Oracle Financial Services Crime and Compliance Studio

Installation Guide

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OFS Crime and Compliance Studio Installation Guide

Document Control

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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. 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
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 (v8.0.8.0.0) 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 v8.0.8.0.0 with OFSAA.
- Upgrade FCC Studio from v8.0.7.4.0 onwards to v8.0.8.0.0 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
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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 - Firefox 52.x
Java Version	Java 8
Processing Server	- RHEL 7.4+ - SFTP - Oracle JRE Standard Edition 1.8.x(with JCE)

Database Server	• 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
PGX (Graph) Server	• RHEL 7.4+ • Minimum gcc library v4.8.2
Elastic Search	elasticsearch-7.6.2
Elastic Search Hadoop Jars	ES - Hadoop v7.6.2 You must download the ZIP file from https://www.elastic.co/downloads/past-releases/elasticsearch-apache-hadoop-7-6-2
Big Data	
Cloudera Distribution Hadoop 6.x	• CDH Version 6.3.1 • 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.
Cloudera Hive Connectors	Hive JDBC Connectors V 2.5.15
Hadoop Security Protocol	• 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

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	PGX version 20.1.1.1 Set the following paths in the environment variables in the .profile file: • `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	`PATH` in the `.profile` file must be set to include the Java Runtime Environment (Java 8) absolute path. **NOTE**: Ensure the absolute path to `JRE/bin` is set at the beginning of the PATH variable. For example: `PATH=/usr/java/jre1.8/bin:$PATH` Ensure no SYMBOLIC links to Java installation are set in the PATH variable.
PGX Server	The following packages must be installed or present in the server where PGX service is installed: • krb5-libs • krb5-workstation • procps-ng • nc Execute the following command to install the above-mentioned packages: `yum install -y krb5-libs krb5-workstation procps-ng nc`
Oracle Database Settings	**NOTE**: This setting is required only if the Wallet has to be created on the same server as that of the FCC Studio server. **Oracle Processing Server** • `ORACLE_HOME` must be set in the .profile file pointing to the appropriate Oracle DB Client installation. • `PATH` in the.profile file must be set to include the appropriate `$ORACLE_HOME/bin` directory.

Download Directory	Indicates the directory where the product installer zip file is downloaded or copied. The user permission must be set to 755 for this directory.
Installation Directory	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. **NOTE:** The Installation and the Download Directory can be the same if the product installer zip file is not copied separately to another directory.
OS Locale	Linux: en_US.utf8 Execute the following command to check the locale: locale -a | grep -i 'en_US.utf' The locale is displayed.

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 Interpretor 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_installed_path> / pgx-19.2.1/conf/` directory and update the new port number as 7007.

3.1.2.5   Matching Service

To change the port number for the matching sevice, 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	- core-site.xml - hadoop-env.sh - hdfs-site.xml - log4j.properties - ssl-client.xml - topology.map - topology.py

Kerberos Files	• krb5.conf • keytab file name as mentioned in the config.sh file. **NOTE**: Ensure to rename your .keytab file to fccstudio.keytab.
Additional Jars	• hive-exec-*.jar. For example, hive-exec-1.1.0-cdh5.13.0.jar. • HiveJDBC4.jar. • hive-metastore-*.jar. For example, hive-metastore-1.1.0-cdh5.13.0. • hive-service-*.jar. For example, hive-service-1.1.0-cdh5.13.0.jar. **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 installation setup. You must download the same from the Cloudera website.
ES-Hadoop Jars	`elasticsearch-spark-20_2.11-7.6.2.jar` To download the elasticsearch-spark-20_2.11-7.6.2.jar file, follow these steps: 1. Download the ZIP file from https://www.elastic.co/downloads/past-releases/elasticsearch-apache-hadoop-7-6-2. 2. Extract the downloaded file. 3. Navigate to the dist directory and download the elasticsearch-spark-20_2.11-7.6.2.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 <u>Verify the Connectivity of the Wallet</u>.
Atomic Wallet Details	You can verify the Wallet details by reviewing the steps in <u>Verify the Connectivity of the Wallet</u>.
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 <u>Create the Credential Keystore</u>.
Cloudera (SSH Connection)	Run the command ssh <hostname of the Cloudera machine>. You must run this command from the host where the Studio is installed.
Cloudera (Keytab)	Run the command kinit -V <KERBEROS_PRINCIPAL> -k -t <KEYTAB_FILEPATH> 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.

