for demo purpose and is not recommended for usage.</p> | Yes | Yes | Yes | Yes |
| FCDM_SOURCE | Indicates the source database for FCC Studio.
The available options are ECM and BD. | Enter BD or ECM | Enter BD or ECM | Enter NA | Enter NA |

| | | | | | |
|---|--|---------------------|---------------------|----------|----------|
| | <p>NOTE:</p> <ul style="list-style-type: none"> FCC Studio can use either the BD or ECM schema as the source of FCDM data for the graph. Ensure to enter the value as ECM whenever ECM integration is required with Investigation Hub. <p>Here, ECM schema is used as the source of the FCDM data to load the case information into the graph.</p> | | | | |
| CB_CONFIGURED | Indicates the setting of the graph edges. When the corresponding edge of the graph is needed, set the value to true. | Enter true or false | Enter true or false | Enter NA | Enter NA |
| STUDIO_SERVER_SSL_PASSWORD | Indicates the password for Studio Server P12 that is required for HTTPS configuration. | Yes | Yes | Yes | Yes |
| STUDIO_SERVER_SSL_ALIAS | Indicates the alias name for P12 for the Studio Server | Yes | Yes | Yes | Yes |
| IDCS
The IDCS related parameters are applicable only if IdcsRealm is used in the Realm parameter. | | | | | |
| IDCS_HOST | Indicates the server of the Oracle Identity Cloud Service (IDCS) instance. | Yes | Yes | Yes | Yes |
| IDCS_PORT | Indicates the port number of the IDCS instance. | Yes | Yes | Yes | Yes |
| IDCS_SSL_ENABLED | Indicates if SSL is enabled for the IDCS application.
Default value: true | Yes | Yes | Yes | Yes |
| LOGOUT_URL | Indicates the URL to redirect after logout from FCC Studio. | Yes | Yes | Yes | Yes |
| IDCS_TENANT | Indicates the IDCS tenant provided by the IDCS Administrator while creating the IDCS application for FCC Studio. | Yes | Yes | Yes | Yes |
| IDCS_CLIENT_ID | Indicates the IDCS client identifier provided by the IDCS Administrator while creating the IDCS application for FCC Studio. | Yes | Yes | Yes | Yes |
| IDCS_CLIENT_SECRET | Indicates the IDCS client secret provided by the IDCS Administrator while creating the IDCS application for FCC Studio. | Yes | Yes | Yes | Yes |
| SAML | 1. In case of SAML Realm, the certificate from IDP (key.cert file) is required. | | | | |

| | | | | | |
|---|--|-----|-----|-----|-----|
| The SAML related parameters are applicable only if SAMLRealm is used in the Realm parameter. | <p>2. The certificate that is obtained from the IDP must be renamed to key.cert and placed in the <Studio_Installation_Path>/OFS_FCCM_STUDIO/datastudio/server/conf directory.</p> <p>3. This certificate is used to identify the trust of the SAML response from the Identity Provider.</p> <p>4. Specify the Role Attribute name from IDP, in which the User Roles are present in the SAML response.</p> | | | | |
| SAML_ISSUER | Indicates the SAML entity ID (Studio URL) configured in the IDP. | Yes | Yes | Yes | Yes |
| SAML_DESTINATION | Indicates the SAML IDP URL that is provided by the Identity Provider after creating the SAML Application. | Yes | Yes | Yes | Yes |
| SAML_ASSERTION | Indicates the SAML consume URL (Studio/URL/saml/consume) that is configured in IDP. | Yes | Yes | Yes | Yes |
| SAML_ROLE_ATTRIBUTE | Indicates the SAML client identifier provided by the SAML Administrator for the Role and Attributes information, while creating the SAML application for FCC Studio. | Yes | Yes | Yes | Yes |
| SAML_LOGOUT_URL | Indicates the SAML client identifier provided by the SAML Administrator for the Logout URL information, while creating the SAML application for FCC Studio. | Yes | Yes | Yes | Yes |
| SAML_COOKIE_DOMAIN | Indicates the SAML client identifier provided by the SAML Administrator for the Logout URL information, while creating the SAML application for FCC Studio. | Yes | Yes | Yes | Yes |
| API_USERS | Indicates the API users. | Yes | Yes | Yes | Yes |
| External Services | | | | | |
| OFSAA_SERVICE_URL | <p>Indicates the URL of the OFSAA instance. Do not enter '/' at the end of the URL.</p> <p>NOTE:
For OFSAAI, the value must be set in the following format:
https://<HostName>:<PortNo>/<ContextName>/rest-api</p> | Yes | Yes | No | No |
| PGX_SERVER_URL | Indicates the URL of the PGX server. | Yes | Yes | Yes | Yes |

| | | | | | |
|---------------------------------|--|-----|-----|-----|-----|
| | Example: http://<HostName>:<PortNo>/
Here, default <PortNo> is 7007. | | | | |
| LIVY_HOST_URL | Indicates the URL of the Livy application.
Example:
http://<HostName>:<PortNo>
NOTE:
This parameter is applicable only if the fcc-spark-sql, fcc-spark-scala and (or) fcc-pyspark interpreters are to be used. | No | No | No | No |
| Internal Services | | | | | |
| AUTH_SERVICE_URL | Indicates the AUTH service URL that gets activated after the fcc-studio.sh file runs.
Example:
http://<HostName>:7041/authservice | Yes | Yes | No | No |
| BATCH_SERVICE_URL | Indicates the batch service URL that gets activated after the fcc-studio.sh file runs.
Example:
https://<HostName>:7043/batchservice | Yes | Yes | Yes | Yes |
| META_SERVICE_URL | Indicates the metaservice URL that gets activated after the fcc-studio.sh file runs.
Example:
http://<HostName>:7045/metaservice | Yes | Yes | Yes | Yes |
| SESSION_SERVICE_URL | Indicates the session service URL that gets activated after the fcc-studio.sh file runs.
Example:
http://<HostName>:7047/sessionservice | Yes | Yes | Yes | Yes |
| FCC_STUDIO_URL | Indicates the FCC Studio URL.
Example:
https://<hostname>:7008 | Yes | Yes | Yes | Yes |
| ORE Interpreter Settings | | | | | |

| | | | | | |
|---|---|-----|-----|-----|-----|
| This section is applicable only if ORE interpreter is to be used. | | | | | |
| RSERVE_USERNAME | Indicates the RServe username. | No | No | No | No |
| RSERVE_PASSWORD | Indicates the RServe password. | No | No | No | No |
| RSERVE_CONF_PATH | Indicates the path where the Rserve.conf file is present. | No | No | No | No |
| DB Details for Studio Schema
You must be logged in as SYSDBA to perform these configurations. | | | | | |
| STUDIO_DB_HOSTNAME | Indicates the hostname of the database where Studio schema is created. | Yes | Yes | Yes | Yes |
| STUDIO_DB_PORT | Indicates the port number where Studio schema is created. | Yes | Yes | Yes | Yes |
| STUDIO_DB_SERVICE_NAME | Indicates the service name of the database where Studio schema is created. | Yes | Yes | Yes | Yes |
| STUDIO_DB_SID | Indicates the SID of the database where Studio schema is created. | Yes | Yes | Yes | Yes |
| STUDIO_DB_USERNAME | Indicates the username of the Studio Schema (newly created Oracle Schema). | Yes | Yes | Yes | Yes |
| STUDIO_DB_PASSWORD | Indicates the password of the Studio schema. | Yes | Yes | Yes | Yes |
| STUDIO_DB_ENCRYPTED_PASSWORD | Indicates the encrypted password that is provided for the Studio schema.
For example, cGFzc3dvcmQ. | Yes | Yes | Yes | Yes |
| STUDIO_HADOOP_CREDENTIAL_ALIAS | Indicated the alias password saved in Hadoop.
For example, studio.password.alias | Yes | Yes | Yes | Yes |
| STUDIO_HADOOP_CREDENTIAL_PATH | Indicates the credentials path.
For example, <Studio Installed Path>oracle.password.jceks | Yes | Yes | Yes | Yes |
| Studio DB Wallet Details
For information on creating a wallet, see Setup Password Stores with Oracle Wallet. | | | | | |
| STUDIO_ALIAS_NAME | Indicates the Studio alias name.
NOTE: | Yes | Yes | Yes | Yes |

| | | | | | |
|---|--|-----|-----|----------|----------|
| | Enter the alias name that was created during wallet creation. | | | | |
| STUDIO_WALLET_LOCATION | Indicates the Studio wallet location. | Yes | Yes | Yes | Yes |
| STUDIO_TNS_ADMIN_PATH | Indicates the path of the tnsnames.ora file where an entry for the STUDIO_ALIAS_NAME is present. | Yes | Yes | Yes | Yes |
| DB Details for BD Config Schema | | | | | |
| BD_CONFIG_HOSTNAME | Indicates the hostname of the database where BD or ECM config schema is installed. | Yes | Yes | Enter NA | Enter NA |
| BD_CONFIG_PORT | Indicates the port of the database where BD or ECM config schema is installed. | Yes | Yes | Enter NA | Enter NA |
| BD_CONFIG_SERVICE_NAME | Indicates the service name of the database where BD or ECM config schema is installed. | Yes | Yes | Enter NA | Enter NA |
| BD_CONFIG_SID | Indicates the SID of the database where BD or ECM config schema is installed. | Yes | Yes | Enter NA | Enter NA |
| BD_CONFIG_USERNAME | Indicates the username for the BD or ECM config schema. | Yes | Yes | Enter NA | Enter NA |
| BD_CONFIG_PASSWORD | Indicates the password for the BD or ECM config schema. | Yes | Yes | Enter NA | Enter NA |
| BD Config Wallet Details
For information on creating a wallet, see Setup Password Stores with Oracle Wallet. | | | | | |
| BD_CONFIG_ALIAS_NAME | Indicates the BD or ECM config alias name.
NOTE:
Enter the alias name that was created during wallet creation. | Yes | Yes | Enter NA | Enter NA |
| BD_CONFIG_WALLET_LOCATION | Indicates the BD or ECM config wallet location. | Yes | Yes | Enter NA | Enter NA |
| BD_CONFIG_TNS_ADMIN_PATH | Indicates the path of the tnsnames.ora file where an entry for the BD_CONFIG_ALIAS_NAME is present. | Yes | Yes | Enter NA | Enter NA |
| DB Details for BD Atomic Schema | | | | | |
| BD_ATOMIC_HOSTNAME | Indicates the BD or ECM atomic schema hostname. | Yes | Yes | Enter NA | Enter NA |
| BD_ATOMIC_PORT | Indicates the BD or ECM atomic schema port number. | Yes | Yes | Enter NA | Enter NA |

| | | | | | |
|---|--|-----|-----|----------|----------|
| BD_ATOMIC_SERVICE_NAME | Indicates the BD or ECM atomic schema service name. | Yes | Yes | Enter NA | Enter NA |
| BD_ATOMIC_SID | Indicates the BD or ECM atomic schema SID. | Yes | Yes | Enter NA | Enter NA |
| BD_ATOMIC_USERNAME | Indicates the username of the BD or ECM atomic schema. | Yes | Yes | Enter NA | Enter NA |
| BD_ATOMIC_PASSWORD | Indicates the password of the BD or ECM atomic schema. | Yes | Yes | Enter NA | Enter NA |
| BD Atomic Wallet Details
For information on creating a wallet, see Setup Password Stores with Oracle Wallet. | | | | | |
| BD_ATOMIC_ALIAS_NAME | Indicates the BD or ECM atomic alias name.
NOTE:
Enter the alias name that was created during wallet creation. | Yes | Yes | Enter NA | Enter NA |
| BD_ATOMIC_WALLET_LOCATION | Indicates the BD or ECM atomic wallet location. | Yes | Yes | Enter NA | Enter NA |
| BD_ATOMIC_TNS_ADMIN_PATH | Indicates the path of the tnsnames.ora file where an entry for the BD_ATOMIC_ALIAS_NAME is present. | Yes | Yes | Enter NA | Enter NA |
| SQL Scripts | | | | | |
| FSINFODOM | Indicates the name of the BD or ECM Infodom. | Yes | Yes | Enter NA | Enter NA |
| FSSEGMENT | Indicates the name of the BD or ECM segment. | Yes | Yes | Enter NA | Enter NA |
| DATAMOVEMENT_LINK_NAME | <ul style="list-style-type: none"> □ If the Studio schema is in a different database host, you must create a DB link and provide the same link in this parameter. □ If no DB link is present, provide the BD or ECM Atomic schema name in this parameter. □ If the Studio schema is in the same database host, the value for this parameter is the username of the BD or ECM Atomic schema. | Yes | Yes | Yes | Yes |
| DATAMOVEMENT_LINK_TYPE | If the DB link is used, enter DBLINK in this field. If the DB link is not used, enter SCHEMA in this field. | Yes | Yes | Yes | Yes |
| PGX Setup Details | | | | | |
| PGX_INSTALLATION_PATH | Indicates the installation path of the PGX server.
Example: <STUDIO_INSTALLATION_PATH> | Yes | Yes | Yes | Yes |

