

Oracle Financial Services Crime and Compliance Studio

Administration Guide

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Financial Services

OFS Crime and Compliance Studio

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1 About this Guide

1.1 Summary

This guide provides instructions for maintaining and configuring the OFS Crime and Compliance Studio application, its subsystem components, and any third-party software required for operation.

Studio provides an open and scalable infrastructure that supports end-to-end functionality across all Oracle Financial Services solution sets. Studio's extensible and modular architecture enables a customer to deploy new solution sets readily as the need arises.

1.2 Audience

This guide is intended for administrators and implementation consultants. Their roles and responsibilities, as they operate within Studio, include the following:

- **System Administrator:** Configures and maintains the system, user accounts, and roles, monitors data management, archives data, loads data feeds, reloads cache and performs post-processing tasks.

1.3 Related Documents

You can access the following additional documents related to the OFS Crime and Compliance Studio application from the [Oracle Help Center \(OHC\)](#) Documentation Library:

- *Oracle Financial Services Crime and Compliance Studio Installation Guide*
- *Oracle Financial Services Crime and Compliance Studio Deployment Guide (Using Kubernetes)*
- *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*

2 About Oracle Financial Services Crime and Compliance Studio

This chapter provides functional details about Oracle Financial Services (OFS) Crime and Compliance Studio application.

This chapter includes the following sections:

- [Introduction to Crime and Compliance Studio](#)
- [The Architecture of Crime and Compliance Studio](#)
- [Oracle Financial Crime Graph Model](#)

2.1 Introduction to Crime and Compliance Studio

In order to effectively monitor anti-money laundering and anti-fraud programs in financial institutions, the most challenging need is to quickly identify and adapt to the changing patterns of financial crime. This ability to discover new and emerging criminal behavioral patterns, coupled with the facility to rapidly deploy as models, is a critical requirement.

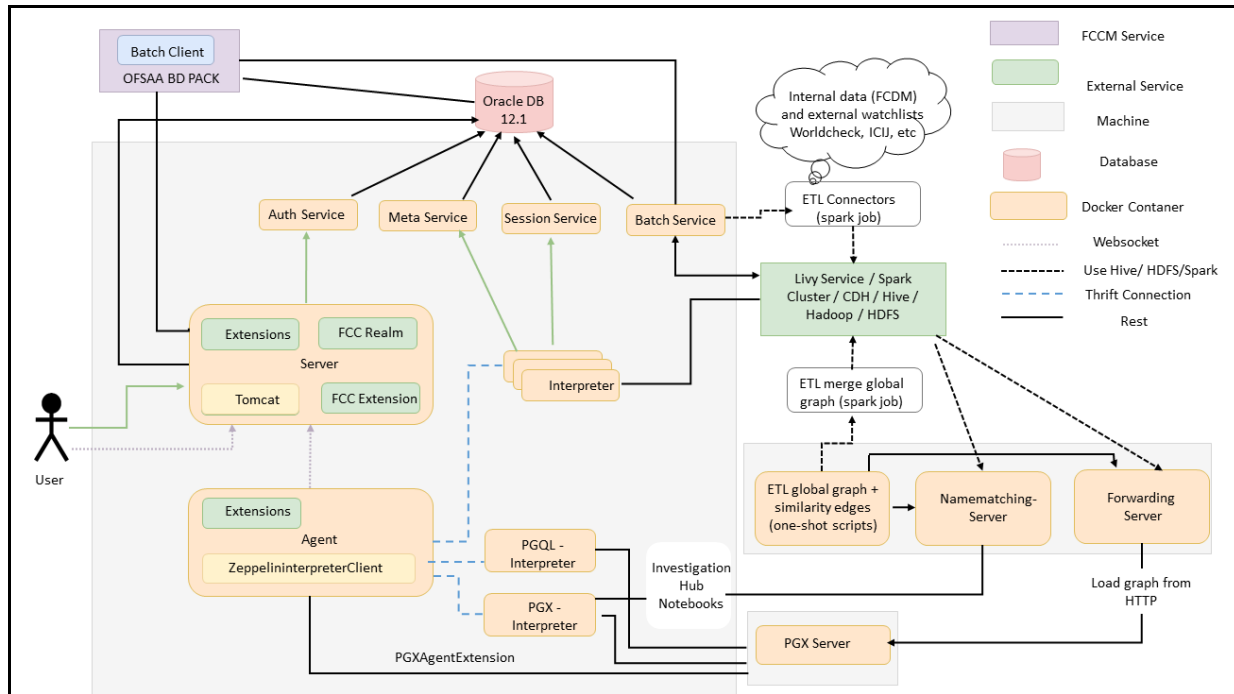
Data scientists and analysts can use Studio to interactively explore financial crime data and gain insights into new and emerging financial crime patterns and trends.