1. Navigate to the elasticsearch-7.6.2/config directory.

2. Configure the elasticsearch.yml with the following variables:

Table 9: elasticsearch.yml File

Interaction Variable Name	Significance
cluster.name	Indicates the name of the cluster.
node.name	Indicates the name given for the node.

node.master	Indicates whether the node is a master.
node.data	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	• 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	• 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`	• 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 (0.5.0) on the master node of the Big Data cluster.
`fcc-spark-sql`	Install the Livy server (0.5.0) 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_rls 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
*   matplot-lib 3.1.1
*   seaborn 0.9.0
*   cx-oracle 7.2.2
*   sqlalchemy 1.3.11

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

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

FCC Studio uses spark 2.4.0. Before you begin the configurations, check the prerequisites depending on your operation mode.

- [Prerequisites](#)
- [Configuration](#)

3.1.6.4.1 Prerequisites for using the Spark Interpreter

To operate the Spark interpreter in local mode or yarn mode, perform the following:

- Local Mode
- Yarn Mode

Local Mode

No additional configuration is required to operate the Spark interpreter in local mode.

Yarn Mode

To operate the Spark interpreter in yarn mode, follow these steps:

1. Provide custom Spark libraries.

   To provide your own Spark libraries and (or) Hadoop client-configuration files for the Spark interpreter to connect to a Spark Standalone or Yarn cluster, follow these steps:

   a. Download the Spark libraries from the Spark's Official Release Archive.

   b. Place the unarchived Spark libraries in a directory that is accessible by FCC Studio.

   c. Set the system environment variable, `SPARK_HOME` to the absolute path of the directory that contains the Spark libraries.

   d. Obtain the Hadoop client-configuration files from the Yarn cluster by performing one of the following:

2. Copy the Hadoop configuration directory, `$HADOOP_HOME/etc/hadoop` or `$HADOOP_HOME/conf` that contains the core-site.xml and hdfs-site.xml files.

   Where,

   `HADOOP_HOME is either /etc/hadoop or /usr/libs/hadoop.`

3. Download the Hadoop client-configuration files directly from the cluster manager's UI if you are using a Cloudera cluster.

   e. Place the Hadoop client-configuration files to a directory accessible by FCC Studio.

   f. Set the system environment variable, `HADOOP_CONF_DIR` to the absolute path of the directory that contains the Hadoop client-configuration files.

4. Provide the cluster's Hadoop client-side configuration files that include XML files such as yarn-site.xml along with the Spark libraries.

5. Obtain the cluster's Hadoop client-side configuration files by performing one of the following:

6. Copy the Hadoop configuration directory, `HADOOP_CONF_DIR` of the cluster.

7. Download the cluster's Hadoop client-side configuration files directly from the cluster manager's UI if you are using a Cloudera cluster.

3.1.6.4.2 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 FCC Studio application UI. This includes properties such as 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 are available in the Spark Official Documentation. All the properties prefixed with the term "zeppelin", that are listed in the Zeppelin Spark Configuration Document can also be set from the Interpreters page of the FCC Studio application UI.

3.1.6.5   Configure the PySpark Interpreter

FCC Studio uses PySpark 2.4.0. Before you begin the configurations, check the prerequisites depending on your operation mode.

- Prerequisites
- Configuration
- Use the Python Virtual Environments with PySpark

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 Studio Schema

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

```
CREATE USER <Studio Schema User Name> IDENTIFIED BY <Password>;
```

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

3.1.8   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_rls 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_rls TO <BD or ECM Schema User>;`

- `GRANT ALL privileges TO <Studio Schema User>;`

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

3.2.1.1   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

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

> **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.