| | | | | | |
|--|---|-----|-----|----------|----------|
| PGX_PGB_PATH | Indicates the path where you want to obtain the output graph PGB file.
Example for Hive Installation:
hdfs:/user/ofsa
Example for Oracle DB Installation:
/scratch/ofsa | Yes | Yes | Yes | Yes |
| Cloudera Setup Details
Contact your System Administrator to obtain the required details for these parameters. | | | | | |
| HADOOP_CREDENTIAL_PROVIDER_PATH | Indicates the path where Hadoop credential is stored. | Yes | Yes | Enter NA | Enter NA |
| HADOOP_PASSWORD_ALIAS | Indicates the Hadoop alias given when creating the Hadoop credentials.
For information on creating credential keystore, see Create the Credential Keystore . | Yes | Yes | Enter NA | Enter NA |
| Hive_Host_Name | Indicates the Hive hostname. | Yes | Yes | Enter NA | Enter NA |
| Hive_Port_number | Indicates the Hive port number.
Contact your Studio Administrator to obtain the port number. | Yes | Yes | Enter NA | Enter NA |
| HIVE_PRINCIPAL | Indicates the Hive Principal.
Contact your Studio Administrator to obtain the HIVE_PRINCIPAL value. | Yes | Yes | Enter NA | Enter NA |
| HIVE_SCHEMA | Indicates to create a schema in HIVE. | Yes | Yes | Enter NA | Enter NA |
| JAAS_CONF_FILE_PATH | Created for future use. | No | No | No | No |
| Krb_Host_FQDN_Name | Indicates the Kerberos host FQDN name. | Yes | Yes | Enter NA | Enter NA |
| Krb_Realm_Name | Indicates the Kerberos realm name. | Yes | Yes | Enter NA | Enter NA |
| Krb_Service_Name | Indicates the Kerberos service name.
Example: Hive | Yes | Yes | Enter NA | Enter NA |
| KRB5_CONF_FILE_PATH | Created for future use. | No | No | No | No |
| security_krb5_kdc_server | Created for future use. | No | No | No | No |
| security_krb5_realm | Created for future use. | No | No | No | No |

| | | | | | |
|---|---|-----|-----|----------|----------|
| server_kerberos_keytab_file | Indicates the Kerberos keytab file. | Yes | Yes | Enter NA | Enter NA |
| server_kerberos_principal | Indicates the Kerberos Principal. | Yes | Yes | Enter NA | Enter NA |
| server_kerberos_krb5_conf_file | Indicates the krb5.conf file name. | Yes | Yes | Enter NA | Enter NA |
| SQOOP_HOSTMACHINE_USER_NAME | Indicates the username of the Host machine where sqoop will run. | Yes | Yes | Enter NA | Enter NA |
| SQOOP_PARAMFILE_PATH | <p>1. Create a file with the name sqoop.properties in the Big Data server and add the following entry:
oracle.jdbc.mapDateToTimestamp=false</p> <p>2. Enter the location of the sqoop.properties file as the value for this parameter.
Example: /scratch/ofsaas/</p> <p>NOTE:
Ensure that the location name ends with a '/'. </p> | Yes | Yes | Enter NA | Enter NA |
| SQOOP_PARTITION_COL | Indicates the column in which the HIVE table is partitioned.
The value must be SNAPSHOT_DT. | Yes | Yes | Enter NA | Enter NA |
| SQOOP_TRG_HOSTNAME | Indicates the hostname of the Big Data server where SQOOP will run.
Example: <HostName> | Yes | Yes | Enter NA | Enter NA |
| SQOOP_WORKDIR_HDFS | Indicates the Sqoop working directory in HDFS.
Example: /user/ofsaas | Yes | Yes | Enter NA | Enter NA |
| Keystore file and pass details for batch service | | | | | |
| KEYSTORE_FILE_NAME | Indicates the keystore file name that is used for secure batch service. | Yes | Yes | Yes | Yes |
| KEYSTORE_PASS | Indicates the keystore password details for the secure batch service. | Yes | Yes | Yes | Yes |
| Elastic Search Cluster details | | | | | |
| ELASTIC_SEARCH_PORT | Indicates the port number where the elastic search service is installed. | Yes | Yes | Yes | Yes |
| ELASTIC_SEARCH_HOSTNAME | Indicates the hostname of the database where the elastic search service is installed. | Yes | Yes | Yes | Yes |
| ELASTIC_SEARCH_USERNAME | Elastic Search Username (Not Applicable, if https enabled is false and authentication is not supported). | Yes | Yes | Yes | Yes |

| | | | | | |
|--|---|-----|-----|-----|-----|
| ELASTIC_SEARCH_ENCRYPTED_PASSWORD | Encrypted password (Not Applicable, if https enabled is false and authentication is not supported). | Yes | Yes | Yes | Yes |
| ELASTIC_SEARCH_HTTPS_ENABLED | True (If ES is https enabled, else false) | Yes | Yes | Yes | Yes |
| ELASTIC_SEARCH_TRUSTSTORE_FILENAME | The filename of the ElasticSearch keystore that contains the certificates of ES host to trust (Not Applicable, if https enabled is false) | Yes | Yes | Yes | Yes |
| ELASTIC_SEARCH_TRUSTSTORE_PASSWORD | The encrypted password of Elasticsearch keystore file. (Not Applicable, if https enabled is false). | Yes | Yes | Yes | Yes |
| ELASTIC_SEARCH_HADOOP_PASSWORD_ALIAS | Indicates the password alias for Elastic Search (Not applicable if ES ELASTIC_SEARCH_HTTPS_ENABLED is false). | Yes | Yes | Yes | Yes |
| ELASTIC_SEARCH_KEYSTORE_HADOOP_CREDENTIAL_ALIAS | Indicates the password alias for Elastic Search (Not applicable if ES ELASTIC_SEARCH_HTTPS_ENABLED is false). | Yes | Yes | Yes | Yes |
| ELASTIC_SEARCH_HADOOP_CREDENTIAL_PATH | Indicates the elastic search hadoop credential path. | Yes | Yes | Yes | Yes |
| Quantifind Details
In case of Quantifind, the generated Quantifind token must be encoded. Use the <Fic_DB_path>/FCCM_Studio_Base64Encoder.sh file for encoding Quantifind token. | | | | | |
| QUANTIFIND_URL | Indicates the URL of the Quantifind.
For example, https://api-test.quantifind.com | Yes | Yes | Yes | Yes |
| ENCRYPTED_QUANTIFIND_TOKEN | Indicates the token that is generated when integrating with Quantifind.
For example, c2FtcGxIX2VuY3J5cHRlZF9xdWFudGlmaW5kX3Rva2Vu | Yes | Yes | Yes | Yes |
| QUANTIFIND_APPNAME | Indicates the Quantifind App Name.
For example, OracleIntegrationTest | Yes | Yes | Yes | Yes |
| QUANTIFIND_ENABLED | Indicates that Quantifind is enabled. Options are True or False. | Yes | Yes | Yes | Yes |
| HTTPS_PROXY_HOST | Indicates the proxy host that is used.
For example, www-proxy-idc.in.oracle.com | Yes | Yes | Yes | Yes |
| HTTPS_PROXY_PORT | Indicates the proxy port that is used. | Yes | Yes | Yes | Yes |

| | | | | | |
|----------------------------------|---|-----|-----|-----|-----|
| | For example, 80 | | | | |
| HTTPS_PROXY_USERNAME | Indicates the proxy username used if there is any.
For example, ##HTTP_PROXY_USERNAME## | Yes | Yes | Yes | Yes |
| HTTPS_PROXY_PASSWORD | Indicates the proxy password used if there is any.
For example, ##HTTP_PROXY_PASSWORD## | Yes | Yes | Yes | Yes |
| Matching Service | | | | | |
| MATCHING_SERVICE_HOSTNAME | Indicates the host name where the matching service is installed. | Yes | Yes | Yes | Yes |
| MATCHING_SERVICE_PORT | Indicates the port number where the matching service is installed. | Yes | Yes | Yes | Yes |
| MATCHING_SERVICE_URL | Indicates the Matching Service url . For Example: http://<SERVER NAME>:<POST>/matching-service | | | | |
| EXECUTOR_THREADS | Indicates the number of threads to run in parallel during one scroll.
For example: 10 | Yes | Yes | Yes | Yes |
| ELASTICRESPONSE_BUFFERLIMIT_BYTE | Indicates the buffer size of the response obtained from the elastic search service.
For example: 200 | Yes | Yes | Yes | Yes |
| SCROLL_TIME | Indicates the duration for which the scroll_size output is active.
For example: 5 | Yes | Yes | Yes | Yes |
| SCROLL_SIZE | Indicates the amount of data that must be obtained in one attempt when a query is fired on an index in the elastic search service.
For example: 1000 | Yes | Yes | Yes | Yes |
| BULK_RESULT_SIZE | Indicates the amount of data that can be loaded in bulk.
For example: 100 | Yes | Yes | Yes | Yes |
| REAL_TIME_RESULT_SIZE | Indicates the result size in real time.
For example: 100 | Yes | Yes | Yes | Yes |
| GROUP_THRESHOLD | Indicates the lowest threshold value for the rule sets. | | | | |
| Entity Resolution | | | | | |

| | | | | | |
|----------------------------------|---|-----|-----|-----|-----|
| ER_SERVICE_PORT | Indicates the port number where the entity resolution service is installed.
Default Value: 7051
NOTE:
This value is already set. Do not change the value. | Yes | Yes | Yes | Yes |
| ER_SERVICE_URL | Indicates the URL of the entity resolution service.
For example: http://<HostName>:7051 | Yes | Yes | Yes | Yes |
| ETL | | | | | |
| HDFS_GRAPH_FILES_PATH | Indicates the filepath in the HDFS where the graph.json is formed. | Yes | Yes | No | No |
| GRAPH_FILES_PATH | Indicates the directory in the Big Data server for graph files. | Yes | Yes | No | No |
| GRAPH_NAME | Indicates the name you want to assign to the global graph at the end of ETL. | Yes | Yes | No | No |
| ETL_PROCESSING_RANGE | Indicates the duration for which the data would be moved from Oracle to Hive.
For example: If the ETL_PROCESSING_RANGE = 2Y, 3M, 10D, that is, 2 years, 3 months, and 10 days, and the present date is 20200814, then the data movement occurs for the range 20180504 to 20200814. | Yes | Yes | No | No |
| OLD_GRAPH_SESSION_DURATION | Indicates the session older than this specified duration will be removed from the PGX server. If unsure, you can set this value for a week (7D). | Yes | Yes | No | No |
| REMOVE_TRNXS_EDGE_AFTER_DURATION | Indicates the date range for which transaction edges will be maintained in graph. For example: 6Y, 3M, 10D, which means 6 years, 3 months and 15 days. | Yes | Yes | No | No |
| CONNECTOR_CHANGESET_SIZE | Indicates the number of nodes or edges you want to process during an update of graph. If unsure, you can set it to 10000. | Yes | Yes | No | No |
| PGX_SERVER_URLS | Indicates the comma ',' separated values of PGX URLs. If you have only one PGX URL, then the value is http://<server1>:7007. | Yes | Yes | No | No |
| PGX_REALM | Indicates the Realm for PGX. For ex:
com.oracle.ofss.fccm.studio.pgx.FCCMPgxRealm | Yes | Yes | No | No |
| NUM_CACHED_RESULTSET | Indicates the ached result set. For ex: 0 | Yes | Yes | No | No |