The key features of Studio include the following:

- Provide an integrated and comprehensive analytics toolkit designed to rapidly discover and model new financial crime patterns.
- Interact with the database, process the data, and generate patterns in various formats using interpreters.
- Provides secure access to an institution's financial crime data with pre-defined scenarios, out-of-the-box graph queries, and visualizations.
- Uses Graph Analytics and Graph Query methods to analyze historic data available in the database, and forecast the generated patterns using various interpreters.
- Uses Machine Learning Algorithms to gain insights from historical alert data, in order to prioritize the alerts generated by the detection engines.
- Offers a unified tool for Graph Analytics, Data Visualization, Machine Learning, Scenario Authoring, Pattern Discovery, Data Mashups and testing for financial crime data
- Engineered to work with Apache Spark, the most prevalent analytics engine on Big Data
- Engineered to work with Apache Zeppelin, a web-based notebook that enables interactive data analysis
- Supports Polyglot Scenario Authoring to author new scenarios in SQL, Scala, Python or R language
- Embedded with highly scalable in-memory Graph Analytics Engine (PGX)
- Enterprise-ready with underlying OFSAA frameworks
- Engineered to work with earlier 8.x releases of Oracle Financial Crime and Compliance Management Anti Money Laundering (AML) and Fraud applications
- Integrated with Oracle Financial Crime Application Data and readily usable across the enterprise financial crime data lake. This can automatically load Oracle AML and Fraud data into the data lake and mash-up Studio data with third-party data for discovery and modeling

2.2 The Architecture of Crime and Compliance Studio

The following figure illustrates the architecture of the Studio application.