3.2.1.2 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>"
```

3.2.2 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.

3.2.2.1 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.

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.

NOTE	To use the ES-Hadoop connector, download the commons-httpclient-3.0.1.jar and elasticsearch-spark-20_2.11-7.6.2.jar files and place them in the jars folder.

3.2.3 Download the Installer Kit

To download the software as a .zip folder, download the mandatory one-off patch 31761460 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   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.

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.

4.3 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.

4.4 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.

4.5 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

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

4.5.1 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.

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 KYESTORE_FILE_NAME=<Keystore file name>.jks`

- `export KYESTORE_PASS=password`

4.5.2 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.

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*.

4.6   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 on performing Data Movement and Graph Load, see the Data Movement and Graph Loading for Big Data Environment section 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.

4.7   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_OFSAA: Accepted values: true or false
export NON_OFSAA=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=bmllOWdpZWI5ZVNoOG9oVGhlMGx1aGFoQzdzZWUwUXVlZXk1aWVub2lOYTdJZTNppYTE=
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 wit (Mandatory)
FCC_STUDIO_INSTALLATION_PATH	Indicates the path where the FCC Studio installer file is extracted.	Yes	Yes	Yes	Yes
NON_OFSAA	☐ 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	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. 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. The FCC Studio application can be accessed using the following realms: ☐ FCCMRealm Value=com.oracle.ofss.fccm.studio.datastudio.auth.FCCMRealm ☐ IdcsRealm Value=oracle.datastudio.realm.idcs.IdcsRealm ☐ DemoRealm Value=com.oracle.ofss.fccm.studio.datastudio.auth.DemoRealm 1 FCCSamlRealm Value=com.oracle.ofss.fccm.studio.datastudio.auth.FCCSamlRealm NOTE: The DemoRealm is used only for demo purpose and is not recommended for usage.	Yes	Yes	Yes	Yes
FCDM_SOURCE	Indicates the source database for FCC Studio. The available options are ECM and BD. NOTE:	Enter BD or ECM	Enter BD or ECM	Enter NA	Enter NA

	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. Here, ECM schema is used as the source of the FCDM data to load the case information into the graph.				
CB_CONFIGURED	Indicates the setting of the graph edges. When the corresponding edges of the graph is needed, set the value to true.	Enter true or false	Enter true or false	Enter NA	Enter NA
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 The SAML related parameters are applicable only if SAMLRealm is used in the Realm parameter.	1. In case of SAML Realm, the certificate from IDP (key.cert file) is required. 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.				

	3. This certificate is used to identify the trust of the SAML response from the Identity Provider. 4. Specify the Role Attribute name from IDP, in which the User Roles are present in the SAML response.				
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_USER	Indicates the API users.	Yes	Yes	Yes	Yes
External Services					
OFSAA_SERVICE_URL	Indicates the URL of the OFSAA instance. Do not enter '/' at the end of the URL. NOTE: For OFSAAI, the value must be set in the following format: https://<HostName>:<PortNo>/<ContextName>/rest-api	Yes	Yes	No	No
PGX_SERVER_URL	Indicates the URL of the PGX server. Example: http://<HostName>:<PortNo>/ Here, default <PortNo> is 7007.	Yes	Yes	Yes	Yes

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: http://<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
HTTP_PROXY	Indicates the proxy for the host where FCC Studio is installed.	No	No	No	No
HTTPS_PROXY	Indicates the proxy for the host where FCC Studio is installed.	No	No	No	No
REPO_CRAN_URL	Indicates the URL from where the R packages are obtained. The format for the REPO_CRAN_URL is as follows: https://cran.r-project.org/.	No	No	No	No
USERS_LIB_PATH	Indicates the path where the R packages are installed.	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: Enter the alias name that was created during wallet creation.	Yes	Yes	Yes	Yes
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:	Yes	Yes	Enter NA	Enter NA

	Enter the alias name that was created during wallet creation.				
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	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 user name 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_INSTALATION_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/ofsaa Example for Oracle DB Installation: /scratch/ofsaa	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
SQOOP_HOSTMACHINE_USER_NAME	Indicates the user name of the Host machine where sqoop will run.	Yes	Yes	Enter NA	Enter NA
SQOOP_PARAMFILE_PATH	1. Create a file with the name sqoop.properties in the Big Data server and add the following entry: oracle.jdbc.mapDateToTimestamp=false 2. Enter the location of the sqoop.properties file as the value for this parameter. Example: /scratch/ofsaa/ NOTE: Ensure that the location name ends with a '/'.	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/ofsaa	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
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, c2FtcGxlX2VuY3J5cHRlZF9xdWFudGlmaW5kX3Rva2Vu	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. For example, 80	Yes	Yes	Yes	Yes

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
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:	Yes	Yes	Yes	Yes

	This value is already set. Do not change the value.				
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

4.8   Run the FCC Studio Installer

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.

   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.

4.9   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-20.1.1.1-server.zip` file.

- If PGX service is to be installed on a different server, follow these steps:

    — Copy the `pgx-distribution-20.1.1.1-server.zip` file to the PGX server.

    — Extract the `pgx-distribution-20.1.1.1-server.zip` file.

NOTE	The path where the pgx-distribution-20.1.1.1-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. To enable the SSL certificate, see the steps in <security guide>.

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

Contact your administrator to get the files.

6. 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
KERBEROS_TICKET_RENEWAL_PERIOD	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

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