| | | | | | |
|------------------------------------|---|-----|-----|----|----|
| RESULTSET_EXPIRATION_TIME_SECS | Indicates the Result set expiration time. For ex: 3600. | Yes | Yes | No | No |
| MAX_TOTAL_SHARED_DATA_MEMORY_SIZE | Absolute memory limit of shared data (includes published graphs and pinned non-referenced graphs).
For example: 20G | Yes | Yes | No | No |
| MAX_TOTAL_PRIVATE_DATA_MEMORY_SIZE | Memory limit of private data (includes non-published graphs and PGQL results) relative to total PGX engine memory limit.
For example: 8G | Yes | Yes | No | No |
| MAX_PER_SESSION_DATA_MEMORY_SIZE | Absolute memory limit for any one session of the PGX engine.
For example: 700M | Yes | Yes | No | No |
| MAX_DATA_MEMORY_SIZE_DSADMIN | Absolute memory limit for any user of the PGX engine whose role is DSADMIN.
For example: 2G | Yes | Yes | No | No |
| MAX_DATA_MEMORY_SIZE_DSBATCH | Absolute memory limit for any user of the PGX engine whose role is DSBATCH.
For example: 10G | Yes | Yes | No | No |
| MAX_DATA_MEMORY_SIZE_DSINTER | Absolute memory limit for any user of the PGX engine whose role is DSINTER.
For example: 5G | Yes | Yes | No | No |
| MAX_DATA_MEMORY_SIZE_DSAPPROVER | Absolute memory limit for any user of the PGX engine whose role is DSAPPROVER.
For example: 5G | Yes | Yes | No | No |
| MAX_DATA_MEMORY_SIZE_DSUSER | Absolute memory limit for any user of the PGX engine whose role is DSUSER.
For example: 5G | Yes | Yes | No | No |

4.13 Run the FCC Studio Installer

NOTE Add following parameters to the `.profile` and make sure `.profile` is executed before starting studio services.

```
export SANE_PARALLELISM=1
export SANE_ADAPTER_THREADS=8
export SANE_TIMEOUT=180
export SANE_SINGLE_THREAD_THRESHOLD=100
```

To run the FCC Studio installer, follow these steps:

WARNING Do not run the `install.sh` command until you verify the configurations made in the `config.sh` file.

1. Navigate to the `<Studio_Installation_Path>/bin/` directory.
2. Execute the following command in the console:

```
./install.sh
```

NOTE Execution of the `install.sh` command does not generate any log file.

3. Execute the following command in the console:

```
./fcc-studio.sh
```

Congratulations! Your installation is complete.

NOTE If user wants to use ML scoring method then 'TNS_ADMIN' and 'LD_LIBRARY_PATH' should be exported, by using the following command:

- `export TNS_ADMIN=<WALLET_LOCATION>`
- `export LD_LIBRARY_PATH=<INSTANT_CLIENT_PATH>:$LD_LIBRARY_PATH.`

For Example,

- `export TNS_ADMIN=/scratch/fccstudio/Studio_809_AbT9/wallet_809_AbT9`

-
- export
LD_LIBRARY_PATH=/opt/oracle/instantclient_19_8:\$LD_LIBRARY_PATH"

The FCC Studio application is installed with or without OFSAA depending on the configuration provided in the `config.sh` file. The FCC Studio application and all the interpreters are started.

After the successful completion of the FCC Studio installation, the script displays a URL that can be used to access the FCC Studio Application.

4.14 Install the PGX Service

NOTE PGX service can be installed on the same server where FCC Studio is installed or on a different server.

To install PGX service, follow these steps:

1. Navigate to the `<Studio_Installation_Path>/pgx/server/` directory.
2. Perform the following:
 - If PGX service is to be installed on the same server where FCC Studio is installed, extract the `pgx-distribution-20.2.3-server.zip` file.
 - If PGX service is to be installed on a different server, follow these steps:
 - Copy the `pgx-distribution-20.2.3-server.zip` file to the PGX server.
 - Extract the `pgx-distribution-20.2.3-server.zip` file.

NOTE The path where the `pgx-distribution-20.2.3-server.zip` file is unzipped is referred to as `<PGX_Installation_Path>`.

3. Navigate to the `<PGX_Installation_Path>/pgx/server/conf` directory.

NOTE Configure the following properties if applicable:

In the `server.conf` file, configure the following properties:

- `enable_tls: false`,
- `enable_client_authentication: false`

In the `pgx.conf` file, configure the following properties:

- `allow_local_filesystem`: true
- By default, the property value is true, which means that the SSL certificate is enabled, and is the recommended value. Change to false only if you do not the SSL certificate enabled.

4. Replace the following Kerberos Files in the `<PGX_Installation_Path>/pgx/server/conf/kerberos` directory:

`krb5.conf`

keytab file name as mentioned in the `config.sh` file.

5. Replace the following Hadoop configuration files in the `<PGX_Installation_Path>/pgx/server/conf/hadoop_cluster` directory:

- `core-site.xml`
- `hadoop-env.sh`
- `hdfs-site.xml`
- `log4j.properties`
- `ssl-client.xml`
- `topology.map`
- `topology.py`
- `hive-site.xml`
- `yarn-site.xml`
- `redaction-rules.json`
- `hive-env.sh`
- `mapred-site.xml`

For additional jars, see [Appendix C – Additional Jars – PGX](#) section. Contact your administrator to get the files.

6. Copy all the jars from `<PGX_Installation_path>/server/conf/hdfs_libs` directory.
7. Navigate to the `<PGX_Installation_Path>/pgx/server/bin` directory and configure the `config.sh` file as described in the following table:

Table 13: config.sh Parameters

| Interaction Variable Name | Significance |
|---|--|
| <code>KERBEROS_TICKET_RENEWAL_PERIOD</code> | For example: 7200 would mean every 2 hours |

| | |
|------------------------------------|--|
| KERBEROS_PRINCIPAL | For example: USER@PRINCIPAL |
| KERBEROS_KEYTAB_FILENAME | For example: fccstudio.keytab |
| KRB5_CONFIG_FILENAME | For example: krb5.conf |
| PGX_SERVER_OFF_HEAP_MB | Indicates the maximum off-heap memory size in megabytes (mainly used for storing graphs except for their string properties) that PGX tries to respect.
Recommended Value: 42% of the container's memory limit size above.
For example: 10240 |
| PGX_SERVER_ON_HEAP_MB | Indicates the maximum and minimum heap memory size (mainly used for storing graphs' string properties) for the Java process of PGX.
Recommended Value: 58% of the container's memory limit size above.
For example: 10240 |
| PGX_SERVER_YOUNG_SPACE_MB | Indicates the amount of young space (new space) configured for the java heap. |
| URL_GLOBAL_GRAPH_CONFIG_JSON | Indicates the URL of the global graph to be pre-loaded. The value can be on HDFS.
For example: hdfs:///user/fccstudio/graph.json |
| PGX_GLOBAL_GRAPH_NAME | Indicates the name that the pre-loaded global graph is published with, and the FCC Studio users can use to reference the global graph.
For example: GlobalGraphIH |
| HDFS_GRAPH_FILES_PATH | Indicates the path of the graph files.
For example:
hdfs:///user/fccstudio/hive_808_test_BD_19aug |
| MAX_TOTAL_SHARED_DATA_MEMORY_SIZE | Absolute memory limit of shared data (includes published graphs and pinned non-referenced graphs).
For example: 20G |
| MAX_TOTAL_PRIVATE_DATA_MEMORY_SIZE | Memory limit of private data (includes non-published graphs and PGQL results) relative to total PGX engine memory limit.
For example: 8G |

| | |
|----------------------------------|---|
| MAX_PER_SESSION_DATA_MEMORY_SIZE | Absolute memory limit for any one session of the PGX engine.
For example: 700M |
| MAX_DATA_MEMORY_SIZE_DSADMIN | Absolute memory limit for any user of the PGX engine whose role is DSADMIN.
For example: 2G |
| MAX_DATA_MEMORY_SIZE_DSBATCH | Absolute memory limit for any user of the PGX engine whose role is DSBATCH.
For example: 10G |
| MAX_DATA_MEMORY_SIZE_DSINTER | Absolute memory limit for any user of the PGX engine whose role is DSINTER.
For example: 5G |
| MAX_DATA_MEMORY_SIZE_DSAPPROVER | Absolute memory limit for any user of the PGX engine whose role is DSAPPROVER.
For example: 5G |
| MAX_DATA_MEMORY_SIZE_DSUSER | Absolute memory limit for any user of the PGX engine whose role is DSUSER.
For example: 5G |
| KEYSTORE_FILE_NAME | Indicates keystore file name of Batchservice's certificatestes.. |
| KEYSTORE_PASS | Indicates keystore password of Batchservice's certificatestes. |

8. Navigate to the <PGX_Installation_Path>/pgx/server/bin directory and run the following command:

```
./install.sh
```

9. Start the PGX service.

To start the PGX service, follow these steps:

- a. Navigate to the path where PGX service is installed.
- b. Navigate to the following directory where the start service for PGX is located:

```
<PGX_Installation_Path>/pgx/server/bin
```

- c. Run the following command:

```
"nohup ./start-pgx.sh &"
```

To stop the PGX service, run the following command:

```
./stop-script.sh
```

NOTE

You must run at least one successful ETL batch to start the PGX service with the graph.json file located in the `URL_GLOBAL_GRAPH_CONFIG_JSON` path is present. For more information, see the *Data Movement and Graph Loading for Big Data Environment* section in the *OFS Crime and Compliance Studio Administration Guide*.

5 Post-installation Steps when OFSAA is Installed

ATTENTION For the utility shell script and patch for [Security Alert CVE-2021-44228](#), please refer to the [Appendix E - Apache Log4j Security Alert CVE-2021-44228 Patch Details](#) section.

On successful installation of FCC Studio, you must perform the following post-installation configurations.

Topics:

- [Verify the Installation](#)
- [Configure the SSH Connection](#)
- [Revoke Permissions for the Database Schemas](#)
- [Add the Python Packages to FCC Studio](#)
- [Configure Schema Creation](#)
- [Configure the ICIJ Data](#)
- [Start the PGX Service](#)
- [Access the FCC Studio Application](#)
- [Perform the OFSAA Configuration for Batch Execution](#)
- [Configure and Run Published Notebooks](#)
- [Apply the GDPR and Redaction Changes](#)

NOTE Before running the post-installation steps, an SSH connection to the Big Data server must be configured

5.1 Verify the Installation

To verify the FCC Studio installation with OFSAA, check the log files in the `<STUDIO_INSTALLATION_PATH>/logs` directory. If all the servers are up and running, it indicates that the installation is complete.

WARNING If you notice any errors in the log files, do not proceed further. Contact [My Oracle Support \(MOS\)](#) and provide the applicable error code and log files.

If the installation of FCC Studio is unsuccessful, you must reinstall the application after performing the cleanup tasks. For more information, see [Reinstall FCC Studio](#).