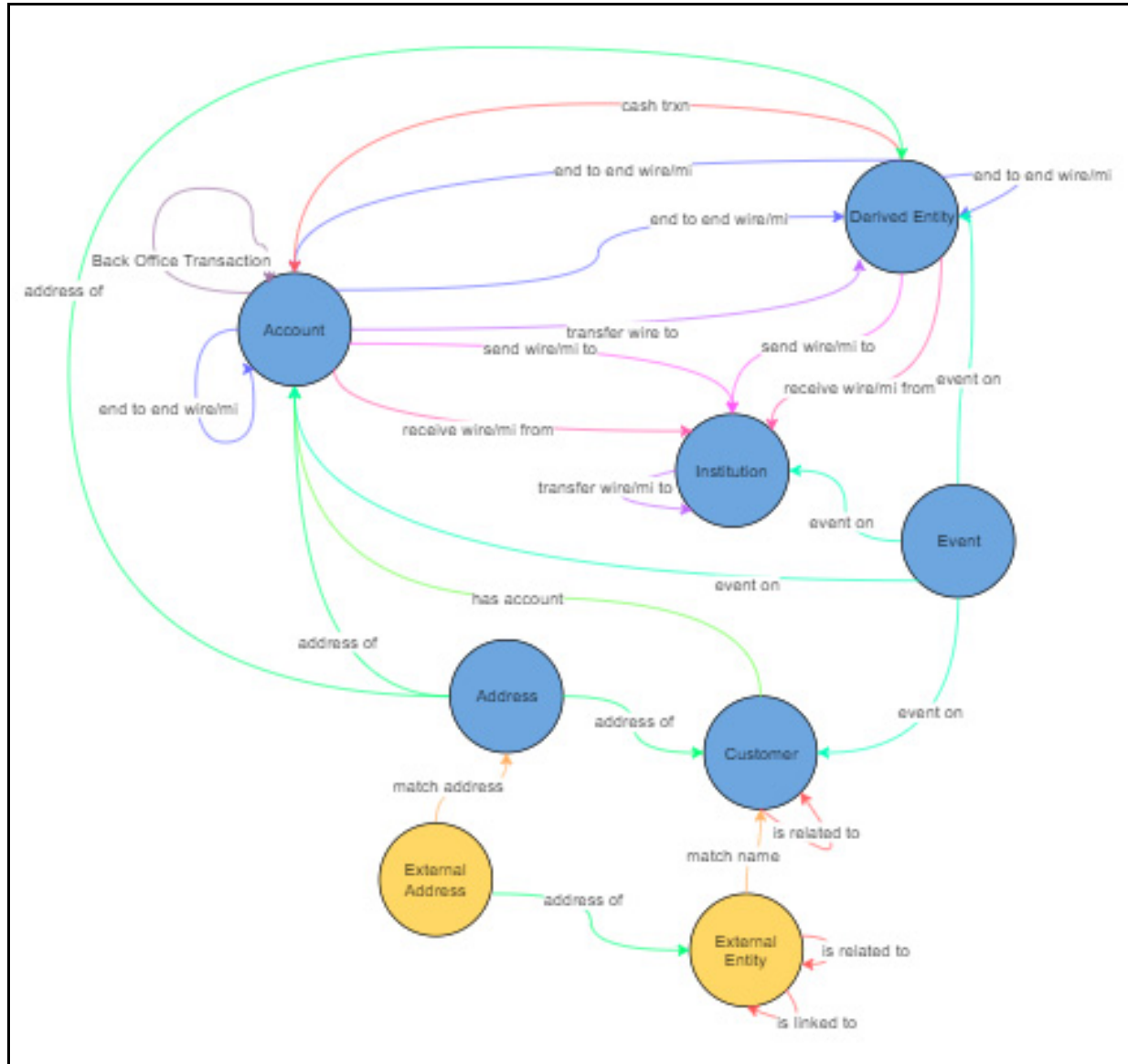


2.3 Oracle Financial Crime Graph Model

The Oracle Financial Crime Graph Model serves as a window to the financial crime's data lake. It collates disparate data sets into an enterprise-wide global graph, enabling a whole new set of financial crime use cases. The Graph Model enables to accelerate financial crime investigation use cases.

For information on Graph Data Model, see [Graph Data Model](#).

For information on the node and edge properties of the Oracle Financial Crime Graph Model, see [Data Model Guide](#).



3 Managing User Administration

This chapter provides information on creating users who can access Studio and execute batches. Creation of users and execution of batches must be performed in the OFSAA environment.

User administration involves creating and managing users and providing access to Studio based on assigned roles.

This section covers the following topics:

- [Managing Identity and Authorization](#)
- [Granting Permissions](#)

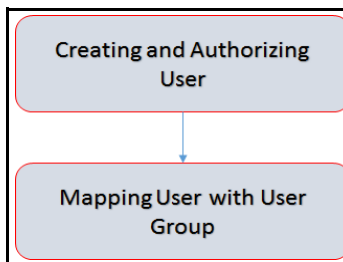
3.1 Managing Identity and Authorization

This section provides information on creating, mapping and authorizing users, and providing access to Studio. It covers the following topics:

- [Identity and Authorization Process Flow](#)
- [Creating and Authorizing User](#)
- [Mapping User with User Group](#)

3.1.1 Identity and Authorization Process Flow

The following figure shows the process flow of identity management and authorization.



The following table lists the various actions involved in the user administration process flow:

Table 1 User Administration Process Flow

Action	Description
Creating and Authorizing User	Create a user by providing the user name, user designation, and time period during which the user will be active in Studio.
Mapping User with User Group	Map user with a user group that provides the user with the privileges defined to that user group.