```
./install.sh
```

8. 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

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

Topics:

- Verify the Installation
- Configure the SSH Connection
- 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 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.

5.4 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

5.4.1 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.

5.4.2 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 atmoic 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.

5.5 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

5.5.1 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.
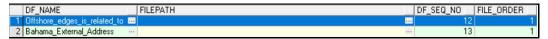
5.5.2   Configure the FILEPATH for ICIJ

> **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_Ad dress	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

5.6   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:

    `./start-pgx.sh`

4. After the PGX service runs successfully, run the
    `./FCCM_Studio_ETL_BulkSimilarityEdgeGeneration.sh` job.

5.7   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).

5.8 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.

5.9 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

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

Topics:

- Verify the Installation
- 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 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.

6.3   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:

    ```
    ./start-pgx.sh
    ```

    After the PGX service runs successfully, run the `./FCCM_Studio_ETL_BulkSimilarityEdgeGeneration.sh` job.

6.4   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 v8.0.8.0.0 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 v8.0.8.0.0 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

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

1. Navigate to the `DATABASECHANGELOG` table in the Studio Schema.
2. Run the following SQL command in the Studio Schema:

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

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

3. Delete all the entries generated as the result of the command.

   ```
   For example:
   FCC_DATASTUDIO_CONFIG_8.0.7.3.0
   FCC_DATASTUDIO_CONFIG_8.0.7
   ```

7.1.1   Perform Extract Transfer and Load (ETL) Cleanup

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.

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	Install all the prerequisite hardware and software
2	Setup the environmental settings
3	Download the files for Big Data
4	Configure the Interpreter Settings
5	Create the Studio Schema
6	Assign Grants for the Database Schemas
7	Setup the Password Stores with Oracle Wallet
8	Create the Credential Keystore
9	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	Install all the prerequisite hardware and software
2	Setup the environmental settings
3	Download the files for Big Data
4	Configure the Interpreter Settings
5	Create the Studio Schema
6	Assign Grants for the Database Schemas
7	Setup the Password Stores with Oracle Wallet
8	Create the Credential Keystore
9	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.

REINSTALL FCC STUDIO

CLEANUP FOR BD OR ECM ATOMIC 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_rls 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.

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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_PERMISSIONS	DS_ROLE	DS_PERMISSION_ACTIONS
DS_GROUP	DS_IS_PERMITTED	DS_PERMISSION_MAPPING
DS_USER_PERMS_MAP	DS_USER_ROLES	DS_NOTEBOOK
DS_INTERPRETER_RESULT_MSGS	DS_USER	DS_PERMS_MAP_ACTIONS
DS_ENTITY_PERMS_MAP	DS_TASK	DS_GRAPH
DS_INTERPRETER_RESULT	DS_GROUP_PERMS_MAP	DS_NOTEBOOK_RELATIONS
DS_INTERPRETER_PROPS	DS_JOB	DS_PERMISSION
DS_ROLE_PERMS_MAP	DS_VISUALIZATION_TEMPLATE	DS_RESULT_MESSAGE

DS_INTERPRETER_ABILITIES	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 `<Studio_Installation_Path>/interpreters/bin/` directory to update the port number to a new port number that is not in use (for example, 7030) and rename the log file (for example, `spark2.sh`).

   In the `start-spark2-interpreter.sh` file,

   c. Line 13 is updated to:

   ```
   ${SPARK_SUBMIT} --class
   oracle.datastudio.interpreterserver.ZeppelinRemoteInter
   preterServer --driver-class-path ${CLASSPATH} --driver-
   java-options "${JAVA_OPTS} ${SPARK_INTERPRETER_OPTS} "
   --files ${py4j[0]},${SPARK_HOME}/python/lib/pyspark.zip
   ${SPARK_CONF} ${SPARK_APP_JAR} ${1:-7030} >
   $DIR/../../logs/spark2.log
   ```

   d. Line 24 is updated to:

   ```
   java -DlogFileName=spark -Dfile.encoding=UTF-8
   ${JAVA_OPTS} ${SPARK_INTERPRETER_OPTS}
   oracle.datastudio.interpreterserver.ZeppelinRemoteInter
   preterServer ${1:-7030} > $DIR/../../logs/spark2.log
   ```

   e. Edit the `start-all-interpreters.sh` file in the `<Studio_Installation_Path>/interpreters/bin/` directory as follows:

   f. Insert the following code:

   ```
   sh "$DIR"/start-spark2-interpreter.sh &
   ```

   g. After the following code:

   ```
   sh "$DIR"/start-spark-interpreter.sh &
   ```

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:

Update the following parameter values:

```
group, name, groupSettings.initialCodeCapability, port,
capabilities.name, capabilities.button.label
```

to the following:

```
<new-spark-interpreter-name> ,<new-spark-interpreter-
name>, <new-spark-interpreter-name>, 7030 (the port
chosen in the first step), <new-spark-interpreter-
name>, <new-spark-interpreter-name>
```

The first 23 lines of the new JSON file must be similar to the following
code, where Spark2 is used for `<new-spark-interpreter-name>`:

```
[
  {
    "group": "spark2",
    "name": "spark2",
    "className":
"org.apache.zeppelin.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"
```

```
        }
      }
    ],
```

3. 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:

      Update the following parameter values:

      ```
      group, name, port, capabilities.name,
      capabilities.button.label
      ```

      to the following:

      ```
      <new-spark-interpreter-name> ,<new-pyspark-interpreter-
      name>, 7030 (the port chosen in the first step), <new-
      pyspark-interpreter-name>, <new-pyspark-interpreter-
      name>
      ```

      The first 19 lines of the new JSON file must be similar to the following
      code, where spark2 is used for `<new-spark-interpreter-name>` and
      pyspark2 is used for `<new-pyspark-interpreter-name>`:

      ```
      [
      {
      "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..

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

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)](#).

OFSAA Support

Raise a Service Request (SR) in My Oracle Support (MOS) for queries related to the OFSAA applications.

Send Us Your Comments

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

- Did you find any errors?

- Is the information clearly presented?

- Do you need more information? If so, where?

- Are the examples correct? Do you need more examples?

- What features did you like most about this manual?

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

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