5.2 Configure the SSH Connection

To configure the SSH connection, run the following commands in the Windows command prompt:

1. Run `ssh-keygen`
Generating public/private rsa key pair
2. Enter file in which to save the key
(`<Linux_Home>/.ssh/id_rsa`) : [Press Enter]
3. Enter passphrase (empty for no passphrase) : [Press Enter]
4. Enter same passphrase again: [Press Enter]
5. `ssh-copy-id -i ~/.ssh/id_rsa.pub <BigData_Server>`
6. `ssh <BigData_Server>`

5.3 Revoke Permissions for the Database Schemas

Revoke the following permissions in the Database Schema:

```
REVOKE create sequence FROM <studio_schema>;
REVOKE execute on dbms_ols FROM <studio_schema>;
REVOKE create SYNONYM FROM <studio_schema>;
REVOKE execute on dbms_ols FROM <BDATOMICSCHEMA>;
REVOKE execute on sys.dbms_session FROM <studio_schema>;
```

NOTE This is an optional step.

The following final set of permissions are available for the user after the above permissions are revoked:

```
GRANT create any context to <Studio_DB_Username>;
GRANT create session TO <Studio_DB_Username>;
GRANT create table TO <Studio_DB_Username>;
GRANT create view TO <Studio_DB_Username>;
GRANT create any procedure TO <Studio_DB_Username>;
GRANT create any context TO <BD or ECM Schema User>;
```

5.4 Add the Python Packages to FCC Studio

To install the Python 3.6 libraries, follow these steps:

1. Navigate to the `<Studio_Installation_Path>/python-packages/bin` directory.
2. Execute the following command:

```
chmod 0755 *
```

3. Install the Python 3.6 library packages that are packaged with the FCC Studio Installer using the following command:

```
./install.sh
```

The Python 3.6 libraries that are packaged with the FCC Studio Installer are installed.

NOTE

- Execute the `./remove.sh` command to remove the Python 3.6 libraries that are already installed.
- To install additional Python libraries, contact your Studio Administrator to install the same on the Processing Server (Studio Notebook Server).
- To change the default Python version in the Interpreters, see the Changing Python Version in the fcc-python Interpreter section in the OFS Crime and Compliance Studio Administration Guide.

5.5 Configure Schema Creation

Schema creation is a one-time activity that replicates the table structure from the Financial Crime Data Model (FCDM) Atomic schema to the Hive Atomic schema.

Topics:

- [Configure Schema Creation from FCC Studio Server](#)
- [Configure Schema Creation from OFSAA Server](#)

5.5.1 Configure Schema Creation from FCC Studio Server

To configure Schema Creation from FCC Studio server, follow these steps:

1. Set `FIC_DB_HOME` path to `<Studio_Installation_Path>/ficdb`.

NOTE The `$FIC_DB_HOME` path can be set from the `.profile` file.

2. Create a Hive Schema with the name mentioned in the `HIVE_SCHEMA` parameter in the `config.sh` file.

For information on the `config.sh` file, see [Configure the config.sh File](#).

3. Execute the following shell script in the `<Studio_Installation_Path>/ficdb/bin/` directory to create tables in Hive Schema:

```
"./FCCM_Studio_SchemaCreation.sh HIVE"
```


4. Check the `<Studio_Installaton_Path>/logs/batchservice.logs` for more information.

NOTE If the table are not created in hive schema, follow the steps 5 and 6 from [Configure Schema Creation from OFSAA Server](#).

5.5.2 Configure Schema Creation from OFSAA Server

To configure Schema Creation from OFSAA server, follow these steps:

1. Copy all the jar files from the `<Studio_Installation_Path>/ficdb/lib` directory and paste into the `<OFSAA_FIC_HOME_PATH>/ficdb/lib` directory .
2. Copy all the `.sh` files from the `<Studio_Installation_Path>/ficdb/bin` directory and paste into the `<OFSAA_FIC_HOME_PATH>/ficdb/bin` directory .
3. Create a Hive Schema with the name mentioned in the `HIVE_SCHEMA` parameter in the `config.sh` file.

For information on the `config.sh` file, see [Configure the config.sh File](#).

4. Execute the following shell script in the `<OFSAA_FIC_HOME_PATH>/ficdb/bin` directory to create tables in Hive Schema:


```
FCCM_Studio_SchemaCreation.sh HIVE
```
5. Check the `<Studio_Installaton_Path>/logs/batchservice.logs` for more information.

If the atomic schema creation fails, login to the atomic schema of BD/ECM and run the following query:

```
select * from fcc_orahive_datatypemapping;
```

The `fcc_orahive_datatypemapping` table must have only 5 rows. If there are more than 5 rows, run the following query to delete the additional rows:

```
select * from fcc_orahive_datatypemapping for update
```

If the studio schema creation fails, login as a studio user and run the following query:

```
select * from fcc_datastudio_schemaobjects
```

6. 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`.

5.6 Configure the ICIJ Data

To configure the International Consortium of Investigative Journalists (ICIJ) data, follow these steps:

1. [Clean the ICIJ Data](#)
2. [Configure the FILEPATH for ICIJ](#)

5.6.1 Clean the ICIJ Data

To clean the ICIJ data, follow these steps:

1. Download the four dataset directories from <https://offshoreleaks.icij.org/pages/database>.
2. Extract the four dataset directories and place the extracted directories in the `<Studio_Installation_Path>/icij_data_cleaning` directory.
3. Navigate to the `<Studio_Installation_Path>/icij_data_cleaning/bin` directory and execute the following command:

```
./clean.sh
```

NOTE Ensure that Python 3 is available in the machine before executing this command.

After successful execution of the command:

- The cleaned data is available for the sqoop job to load it in Hive and HDFS.
- A directory named `clean` is created inside each of the dataset where a clean version of each CSV file is created.

5.6.2 Configure the FILEPATH for ICIJ

NOTE The FCC Studio graph model is configured to include ICIJ watchlist files.

To configure the `FILEPATH` for ICIJ, follow these steps:

1. Place the watchlist files in HDFS, that is accessible by the user.
2. Update the `FILEPATH` of the watch list files in the `fcc_studio_etl_files` table. The `FILEPATH` refers to the complete hdfs filepath of the csv file. For mapping between `DF_NAME` and `FILEPATH`, see the following image:

Figure 4: fcc_studio_etl_files Table

| DF_NAME | FILEPATH | DF_SEQ_NO | FILE_ORDER |
|--------------------------------|----------|-----------|------------|
| 1 Offshore_edges_is_related_to | ... | 12 | 1 |
| 2 Bahama_External_Address | ... | 13 | 1 |

The following table provides the file path for the csv files:

| DF_NAME | File Path |
|------------------------------|--|
| Panama_External_Address | panama_papers.nodes.address.csv |
| Panama_External_Entity | panama_papers.nodes.entity.csv |
| Panama_External_Entity | panama_papers.nodes.intermediary.csv |
| Panama_External_Entity | panama_papers.nodes.officer.csv |
| Panama_edges_address_of | panama_papers.edges.csv |
| Panama_edges_is_related_to | panama_papers.edges.csv |
| Offshore_External_Address | offshore_leaks.nodes.address.csv |
| Offshore_External_Entity | offshore_leaks.nodes.entity.csv |
| Offshore_External_Entity | offshore_leaks.nodes.intermediary.csv |
| Offshore_External_Entity | offshore_leaks.nodes.officer.csv |
| Offshore_edges_address_of | offshore_leaks.edges.csv |
| Offshore_edges_is_related_to | offshore_leaks.edges.csv |
| Bahama_External_Address | bahamas_leaks.nodes.address.csv |
| Bahama_External_Entity | bahamas_leaks.nodes.entity.csv |
| Bahama_External_Entity | bahamas_leaks.nodes.intermediary.csv |
| Bahama_External_Entity | bahamas_leaks.nodes.officer.csv |
| Bahama_edges_address_of | bahamas_leaks.edges.csv |
| Bahama_edges_is_related_to | bahamas_leaks.edges.csv |
| Paradise_External_Address | paradise_papers.nodes.address.csv |
| Paradise_External_Entity | paradise_papers.nodes.entity.csv |
| Paradise_External_Entity | paradise_papers.nodes.intermediary.csv |
| Paradise_External_Entity | paradise_papers.nodes.officer.csv |
| Paradise_External_Entity | paradise_papers.nodes.other.csv |
| Paradise_edges_is_related_to | paradise_papers.edges.csv |
| Paradise_edges_address_of | paradise_papers.edges.csv |
| Paradise_edges_is_linked_to | paradise_papers.edges.csv |

5.7 Start the PGX Service

To start the PGX service, follow these steps:

1. Navigate to the path where PGX service is installed.
2. Navigate to the following directory where the start service for PGX is located:

```
<PGX_Installation_Path>/pgx/server/bin
```

3. Run the following command:

```
"nohup ./start-pgx.sh &"
```

NOTE Make sure to update correct location of `graph.json` and `csv` files in `config.sh` inside `<PGX Installation Path>/bin` directory before starting the PGX server

For information about triggering bulk similarity, see the [FCC Studio Administration Guide](#).

5.8 Access the FCC Studio Application

To access FCC Studio, follow these steps:

1. Enter the URL in the following format in the web browser:

```
https://<Host_Name>:<Port_Number>
```
2. Here `<Port_Number>` is 7008 for the FCC Studio application installed on-premise. The FCC Studio application login page is displayed.

Figure 5:FCC Studio Application Login Page



3. Enter the Username and Password.
4. Click Login.

After you access the application, you can view the ready-to-use notebooks. To check if you have been assigned any roles, create a notebook. If you cannot create a notebook, contact [My Oracle Support \(MOS\)](#).

5.9 Perform the OFSAA Configuration for Batch Execution

NOTE This configuration is not applicable for FCC Studio installed without OFSAA.

To perform OFSAA configuration for batch execution, follow these steps:

1. Copy the files in the `<Studio_Installation_Path>/ficdb/bin` directory to the server where the BD or ECM pack is installed and to the `$FIC_DB_HOME/bin` directory of the OFSAA setup.
2. Execute the following command to grant Execute permission to the files:

```
chmod +x <filenames>
```

3. Copy all the files from the `<Studio_Installation_Path>/ficdb/lib` directory into the `$FIC_DB_HOME/lib` directory.

For information on running FCC Studio Batches, see Managing Studio Batches chapter in the Oracle Financial Services Crime and Compliance Studio Administration Guide.

5.10 Configure and Run Published Notebooks

NOTE This configuration is not applicable for FCC Studio installed without OFSAA.

To perform the configuration required to run published notebooks, copy the required `FCCM_Studio_NotebookExecution.sh` file from the `<Studio_Installation_Path>/ficdb/bin` directory into the `<FIC_HOME of OFSAA_Installed_Path>/ficdb/bin` directory.

For information on running published notebooks, see the Executing Published Notebook section in the `<OFS Crime and Compliance Studio Administration Guide`.

6 Post-installation Steps when OFSAA is Not Installed

ATTENTION For the utility shell script and patch for [Security Alert CVE-2021-44228](#), please refer to the [Appendix E - Apache Log4j Security Alert CVE-2021-44228 Patch Details](#) section.

On successful installation of FCC Studio, you must perform the following post-installation configurations.

Topics:

- [Verify the Installation](#)
- [Revoke Permissions for the Database Schemas](#)
- [Add the Python Packages to FCC Studio](#)
- [Start the PGX Service](#)
- [Access the FCC Studio Application](#)

NOTE Before running the post-installation steps, an SSH connection to the Big Data server must be configured

6.1 Verify the Installation

To verify the FCC Studio installation without OFSAA, check the log files in the `<STUDIO_INSTALLATION_PATH>/logs` directory. If all the servers are up and running, it indicates that the installation is complete. Also, ensure all the interpreters are displayed and the JDBC interpreter is working in the FCC Studio application home page.

WARNING If you notice any errors in the log files, do not proceed further. Contact [My Oracle Support \(MOS\)](#) and provide the applicable error code and log files.