3.1.1.1 Creating and Authorizing User

The users with SYSADMN and SYSAUTH roles can create and authorize users respectively. For more information on creating and authorizing users, see [Oracle Financial Services Analytical Applications Infrastructure User Guide](#).

3.1.1.2 Mapping User with User Group

A user is mapped with a user group, and the user group is associated with a role. Each role comprises of certain predefined privileges.

On mapping a user to a user group, the user is granted with the privileges that are defined to the role of the user group. The SYSADM user maps a user to a user group in Studio.

The following table describes the roles and the corresponding user groups in Studio.

Table 2 Roles and User Groups in Studio

Role	User Groups
DSADMIN	DSADMINGRP
DSINTER	DSINTERGRP
DSUSER	DSUSERGRP
DSBATCH	DSBATCHGRP

You can log in to the Studio application installed without BD as one of the following users:

- DSADMIN
- DSUSER
- DSBATCH

3.2 Granting Permissions

To grant permissions, follow these steps:

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

```
grant execute dbms_ols to <Studio DB Username>
```

The Execute permission is granted to VPD.

3. Execute the following command:

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

The Create permission is granted to context.

4 Accessing Crime and Compliance Studio

To access the Crime and Compliance Studio application as a system administrator, follow these steps:

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

`https://<Host_Name>:<Port_Number>`

Here <Port_Number> is,

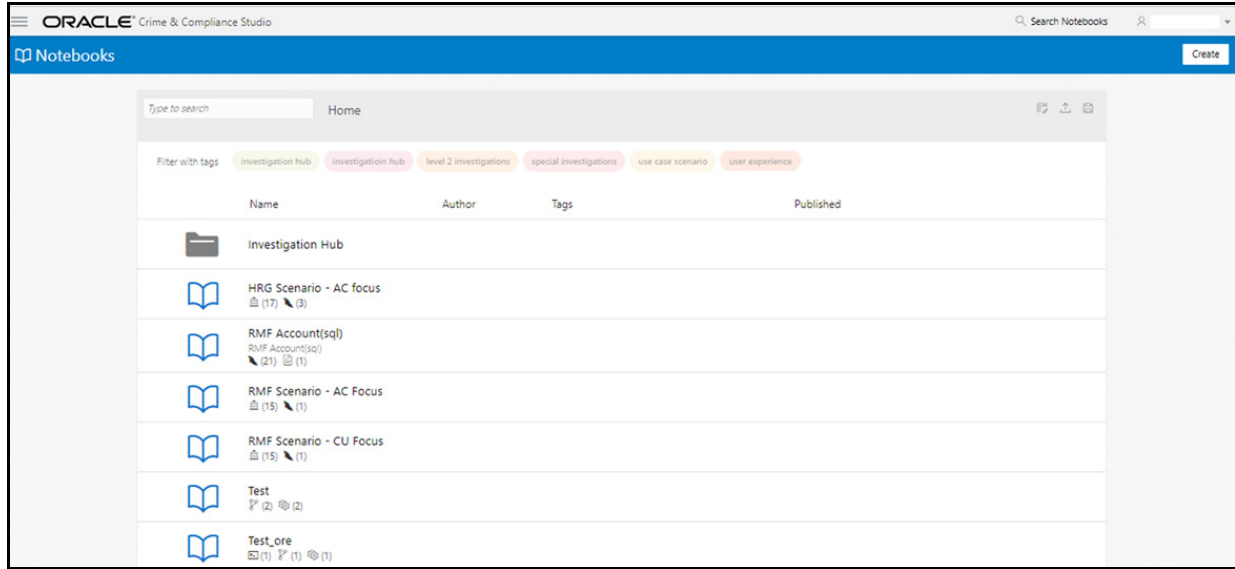
- 7008 for Studio installed on-premise.
- 30078 for Studio deployed on the Kubernetes cluster.


The Crime and Compliance Studio login page is displayed.