If the installation of FCC Studio is unsuccessful, you must reinstall the application after performing the cleanup tasks. For more information, see [Reinstall FCC Studio](#).

6.2 Revoke Permissions for the Database Schemas

Revoke the following permissions in the Database Schema:

```
REVOKE create sequence FROM <studio_schema>;
REVOKE execute on dbms_ols FROM <studio_schema>;
```

```
REVOKE create SYNONYM FROM <studio_schema>;
REVOKE execute on dbms_ols FROM <BDATOMICSCHEMA>;
REVOKE execute on sys.dbms_session FROM <studio_schema>;
```

NOTE This is an optional step.

The following final set of permissions are available for the user after the above permissions are revoked:

```
GRANT create any context to <Studio_DB_Username>;
GRANT create session TO <Studio_DB_Username>;
GRANT create table TO <Studio_DB_Username>;
GRANT create view TO <Studio_DB_Username>;
GRANT create any procedure TO <Studio_DB_Username>;
GRANT create any context TO <BD or ECM Schema User>;
```

6.3 Add the Python Packages to FCC Studio

To install the Python 3.6 libraries, follow these steps:

1. Navigate to the `<Studio_Installation_Path>/python-packages/bin` directory.
2. Execute the following command:

```
chmod 0755 *
```

3. Install the Python 3.6 library packages that are packaged with the FCC Studio Installer using the following command:

```
./install.sh
```

The Python 3.6 libraries that are packaged with the FCC Studio Installer are installed.

NOTE

- Execute the `./remove.sh` command to remove the Python 3.6 libraries that are already installed.
- To install additional Python libraries, contact your Studio Administrator to install the same on the Processing Server (Studio Notebook Server).
- To change the default Python version in the Interpreters, see the Changing Python Version in the fcc-python Interpreter section in the OFS Crime and Compliance Studio Administration Guide.

6.4 Start the PGX Service

To start the PGX service, follow these steps:

1. Navigate to the path where PGX service is installed.
2. Navigate to the following directory where the start service for PGX is located:

```
<PGX_Installation_Path>/pgx/server/bin
```

3. Run the following command:

```
"nohup./start-pgx.sh &"
```

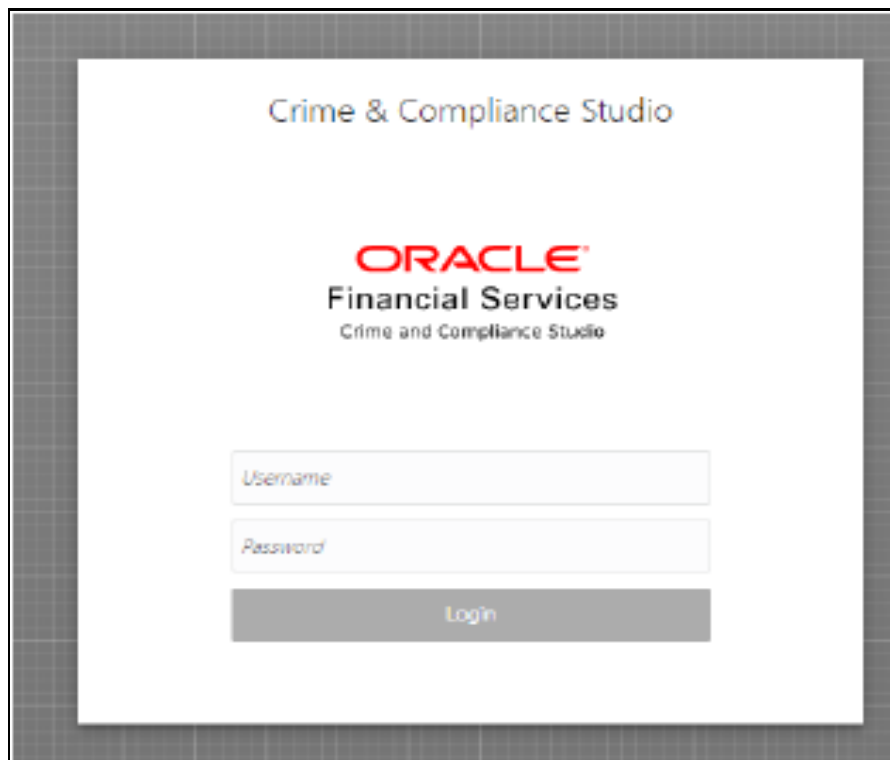
For information about triggering bulk similarity, see the [FCC Studio Administration Guide](#).

6.5 Access the FCC Studio Application

To access FCC Studio, follow these steps:

1. Enter the URL in the following format in the web browser:
2. `https://<Host_Name>:<Port_Number>`
3. Here `<Port_Number>` is 7008 for the FCC Studio application installed on-premise.
4. The FCC Studio application login page is displayed.

Figure 6: FCC Studio Application Login Page



7 Upgrade

Follow these steps to upgrade an existing instance of FCC Studio:

1. [Cleanup for Upgrade](#)
2. [Install Steps for Upgrade](#)

You can upgrade an existing instance of FCC Studio as follows:

Upgrade FCC Studio from v8.0.7.1 onwards to v8.0.8.2.0 with OFSAA.

NOTE Here, ensure to provide the same BD database, Studio schema, Hive schema, wallet related information that you used during the installation of the existing instance FCC Studio.

Upgrade FCC Studio from v8.0.7.1 onwards to v8.0.8.2.0 without OFSAA.

NOTE Here, ensure to provide the same Studio schema and wallet related information that you used during the installation of the existing instance of FCC Studio.

Upgrade FCC Studio from v8.0.7.1 onwards to v8.0.8.3.0 without OFSAA.

NOTE Here, ensure to provide the same Studio schema and wallet related information that you used during the installation of the existing instance of FCC Studio.

7.1 Cleanup for Upgrade

For upgrade from **8.0.8.0.0** to **8.0.8.x**, if you are using **Spark**, **Py-Spark**, and **FCC ORE** interpreters, then you must delete all the entries from the following tables from **Studio Schema** and then **8.0.8.x** must be deployed.

Table Names as follows:

- **DS_INTERPRETER_ABILITIES**
- **DS_INTERPRETER_CREDENTIALS**
- **DS_INTERPRETER_PROPS**
- **DS_INTERPRETER_VARIANT**

Before you begin the upgrade process, perform the following cleanup steps:

NOTE You must delete the previous namespace, before upgrading.

3. Navigate to the `DATABASECHANGELOG` table in the Studio Schema.

4. Run the following SQL queries in the Studio Schema:

```
select * from DatabaseChangeLog a where REGEXP_LIKE
(a.id, 'FCC_DATASTUDIO_CONFIG');
```

```
select * from DatabaseChangeLog a where REGEXP_LIKE
(a.id, 'FCC_STUDIO_DATASTUDIO_CONFIG_808');
```

The entries in the `DATABASECHANGELOG` table that match the criteria are displayed.

5. Delete all the entries generated as the result of above two SQL queries. The entries are as follows:

```
FCC_DATASTUDIO_CONFIG_8.0.7.3.0
FCC_DATASTUDIO_CONFIG_8.0.7
FCC_DATASTUDIO_CONFIG_8.0.7.4.0
FCC_STUDIO_DATASTUDIO_CONFIG_808
```

7.1.1 Perform Extract Transfer and Load (ETL) Cleanup

NOTE For upgrade from **8.0.7.4.0** to **8.0.8.0.0**, you can perform the following steps.

To perform the ETL cleanup, follow these steps:

- Extract the contents of the installer archive file in the download directory using the `unzip -a <FCC_Studio_Installer_Archive_File>.zip`. The FCC Studio installer file is extracted in the `<Studio_Installation_Path>` directory.
- Configure the applicable parameters in the `config.sh` file. For more information, see [Configure the config.sh File](#).
- Generate the keystore file. For more information, see [Generate the Key Store File for Secure Batch Service](#).
- Generate an encrypted password. For more information, see [Generate an Encrypted Password](#).
- Remove the existing jar files from the spark cluster.
- Create the folder in the `GRAPH_FILES_PATH` parameter in a node of the big data cluster.
- Create a folder called jars.

- Navigate to the <STUDIO>/ficdb/etlJars directory and copy all the jars present in this directory into the big data node inside the folder jars.

NOTE To use the ES-Hadoop connector, [download](#) the commons-httpclient-3.0.1.jar file and place it in the jars folder.

- Run FCCM_Studio_SchemaCreation.sh HIVE.

For upgrade from 80800 to 808x, perform the following steps:

- NOTE**
- For upgrade from **8.0.8.0.0** to **8.0.8.x**, you can perform the following steps.
 - Remove the old batch service jar for upgrade.

- Navigate to the <STUDIO>/ficdb/etlJars directory and copy the batch service jar present in this directory into the big data node inside the folder jars.

7.2 Upgrade Steps with OFSAA

The following table provides the steps to upgrade FCC Studio with OFSAA.

Table 13: Upgrade Steps with OFSAA

| Sl. No. | Activity |
|------------------------|---|
| Pre-installation Steps | |
| 1 | Download the installer kit |
| Installation Steps | |
| 1 | Extract the installer kit |
| 2 | Configure the Elastic Search Component |
| 3 | Enable Synonym and Stopword with the Elastic Search Service |
| 4 | Place files in the Installation Directories |
| 5 | Generate an Encrypted Password |
| 6 | Generate the Public Key and Private Key |
| 7 | Generate the Key Store File for Secure Batch Service |
| 8 | Configure the Extract Transfer and Load (ETL) Process |
| 9 | Configure the config.sh File |
| 10 | Run the FCC Studio Installer |
| 11 | Install the PGX Service |

| | |
|-------------------------|---|
| Post-Installation Steps | |
| 1 | Verify the Installation |
| 2 | Stop the PGX Service. |
| 3 | Stop the FCC Studio Installer |
| 4 | Configure the SSH Connection |
| 5 | Add the Python Packages to FCC Studio |
| 6 | Configure the Schema Creation |
| 7 | Configure the ICIJ Data |
| 8 | Start the PGX Service |
| 9 | Start the FCC Studio Installer |
| 10 | Access the FCC Studio Application |

7.3 Stop the PGX Service

To stop the PGX service, follow these steps:

1. Navigate to the path where PGX service is installed.
2. Navigate to the following directory where the start service for PGX is located:
<PGX_Installation_Path>/pgx/server/bin
3. Run `./stop-script.sh`.

7.4 Stop the FCC Studio Installer

To stop the FCC Studio installer, follow these steps:

1. Navigate to the <Studio_Installation_Path>/bin/ directory.
2. Run `./stop-script.sh`.

7.5 Upgrade Steps without OFSAA

The following table provides the steps to upgrade FCC Studio without OFSAA.

Table 14: Upgrade Steps without OFSAA

| Sl. No. | Activity |
|------------------------|--|
| Pre-installation Steps | |
| 1 | Download the installer kit |
| Installation Steps | |

| | |
|-------------------------|---|
| 1 | Extract the installer kit |
| 2 | Configure the Elastic Search Component |
| 3 | Enable Synonym and Stopword with the Elastic Search Service |
| 4 | Place files in the Installation Directories |
| 5 | Generate an Encrypted Password |
| 6 | Generate the Public Key and Private Key |
| 7 | Generate the Key Store File for Secure Batch Service |
| 8 | Configure the Extract Transfer and Load (ETL) Process |
| 9 | Configure the config.sh File |
| 10 | Run the FCC Studio Installer |
| 11 | Install the PGX Service |
| Post-Installation Steps | |
| 1 | Stop the PGX Service. |
| 2 | Stop the FCC Studio Installer |
| 3 | Add the Python Packages to FCC Studio |
| 4 | Start the PGX Service |
| 5 | Start the FCC Studio Installer |
| 6 | Access the FCC Studio Application |

8 Reinstall FCC Studio

If the installation of FCC Studio is unsuccessful, you must reinstall the application after performing the required cleanup tasks.