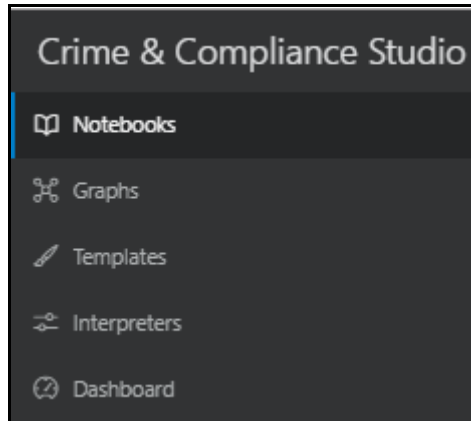


2. Login with the **Username** and **Password** of the System Administrator.
3. Click **Login**.

The Crime and Compliance Studio application's landing page is displayed.



- Click the  **Menu** icon on the top left corner.
The menu items applicable to the logged-in user are displayed.



For information on Notebooks, Graphs, and Templates, see [Oracle Financial Services Crime and Compliance Studio User Guide](#).

5 Managing Studio Batches

This chapter provides information on creating batches required for Studio. Batches enable us to load graphs, run notebooks, and move data from Oracle Database or Big Data to Studio.

This section covers the following topics:

- [Preparing for Batches](#)
- [Performing Batches](#)

5.1 Preparing for Batches

Follow these steps to prepare the batches:

1. Copy all the jars from the `<STUDIO_INSTALLATION_PATH>/ficdb/lib` directory to the `<FIC_HOME of OFSAA_Installed_Path>/ficdb/lib` directory.
2. Copy the `NBExecutor.txt` file from the `<STUDIO_INSTALLATION_PATH>/ficdb/bin` directory to the `<FIC_HOME of OFSAA_Installed_Path>/ficdb/bin` directory.
3. Enter the following details in the `NBExecutor.txt` file:

```
username=<Studio Username>
```

```
password=<Studio Password>
```

NOTE The username must be of a user who has permission to run notebooks.

5.2 Performing Batches

The following type of batches are configured in Studio.

- [Data Movement and Graph Loading for Big Data Environment](#)
- [Executing Published Scenario Notebook](#)

5.2.1 Data Movement and Graph Loading for Big Data Environment

You can move data from the *BD Atomic* environment to the *Big Data* environment. As a result, a graph is created in the form of the `.pgb` and `config.json` files. These files can be used to view and query the PGQL and PGX graphs.

For information on the Oracle Financial Crime Graph Model, see [Oracle Financial Crime Graph Model](#).

To create batches for data movement and graph loading, follow these steps:

1. Perform one of the following:
 - [Creating and Executing Run Executable](#).
 - Alternatively, you can execute the `FCCM_Studio_SqoopJob.sh` command with the required parameters as follows:

```
./FCCM_Studio_SqoopJob.sh <Batch_Name> <Batch_ID> EXEC <FROM_FIC_MIS_DATE>  
<TO_FIC_MIS_DATE> SNAPSHOT_DT=<SNAPSHOT_Date>,DATAMOVEMENTCODE=ALL <SOURCE> <ETL2  
Trigger>
```

For example:

```
./FCCM_Studio_SqoopJob.sh A B C 20150618 20190618 SNAPSHOT_
DT=20181219,DATAMOVEMENTCODE=ALL FCDM 1
```

Where,

- <Batch_Name> is A
- <Batch_ID> is B
- EXEC is C
- <FROM_FIC_MIS_DATE> is 20150618
- <TO_FIC_MIS_DATE> is 20190618
- <SNAPSHOT_Date> is 20181219
- DATAMOVEMENTCODE is ALL
- <SOURCE> is FCDM
- <ETL2 Trigger> is set to 1.

Set to 1 to trigger Name matching and generate graph-related files.

Set to 0 to not trigger the Name matching and graph-related files.

5.2.2 Executing Published Scenario Notebook

The published scenario notebook can be scheduled for execution with a set of threshold values required for generating alert or trends.