To reinstall FCC Studio, follow these steps:

1. Navigate to the `<Studio_Installation_Path>/bin` directory.
2. Create a backup for the existing `config.sh` file.
3. Delete the `<Studio_Installation_Path>` directory.
4. Download and extract the FCC Studio installer archive file. For more information, see [Download the Installer Kit](#).
5. Perform the database cleanup for the following schemas:

| Schema | Applicable for FCC Studio with OFSAA | Applicable for FCC Studio without OFSAA |
|---|--------------------------------------|---|
| Clean up for Studio Schema | Yes | Yes |
| Cleanup for BD or ECM Atomic Schema | Yes | No |
| Cleanup for BD or ECM Config Schema | Yes | No |

6. Reinstall FCC Studio.

Topics:

- [Clean up for Studio Schema](#)
- [Cleanup for BD or ECM Atomic Schema](#)
- [Cleanup for BD or ECM Config Schema](#)

8.1 Clean up for Studio Schema

To clean up the Studio schema, follow these steps:

1. Drop the existing Studio schema and create a new Studio schema.

NOTE The username and password credentials of the Studio Schema in the wallet files must be updated accordingly. (If applicable)

2. Grant the following permissions to the newly created Oracle Database Schema:
 - `GRANT create session TO <Schema User>;`

- GRANT create table TO <Schema User>;
- GRANT create view TO <Schema User>;
- GRANT create any trigger TO <Schema User>;
- GRANT create any procedure TO <Schema User>;
- GRANT create sequence TO <Schema User>;
- GRANT execute on dbms_ols TO <Schema User>;
- GRANT execute on sys.dbms_session TO <Schema User>;
- ALTER USER <Schema User> QUOTA 100M ON users;
- GRANT create sequence TO <Schema User>;
- GRANT create SYNONYM TO <Schema User>;
- GRANT ALL privileges TO <Studio Schema User>;

NOTE If dropping the schema is not an option, drop the tables and sequences as mentioned in the [Appendix A - Tables and Sequences](#) section.

8.2 Cleanup for BD or ECM Atomic Schema

To clean up the BD or ECM Atomic schema, follow these steps:

1. Login to the BD or ECM Atomic Schema.
2. Truncate the DATABASECHANGELOG and DATABASECHANGELOGLOCK tables using the following command:

```
TRUNCATE TABLE DATABASECHANGELOGLOCK;
TRUNCATE TABLE DATABASECHANGELOG;
```

8.3 Cleanup for BD or ECM Config Schema

To clean up the BD or ECM Config schema, follow these steps:

1. Login to the BD or ECM Config Schema.
2. Truncate the DATABASECHANGELOG and DATABASECHANGELOGLOCK tables using the following command:

```
TRUNCATE TABLE DATABASECHANGELOGLOCK;
TRUNCATE TABLE DATABASECHANGELOG;
```


9 Appendix A - Tables and Sequences

The list of tables and sequences to be dropped during reinstallation of FCC Studio are as follows:

- [Studio Schema Tables](#)
- [Studio Schema Sequences](#)

9.1 Studio Schema Tables

The following table lists the Studio Schema tables that must be dropped during reinstallation of FCC Studio.

| | | |
|--------------------------------|---------------------------|-----------------------|
| DS_PARAGRAPH | DS_NOTEBOOK_TAGS | DS_TASK_RESULTS |
| DS_ENTITY_PERMIS
SIONS | DS_ROLE | DS_PERMISSION_ACTIONS |
| DS_GROUP | DS_IS_PERMITTED | DS_PERMISSION_MAPPING |
| DS_USER_PERMS_M
AP | DS_USER_ROLES | DS_NOTEBOOK |
| DS_INTERPRETER_R
ESULT_MSGS | DS_USER | DS_PERMS_MAP_ACTIONS |
| DS_ENTITY_PERMS_
MAP | DS_TASK | DS_GRAPH |
| DS_INTERPRETER_R
ESULT | DS_GROUP_PERMS_MAP | DS_NOTEBOOK_RELATIONS |
| DS_INTERPRETER_P
ROPS | DS_JOB | DS_PERMISSION |
| DS_ROLE_PERMS_M
AP | DS_VISUALIZATION_TEMPLATE | DS_RESULT_MESSAGE |
| DS_INTERPRETER_A
BILITIES | DATABASECHANGELOG | DATABASECHANGELOGLOCK |
| DS_USER_GROUPS | DS_INTERPRETER_VARIANT | DS_COMMENT |

| | | |
|------------------------|--|--|
| DS_PARAGRAPH_RELATIONS | | |
|------------------------|--|--|

9.2 Studio Schema Sequences

The following table lists the Studio Schema sequences that must be dropped during reinstallation of FCC Studio.

| | | |
|----------------------------|------------------------|-------------------------|
| SEQ_COMMENT | SEQ_ENTITY_PERMISSIONS | SEQ_GRAPH |
| SEQ_GROUP | SEQ_INTERPRETER_RESULT | SEQ_INTERPRETER_VARIANT |
| SEQ_JOB | SEQ_NOTEBOOK | SEQ_PARAGRAPH |
| SEQ_PERMISSION | SEQ_PERMISSION_MAPPING | SEQ_RESULT_MESSAGE |
| SEQ_ROLE | SEQ_TASK | SEQ_USER |
| SEQ_VISUALIZATION_TEMPLATE | | |

10 Appendix B - Enabling a Second Spark or PySpark Interpreter

To set up a second Spark or PySpark interpreter, for example, to connect to two different external clusters at the same time, follow these steps:

1. Create a start-script for the second Spark interpreter.

NOTE This is an optional step.

- a. Navigate to the `<Studio_Installation_Path>/interpreters/bin` directory and create a new start-script called `start-spark2-interpreter.sh` using the following command:


```
cp start-spark-interpreter.sh start-spark2-interpreter.sh
```
- b. Edit the `start-spark2-interpreter.sh` file in the `/interpreters/bin/` directory to update:
 - i. Port number to a new port number that is not in use (for example, 7030)
 - ii. Rename the log file, search for the text, `.log` and give a new name to the log (for example, from `spark.log` to `spark2.log`).
- c. Edit the `start-all-interpreters.sh` file in the `<Studio_Installation_Path>/interpreters/bin/` directory as follows:
 - i. Search for the text `sh "$DIR"/start-spark-interpreter.sh & ,` and add an additional entry with `sh "$DIR"/start-spark2-interpreter.sh & .`

NOTE For the **2nd Spark** interpreter variant use `start-spark2-interpreter.sh`, when configuring for a 3rd variant, use as `start-spark3-interpreter.sh` and so on.

2. Create the interpreter JSON for the second Spark interpreter.
 - a. Navigate to the `<Studio_Installation_Path>/interpreters/conf` directory and create the new interpreter JSON called `spark2.json` using the following command:


```
cp spark.json spark2.json
```
 - b. Edit the `spark2.json` file in the `<Studio_Installation_Path>/interpreters/conf/` directory as follows:
 - i. Update the following parameter values:


```
group: <new-spark-interpreter-name>,
name: <new-spark-interpreter-name> ,
```

```

groupSettings.initialCodeCapability: <new-spark-interpreter-
name>,
port: 7030 (the port chosen in the step 1),
capabilities.name: <new-spark-interpreter-name>,
capabilities.button.label: <new-spark-interpreter-name>,

```

3. After update, the file will look like the following:

```

[
  {
    "group": "spark2",
    "name": "spark2",
    "className": "org.apache.zepplin.spark.SparkInterpreter",
    "groupSettings": {
      "initialCode": "True\n",
      "initialCodeCapability": "spark2"
    },
    "host": "localhost",
    "port": 7030,
    "capabilities": [
      {
        "name": "spark2",
        "highlightLanguage": "scala",
        "formEscapeCharacter": "@",
        "button": {
          "defaultCode": "println(\"Hello, world\")",
          "icon": "fa fa-fw fa-building-o",
          "label": "Spark2"
        }
      }
    ]
  },
]

```

4. Create the interpreter JSON for the second PySpark interpreter.

- a. Navigate to the <Studio_Installation_Path>/interpreters/conf directory and create the new interpreter JSON called `pyspark2.json` using following command:**

```
cp pyspark.json pyspark2.json
```

- b. Edit the `pyspark2.json` file in the <Studio_Installation_Path>/interpreters/conf/ directory as follows:**

- i. Update the following parameter values:**

```
group: <new-spark-interpreter-name>,
```

```

name: <new-spark-interpreter-name>,
groupSettings.initialCodeCapability: <new-spark-interpreter-
name>,
port: 7030 (the port chosen in the step 1),
capabilities.name: <new-spark-interpreter-name>,
capabilities.button.label: <new-spark-interpreter-name>,

```

5. After update, the file will look like the following:

```

[
{
"group": "spark2",
"name": "pyspark2",
"className": "org.apache.zeppelin.spark.PySparkInterpreter",
"host": "localhost",
"port": 7030,
"capabilities": [
{
"name": "pyspark2",
"highlightLanguage": "python",
"button": {
"defaultCode": "print('Hello World')",
"icon": "icon-python",
"label": "pyspark2"
},
"formEscapeCharacter": "$"
}
],

```

NOTE If you try to connect two interpreters to different external clusters when setting the environment variables, `SPARK_HOME` and `HADOOP_CONF_DIR` as part of providing custom Spark libraries in [Yarn Mode](#), ensure that you append the environment variables to the respective Spark interpreter start-scripts..

6. Restart FCC Studio. To do this, navigate to the `<Studio_Installation_Path>/bin/` directory and run the `./fcc-studio.sh` script

10.1 Enabling Spark for Multiple Sources:

1. Navigate to `<Studio_Installation_Path>/interpreters/interpreter/spark` directory.
2. Create a folder with the name `extralibs2` and copy the spark client files from the **2nd Source** into the `extralibs2` folder.
3. Navigate to `<Studio_Installation_Path>/interpreters/interpreter/spark/extralibs2` directory and create a new folder with the name `conf`.
4. Copy the *hadoop client configurations*, *Kerberos*, and *keytab* files from the **2nd Spark** data source into the `conf` folder.
5. In the `conf` folder, locate the `spark-defaults.conf` file and change the values for following parameters,
 - a. `spark.driver.port` to a new port number, for example: **30344**
 - b. Path to the libraries
 - c. `spark.yarn.keytab` – mention path to the keytab
 - d. `-Djava.security.krb5.conf` – mention path to the krb files.

10.2 Sample spark-default.conf Configuration File

Here is the sample code block for creating `spark-default.conf` file:

```
spark.driver.port 30303
spark.blockManager.port 31313
spark.driver.bindAddress 0.0.0.0

spark.yarn.dist.files
<STUDIO_INSTALLATION_PATH>/interpreters/interpreter/spark/extralibs/spark-
<version>-bin-
hadoop<version>/python/lib/pyspark.zip,<STUDIO_INSTALLATION_PATH>/interprete
rs/interpreter/spark/extralibs/spark-<version>-bin-
hadoop<version>/python/lib/py4j-0.10.7-src.zip

spark.executorEnv.PYTHONPATH pyspark.zip:py4j-0.10.7-src.zip

spark.driver.defaultJavaOptions "-Dsun.security.krb5.debug=false -
Djavax.security.auth.useSubjectCredsOnly=false -
Djava.security.krb5.conf=<STUDIO_INSTALLATION_PATH>/batchservice/user/conf/k
rb5.conf"

spark.driver.host <FQDN_HOSTNAME>

spark.yarn.keytab <STUDIO_INSTALLATION_PATH>
/batchservice/user/conf/fccstudio.keytab

spark.yarn.principal <KRBS_PRINCIPAL>

spark.yarn.kerberos.relogin.period 1m
```

NOTE

- **FQDN_HOSTNAME** stands for compliance Studio fully qualified hostname and **KRBS_PRINCIPAL** stands for Kerberos principal.
- Spark version is spark-2.4.0-bin-hadoop2.7.

11 Frequently Asked Questions (FAQs) and Error Dictionary

This section consists of resolution to the frequently asked questions and error codes noticed during the FCC Studio installation.

- [Frequently Asked Questions in FCC Studio](#)
- [Frequently Asked Questions in OFSAA](#)

The FCC Studio installer performs all the pre-requisite validation check during installation. Any errors encountered in the process is displayed with an appropriate Error Code. You can refer to the Error Dictionary to find the exact cause and resolution to rectify the error.

11.1 Frequently Asked Questions in FCC Studio

You can refer to the Frequently Asked Questions which is developed with the interest to help you resolve some of the FCC Studio Installation and configuration issues. This intends to share the knowledge of problem resolution to a few of the known issues. This is not an official support document and just attempts to share the knowledge of problem resolution to a few of the known issues.

1. Why does my console show an unsuccessful message during wallet creation?

Please check if you have run the following commands correctly. For more information on wallet creation, see [Setup Password Stores with Oracle Wallet](#).

- a. `mkstore -wrl <wallet_location> -create //creates a wallet in the specified location`
- b. `mkstore -wrl <wallet_location> -createCredential <alias-name> <database-user-name> //creates an alias in the studio schema`
- c. `mkstore -wrl <wallet_location> -createCredential <alias-name> <database-user-name> //creates an alias in the atomic schema`
- d. `mkstore -wrl <wallet_location> -createCredential <alias-name> <database-user-name> //creates an alias in the config schema`

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

2. Where can I find my created wallet?

Your wallet will be in the directory you have set as your wallet location.

3. Can I run `./install.sh` again if I make updates to the `config.sh` file?

Make updates to the `config.sh` file and then trigger the installation by running the `./install.sh` command. If you have already triggered the installation, then you must do the following. For more information on the attributes you can configure, see [Configure the config.sh File](#).

- Perform a backup of the `config.sh` file.
- Delete the installation folder in the `<Studio_Installation_Path>` directory.

- Extract the contents of the installer archive file in the download directory using the `unzip -a <FCC_Studio_Installer_Archive_File>.zip`. The FCC Studio installer file is extracted in the `<Studio_Installation_Path>` directory.

```
— run ./install.sh
— run ./fcc-studio.sh.
```

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

4. When should I create a Database link, and if yes, how do I do it?

Create a Database link to connect the Atomic and Config database schemas to the Studio database schema if the databases are different. You must create the link in the Studio database.

In the following example, a link has been created from the config schema to the atomic schema by running the following script:

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

Config schema : `<Config Schema>/password`

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

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

5. Why does my installed studio setup not have any notebooks?

There are some default notebooks that are ready-to-use when you install FCC Studio. If you do not see any notebooks when you log in to the application, you may not be assigned any roles. Check the `<Studio_Installation_Path>/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 \(MOS\)](#).

6. 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 any errors in the applicable log file in the `<Studio_Installation_Path>/logs` directory.

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

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 applicable log file in the `<Studio_Installation_Path>/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 `<Studio_Installation_Path>/ficdb` directory.

You can also check for any errors in the applicable log file in the `<Studio_Installation_Path>/logs` directory.

9. Why is the PGX Server not starting?

The PGX server starts only after the FCDM tables are created, that is, 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 applicable log file in the `<Installed path>/logs` directory.

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

10. 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 applicable log file in the `<Installed path>/logs` directory.

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

11. 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
(CombinedPgxDriver.java:147) at
oracle.pgx.graphviz.driver.PgxDriver.getGraph(PgxDriver.java:334)
oracle.pgx.graphviz.library.QueryEnhancer.createEnhancer(QueryEnhancer
.java:223) at
oracle.pgx.graphviz.library.QueryEnhancer.createEnhancer(QueryEnhancer
.java:209)
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.zepplin.interpreter.LazyOpenInterpreter.interpret (LazyOpenInterpreter.java:103) at
org.apache.zepplin.interpreter.remote.RemoteInterpreterServer$InterpretJob.jobRun (RemoteInterpreterServer.java:632) at
org.apache.zepplin.scheduler.Job.run (Job.java:188) at
org.apache.zepplin.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$ScheduledFutureTask.run (ScheduledThreadPoolExecutor.java:304) at
java.base/java.util.concurrent.ThreadPoolExecutor.runWorker (ThreadPoolExecutor.java:1128) at
java.base/java.util.concurrent.ThreadPoolExecutor$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) at
oracle.datastudio.interpreter.pgx.CombinedPgxDriver.getOrCreateSession (CombinedPgxDriver.java:145) ... 17 moreCaused by:
oracle.pgx.common.auth.AuthorizationException: PgxUser (FCCMDSADMIN) does not own session 6007f00a-8305-4576-9a56-9fa0f061586f or the session does not exist code: PGX-ERROR-CQAZPV67UM4H at
oracle.pgx.common.marshalers.ExceptionMarshaler.toUnserializedException (ExceptionMarshaler.java:107) at
oracle.pgx.common.marshalers.ExceptionMarshaler.unmarshal (ExceptionMarshaler.java: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.java:119) at
oracle.pgx.client.RemoteControlImpl$ControlRequest.request (RemoteControlImpl.java: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.java:490) at
java.base/java.util.concurrent.CompletableFuture.uniComposeStage (CompletableFuture.java:1106) at
java.base/java.util.concurrent.CompletableFuture.thenCompose (CompletableFuture.java:2235) at
oracle.pgx.api.PgxFuture.thenCompose (PgxFuture.java:158)

```

Then, please perform below steps as a workaround -

- a. Export the "Manual Decision" Notebook
- b. Add the link parameter just below Description
- c. for Ex - "link": "manualDecision",

```

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

```

- d. truncate the table "fcc_er_paragraph_manual" in Studio Schema.
- e. Import the modified notebook again.

12. What should I do when the result set is truncated if the size goes above '102400' bytes?

Perform the following steps:

- a. Login to FCC Studio.
- b. Navigate to interpreter **zeppelin.interpreter.output.limit**.



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

13. What should I do when the spark interpreter is not working?

- a. Login to Server.
- b. Navigate to \$SPARK_HOME directory. If the path is not set, then navigate to \$Studio_HOME/interpreters/interpreter/spark/extralibs/spark*.
- c. Export the following environment variables:

```
export HADOOP_CONF_DIR=<HADOOP Configuration Directory path>
```

```
export SPARK_HOME=<SPARK CLIENT DIRECTORY path>
export SPARK_CONF_DIR=<spark-defaults.conf directory path >
export SPARK_SUBMIT_OPTS="-Djava.security.krb5.conf=<kerberos
directory path>/krb5.conf"
```

d. Run the following command:

```
./bin/run-example --master yarn SparkPi 10
```

e. The result of the above command should be Pie value. (It ensures that the client is configured successfully.)

14. What should I do when the spark interpreter is not working?

a. Login to the Server.

b. Navigate to \$SPARK_HOME directory. If the path is not set, then navigate to \$Studio_HOME/interpreters/interpreter/spark/extralibs/spark*.

c. Export the following environment variables:

```
export HADOOP_CONF_DIR=<HADOOP Configuration Directory path>
export SPARK_HOME=<SPARK CLIENT DIRECTORY path>
export SPARK_CONF_DIR=<spark-defaults.conf directory path >
export SPARK_SUBMIT_OPTS="-Djava.security.krb5.conf=<kerberos
directory path>/krb5.conf"
```

d. Run the following command to

```
./bin/spark-submit --class org.apache.spark.examples.SparkPi --
master yarn <SPARK_HOME/examples/jars/>/spark-examples_<Version>.jar
10
```

For example, in case of spark 2.11-2.4.0, the command is as follows:

```
./bin/spark-submit --class org.apache.spark.examples.SparkPi --
master yarn <SPARK_HOME/examples/jars/>/spark-examples_2.11-
2.4.0.jar 10
```

e. The result of the above command is displayed as a Pie value. (It ensures that the client can successfully connect to the remote cluster.)

15. What should I do when the spark interpreter is not working?

a. Login to Server.

b. Navigate to \$SPARK_HOME directory. If the path is not set, then navigate to \$Studio_HOME/interpreters/interpreter/spark/extralibs/spark*.

c. Export the following environment variables:

```
export HADOOP_CONF_DIR=<HADOOP Configuration Directory path>
export SPARK_HOME=<SPARK CLIENT DIRECTORY path>
export SPARK_CONF_DIR=<spark-defaults.conf directory path >
export SPARK_SUBMIT_OPTS="-Djava.security.krb5.conf=<kerberos
directory path>/krb5.conf"
```

d. Run the following command:

```
./bin/spark-submit --class
org.apache.spark.sql.hive.thriftserver.SparkSQLCLIDriver --master
yarn -e "Show databases"
```

e. The result of the above command displays the list of databases that exist in HIVE.**16. What should I do when the spark interpreter is not working?****a. Login to Server.****b. Navigate to \$SPARK_HOME directory. If the path is not set, then navigate to \$Studio_HOME/interpreters/interpreter/spark/extralibs/spark*.****c. Export the following environment variables:**

```
export HADOOP_CONF_DIR=<HADOOP Configuration Directory path>
export SPARK_HOME=<SPARK CLIENT DIRECTORY path>
export SPARK_CONF_DIR=<spark-defaults.conf directory path >
export SPARK_SUBMIT_OPTS="-Djava.security.krb5.conf=<kerberos
directory path>/krb5.conf"
```

d. Run the following command:

```
./bin/spark-submit --class
org.apache.spark.sql.hive.thriftserver.SparkSQLCLIDriver --master
yarn -e "select * from <hiveSchema>.<tableName> limit 10"
```

e. The result of the above command ensures that the client can query from the HIVE schema.**17. What should I do when you see the following error in the spark.log file?**

```
Could not find or load main class
org.apache.spark.deploy.yarn.ExecutorLauncher
```

a. Login to the FCC Studio.**b. Navigate to Interpreter configurations.****c. Click on Spark Interpreter.****d. The spark.yarn.archive field value must be empty.****18. What should I do when you see the following error in the spark.log file?**

```
INFO client.TransportClientFactory: Successfully created connection to
after 105 ms (0 ms spent in bootstraps)

Exception in thread "main"
java.lang.reflect.UndeclaredThrowableException
at
org.apache.hadoop.security.UserGroupInformation.doAs(UserGroupInformati
on.java:1713)
at
org.apache.spark.deploy.SparkHadoopUtil.runAsSparkUser(SparkHadoopUtil.
scala:64)
at
org.apache.spark.executor.CoarseGrainedExecutorBackend$.run(CoarseGrain
edExecutorBackend.scala:188)
at
```