To create batches for executing the published scenario notebooks, follow these steps:

1. Perform one of the following:
 - [Creating and Executing Run Executable](#).
 - Alternatively, you can execute the following command with the required parameters as follows:

NOTE Ensure that the username and password are set before executing a notebook batch. For more information, see [Chapter 15, "Setting up Login Credentials for Notebook Execution"](#).

```
./FCCM_Studio_NotebookExecution.sh "notebookID" "null" "scenarioID" "thresholdsetID"
>null" "BATCH_ID"
```

To execute a non-scenario notebook, follow these steps:

- i. Execute the following command:

```
./FCCM_Studio_NotebookExecution.sh "notebookID" "null" "null" "null"
"paramkey1~~value1,paramkey2~~value2"
```

For example, here

- paramkey1 is ficmisdate
- paramkey2 is lookbackperiod
- value1 is 20-09-2018
- value2 is 30

The extraparams must be written as follows:

```
ficmisdate~~20-09-2018,lookbackperiod~~30
```

6 Configuring Security for PGX

The PGX web server enables two-way SSL/TLS by default. The PGX server enforces TLS 1.2 and disables certain cipher suites known to be vulnerable to attacks. Upon TLS handshake, both server and client present certificates to each other which are used to validate the authenticity of the other party. Client certificates are additionally used to authorize client applications.

This chapter includes the following sections.

- [Prepare Certificates](#)
- [Prepare Client Keystore](#)
- [Prepare Client Truststore](#)
- [Configure PGX Server](#)
- [Test Connection Using PGX Client Shell](#)

6.1 Prepare Certificates

NOTE

Disabling SSL/TLS:

You can skip this part if you turn off SSL/TLS in a single-node or multi-node PGX server configuration. However, we strongly recommend leaving SSL/TLS turned on for any production deployment.

You must create a server certificate that will be validated by the client upon SSL/TLS handshake. You can either create a self-signed server certificate or import a certificate from a certificate authority.

This section includes the following:

- [Create a Self-Signed Server Certificate](#)
- [Import Existing Certificate or Install Certificate from a Certificate Authority](#)

6.1.1 Create a Self-Signed Server Certificate

NOTE

Do not use self-signed certificates in production deployments. For production, you should obtain a certificate from a certificate authority that is trusted by your organization.

You can create a self-signed certificate to the keytool command-line utility, which is part of the Java Development Kit (JDK) that you already installed.

Perform the following to create a self-signed server certificate:

- [Create New Keystore](#)
- [Extract the Certificate](#)

6.1.1.1 Create New Keystore

Perform the following to create a new keystore.

1. Create a new keystore containing a self-signed certificate by executing the following command:

```
keytool -genkey -alias pgx -keyalg RSA -keystore server_keystore.jks
```

The command prompts for keystore password, general information of the certificate (which will be displayed to clients who attempt to connect to the PGX web server) and the key password. The keystore password is for the keystore file itself and the key password is for the certificate. This is because JKS keystore files can store more than one certificate (identified by the provided alias).

2. Upon prompt, enter the first name, last name, and hostname of the host you will deploy the PGX server on.

NOTE

- If the hostname in the certificate does not match the hostname the server is listening on, client applications will reject the connection.
- In distributed mode: use the host which starts the web-server

For the multi-node setup, use the first hostname in the list of `pgx_hostnames` as the hostname for your certificates. Only the first host in this list will start an http server.

6.1.1.2 Extract the Certificate

The PGX server requires both the server certificate and server private key in the PKCS12 (PEM) format.

Perform the following to extract the certificate and private key from the JKS file:

1. Convert the generated `server_keystore.jks` file into a `server_keystore.p12` file by executing the following:

```
keytool -importkeystore -srckeystore server_keystore.jks -destkeystore
server_keystore.p12 -srcalias pgx \
    -srcstoretype jks -deststoretype pkcs12
```

The command will prompt with both the source and destination keystore password.

2. Enter the source and destination keystore password.

A file `server_keystore.p12` is generated in the current directory.