```
org.apache.spark.executor.CoarseGrainedExecutorBackend$.main (CoarseGrainedExecutorBackend.scala:281)
at
org.apache.spark.executor.CoarseGrainedExecutorBackend.main (CoarseGrainedExecutorBackend.scala)
Caused by: org.apache.spark.rpc.RpcTimeoutException: Futures timed out after [120 seconds]. This timeout is controlled by spark.rpc.askTimeout
at
org.apache.spark.rpc.RpcTimeout.org$apache$spark$rpc$RpcTimeout$$createRpcTimeoutException (RpcTimeout.scala:47)
at
org.apache.spark.rpc.RpcTimeout$$anonfun$addMessageIfTimeout$1.applyOrElse (RpcTimeout.scala:62)
at
org.apache.spark.rpc.RpcTimeout$$anonfun$addMessageIfTimeout$1.applyOrElse (RpcTimeout.scala:58)
at
scala.runtime.AbstractPartialFunction.apply (AbstractPartialFunction.scala:36)
at org.apache.spark.rpc.RpcTimeout.awaitResult (RpcTimeout.scala:76)
at org.apache.spark.rpc.RpcEndpointRef.askSync (RpcEndpointRef.scala:92)
at org.apache.spark.rpc.RpcEndpointRef.askSync (RpcEndpointRef.scala:76)
at
org.apache.spark.executor.CoarseGrainedExecutorBackend$$anonfun$run$1.apply$mcV$sp (CoarseGrainedExecutorBackend.scala:202)
at
org.apache.spark.deploy.SparkHadoopUtil$$anon$2.run (SparkHadoopUtil.scala:65)
at
org.apache.spark.deploy.SparkHadoopUtil$$anon$2.run (SparkHadoopUtil.scala:64)
at java.security.AccessController.doPrivileged (Native Method)
at javax.security.auth.Subject.doAs (Subject.java:422)
at
org.apache.hadoop.security.UserGroupInformation.doAs (UserGroupInformation.java:1698)
```

- a. Login to the FCC Studio.
- b. Navigate to Interpreter configurations.
- c. Click on Spark Interpreter.
- d. The `spark.master` field value must be configured as `yarn`.
- e. The `spark.master` should not be set in `spark-default.conf` file.

12 Appendix C – Additional Jars – PGX

PGX-Server doesn't include Hadoop-client for reading graph from HDFS. This section can be skipped if the deployer intend to use only ready to use sample-graph or PGX server without ETL.

When deploying Studio, you must obtain the following libraries. These libraries can be obtained from your existing big data cluster or from the internet. The following list of jars are for **Hadoop-client 3.0.0-cdh6.3.0**. These libraries are referred as '**hdfs-libs**'.

NOTE The following Jar files for your reference. you can use the similar **hdfs-libs** jars based on your Big Data cluster.

List of libraries required are as follows:

| | |
|--|-------------------------------------|
| accessors-smart-1.2.jar | jaxb-api-2.2.11.jar |
| aopalliance-1.0.jar | jaxb-impl-2.2.3-1.jar |
| asm-5.0.4.jar | jcip-annotations-1.0-1.jar |
| avro-1.8.2-cdh6.3.1.jar | jersey-client-1.19.jar |
| commons-beanutils-1.9.4.jar | jersey-core-1.19.jar |
| commons-cli-1.2.jar | jersey-guice-1.19.jar |
| commons-codec-1.11.jar | jersey-json-1.19.jar |
| commons-collections-3.2.2.jar | jersey-server-1.19.jar |
| commons-compress-1.18.jar | jersey-servlet-1.19.jar |
| commons-configuration2-2.1.1.jar | jettison-1.1.jar |
| commons-io-2.6.jar | jetty-security-9.3.25.v20180904.jar |
| commons-lang-2.6.jar | jetty-servlet-9.3.25.v20180904.jar |
| commons-lang3-3.7.jar | jetty-util-9.3.25.v20180904.jar |
| commons-logging-1.2.jar | jetty-webapp-9.3.25.v20180904.jar |
| commons-math3-3.1.1.jar | jetty-xml-9.3.25.v20180904.jar |
| commons-net-3.1.jar | jline-0.9.94.jar |
| curator-client-2.12.0.jar | json-smart-2.3.jar |
| curator-framework-2.12.0.jar | jsp-api-2.1.jar |
| curator-recipes-2.12.0.jar | jsr305-3.0.0.jar |
| gson-2.2.4.jar | jsr311-api-1.1.1.jar |
| guava-16.0.1.jar | kerb-admin-1.0.0.jar |
| guice-4.0.jar | kerb-client-1.0.0.jar |
| hadoop-annotations-3.0.0-cdh6.3.1.jar | kerb-common-1.0.0.jar |
| hadoop-auth-3.0.0-cdh6.3.1.jar | kerb-core-1.0.0.jar |
| hadoop-client-3.0.0-cdh6.3.1.jar | kerb-crypto-1.0.0.jar |
| hadoop-common-3.0.0-cdh6.3.1.jar | kerb-identity-1.0.0.jar |
| hadoop-hdfs-client-3.0.0-cdh6.3.1.jar | kerb-server-1.0.0.jar |
| hadoop-mapreduce-client-common-3.0.0-cdh6.3.1.jar | kerb-simplekdc-1.0.0.jar |
| hadoop-mapreduce-client-core-3.0.0-cdh6.3.1.jar | kerb-util-1.0.0.jar |
| hadoop-mapreduce-client-jobclient-3.0.0-cdh6.3.1.jar | kerby-asn1-1.0.0.jar |

| | |
|---|----------------------------|
| hadoop-yarn-api-3.0.0-cdh6.3.1.jar | kerby-config-1.0.0.jar |
| hadoop-yarn-client-3.0.0-cdh6.3.1.jar | kerby-pkix-1.0.0.jar |
| hadoop-yarn-common-3.0.0-cdh6.3.1.jar | kerby-util-1.0.0.jar |
| htrace-core4-4.1.0-incubating.jar | kerby-xdr-1.0.0.jar |
| httpclient-4.5.3.jar | log4j-1.2.17.jar |
| httpcore-4.4.6.jar | netty-3.7.0.Final.jar |
| jackson-annotations-2.9.9.jar | nimbus-jose-jwt-4.41.1.jar |
| jackson-core-2.9.9.jar | okhttp-2.7.5.jar |
| jackson-core-asl-1.9.13.jar | okio-1.6.0.jar |
| jackson-databind-2.9.9.3.jar | paranamer-2.8.jar |
| jackson-jaxrs-1.9.2.jar | protobuf-java-2.5.0.jar |
| jackson-jaxrs-base-2.9.9.jar | re2j-1.1.jar |
| jackson-jaxrs-json-provider-2.9.9.jar | slf4j-api-1.7.25.jar |
| jackson-mapper-asl-1.9.13-cloudera.1.jar | slf4j-log4j12-1.7.25.jar |
| jackson-module-jaxb-annotations-2.9.9.jar | snappy-java-1.1.4.jar |
| jackson-xc-1.9.2.jar | stax2-api-3.1.4.jar |
| javax.activation-api-1.2.0.jar | woodstox-core-5.0.3.jar |
| javax.inject-1.jar | xz-1.6.jar |
| javax.servlet-api-3.1.0.jar | zookeeper-3.4.8.jar |

13 Appendix D – Additional Jars – Batch Service

When deploying Studio, you must obtain the following files for Batch Service.

NOTE The following Jar files for your reference. you can use the similar **hdfs-libs** jars based on your Big Data cluster.

List of files required are as follows:

| | |
|---------------------------------------|-------------------------------------|
| accessors-smart-1.2.jar | jersey-server-1.19.jar |
| activation-1.1.jar | jersey-servlet-1.19.jar |
| asm-5.0.4.jar | jettison-1.1.jar |
| avro-1.8.2-cdh6.3.1.jar | jetty-http-9.3.25.v20180904.jar |
| commons-beanutils-1.9.4.jar | jetty-io-9.3.25.v20180904.jar |
| commons-cli-1.2.jar | jetty-security-9.3.25.v20180904.jar |
| commons-codec-1.11.jar | jetty-server-9.3.25.v20180904.jar |
| commons-collections-3.2.2.jar | jetty-servlet-9.3.25.v20180904.jar |
| commons-compress-1.18.jar | jetty-util-9.3.25.v20180904.jar |
| commons-configuration2-2.1.1.jar | jetty-webapp-9.3.25.v20180904.jar |
| commons-io-2.6.jar | jetty-xml-9.3.25.v20180904.jar |
| commons-lang-2.6.jar | jline-0.9.94.jar |
| commons-lang3-3.7.jar | jsch-0.1.54.jar |
| commons-logging-1.2.jar | json-smart-2.3.jar |
| commons-math3-3.1.1.jar | jsp-api-2.1.jar |
| commons-net-3.1.jar | jsr305-3.0.0.jar |
| curator-client-2.12.0.jar | jsr311-api-1.1.1.jar |
| curator-framework-2.12.0.jar | kerb-admin-1.0.0.jar |
| curator-recipes-2.12.0.jar | kerb-client-1.0.0.jar |
| gson-2.2.4.jar | kerb-common-1.0.0.jar |
| guava-16.0.1.jar | kerb-core-1.0.0.jar |
| hadoop-annotations-3.0.0-cdh6.3.1.jar | kerb-crypto-1.0.0.jar |
| hadoop-auth-3.0.0-cdh6.3.1.jar | kerb-identity-1.0.0.jar |
| hadoop-common-3.0.0-cdh6.3.1.jar | kerb-server-1.0.0.jar |
| hive-exec-1.1.0-cdh5.13.0.jar | kerb-simplekdc-1.0.0.jar |
| HiveJDBC4.jar | kerb-util-1.0.0.jar |
| hive-metastore-1.1.0-cdh5.13.0.jar | kerby-asn1-1.0.0.jar |
| hive-service-1.1.0-cdh5.13.0.jar | kerby-config-1.0.0.jar |
| htrace-core4-4.1.0-incubating.jar | kerby-pkix-1.0.0.jar |
| httpclient-4.5.3.jar | kerby-util-1.0.0.jar |
| httpcore-4.4.6.jar | kerby-xdr-1.0.0.jar |
| jackson-annotations-2.9.0.jar | log4j-1.2.17.jar |
| jackson-core-2.9.9.jar | netty-3.7.0.Final.jar |

| | |
|--|----------------------------|
| jackson-core-asl-1.9.13.jar | nimbus-jose-jwt-4.41.1.jar |
| jackson-databind-2.9.9.3.jar | paranamer-2.8.jar |
| jackson-jaxrs-1.9.2.jar | protobuf-java-2.5.0.jar |
| jackson-mapper-asl-1.9.13-cloudera.1.jar | re2j-1.1.jar |
| jackson-xc-1.9.2.jar | slf4j-api-1.7.25.jar |
| javax.activation-api-1.2.0.jar | slf4j-log4j12-1.7.25.jar |
| javax.servlet-api-3.1.0.jar | snappy-java-1.1.4.jar |
| jaxb-api-2.2.2.jar | stax2-api-3.1.4.jar |
| jaxb-impl-2.2.3-1.jar | stax-api-1.0-2.jar |
| jcip-annotations-1.0-1.jar | woodstox-core-5.0.3.jar |
| jersey-core-1.19.jar | xz-1.6.jar |
| jersey-json-1.19.jar | zookeeper-3.4.8.jar |

14 Appendix E - Apache Log4j Security Alert CVE-2021-44228 Patch Details

To address the vulnerability on Apache Log4J v2, [Patch 33684419](#) is released as remediation for a new or upgraded installation of any FCC Studio Instance.

14.1 On-Premise Deployment

The patch is based on the removal of JndiLookup class from the log4j2 jars. To remove this class from the jars in FCC Studio, perform the following steps:

NOTE The following utilities are required to execute the `studio-patch.sh` script.

- `bash`
- `tar`
- `zip`
- `unzip`
- `jar`

1. Copy the following shell-script: `studio-patch.sh` from [Patch 33684419](#).
2. Place this shell-script in the FCC Studio Home directory.
3. Give execute permission by using the command: `chmod +x studio-patch.sh`.
4. Stop FCC Studio services (including PGX server).
5. Set `STUDIO_HOME` and execute the shell script, where `STUDIO_HOME` is the path where Studio is installed.

For example:

```
/user/studio/OFS_FCCM_STUDIO
```

Set the `STUDIO_HOME` by either of the below options:

- a. Edit the shell-script to update the path as shown below (as applicable):

```
export STUDIO_HOME=/user/studio/OFS_FCCM_STUDIO
```

- b. While execution (use `./studio-patch.sh`) it will ask for Studio Home. The message will be like this:

```
STUDIO_HOME path is not set. Please set it.
```

```
Enter the STUDIO_HOME:
```

6. Run `./studio-patch.sh` to execute this shell-script. This will patch the application.
7. Restart FCC Studio and the PGX server (if applicable).
8. Post-patch Steps:
 - a. Refresh the jars in Big data environments for ETL from `STUDIO_HOME/ficdb/etlJars`.

- b.** If your PGX server is deployed on another server, refresh it with the PGX server from Studio Home and restart.

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