3. Extract certificate and private key from that `server_keystore.p12` file by executing the following openssl commands:

```
openssl pkcs12 -in server_keystore.p12 -nokeys -out server_cert.pem
openssl pkcs12 -in server_keystore.p12 -nodes -nocerts -out server_key.pem
```

The `server_cert.pem` and `server_key.pem` are generated in the current directory.

6.1.2 Import Existing Certificate or Install Certificate from a Certificate Authority

Refer [Tomcat TLS/SSL documentation](#) on how to import existing certificates or on how to install a certificate from a certificate authority into keystore files.

6.2 Prepare Client Keystore

NOTE Disabling two-way SSL/TLS

You can skip this part if you turn off client authentication in single-node or multi-node PGX server configuration. However, we strongly recommend leaving two-way SSL/TLS turned on for any production deployment.

For two-way SSL/TLS to work, you have to create one certificate for each client application you allow access to your PGX server. You must first create a keystore file for the client.

1. Execute the following to create a keystore file for the client:

```
keytool -genkey -alias pgx -keyalg RSA -keystore client_keystore.jks
```

The above command prompts with a keystore password, general information of the certificate and the key password. Note down the general information in the certificate (distinguished name string) as you will need this information in the next section for the PGX server authorization configuration.

2. You must sign the certificate inside the client keystore with the server private key which will make the client certificate to be accepted by the server. For which you must first create a sign request file `client.csr` by executing the following:

```
keytool -certreq -keystore client_keystore.jks -storepass <keystore_password> -alias pgx -keyalg RSA -file client.csr
```

3. Sign the `client.csr` file by providing both the server's certificate and private key files to the following `openssl` command:

```
openssl x509 -req -CA server_cert.pem -CAkey server_key.pem -in client.csr -out client_certificate.pem -days 365 -CAcreateserial
```

A signed client certificate file `client_certificate.pem` is generated that is accepted by the server for the next 365 days. You can modify the `-days` parameter as per your needs.

4. Import both the server certificate as well as the signed client certificate back into the client keystore file by executing the following:

```
keytool -import -noprompt -trustcacerts -keystore client_keystore.jks -file server_cert.pem -alias pgxserver
```

```
keytool -import -noprompt -trustcacerts -keystore client_keystore.jks -file client_certificate.pem -alias pgx
```

6.3 Prepare Client Truststore

Use the same `client_keystore.jks` file for both the client keystore (which certificate to present to the server) and the client trust store (which server certificates to trust). If you have used a self-signed server certificate, you also have to import the server certificate's trust authority (CA) into the client keystore, else the client will reject the server certificate. Note that if you are using the PGX client shell, a range of well-known certificate authorities are trusted already by default by the client-side Java virtual machine.

6.4 Configure PGX Server

Specify the paths to the `server_cert.pem` and the `server_key.pem` files in the single-node or multi-node PGX server configurations. You can also specify a list of certificate authorities that will be trusted by the server.

6.5 Test Connection Using PGX Client Shell

If you started the webserver with a self-signed certificate, you must first configure the client to accept the certificate. As the certificate is self-signed and not issued from a trusted certificate authority, the PGX client would reject it otherwise. You can set the trust store of the PGX client shell via the `--truststore` command-line option. Similarly, we have to specify the path to the keystore (`--keystore`) which contains the certificate the client will present to the server for authentication and authorization as well as the keystore password (`--password`).

NOTE Do not accept self-signed certificates from unknown sources. Do not accept certificates from sources other than yourself.

Assuming the PGX web server listens on the default port 7007 on the same machine and you created the keystores as described above, you can test the connection by executing the following:

```
cd $PGX_HOME
```

```
./bin/pgx --base_url https://localhost:7007 --truststore client_keystore.jks --keystore  
client_keystore.jks --password <keystore_password>
```

If the shell starts up without any error, you successfully connected to the PGX web server securely over two-way TLS/SSL.

7 Configuring Interpreters


An interpreter reads and executes the instructions written in a programming or scripting language without compiling the high-level language code into a machine language program.

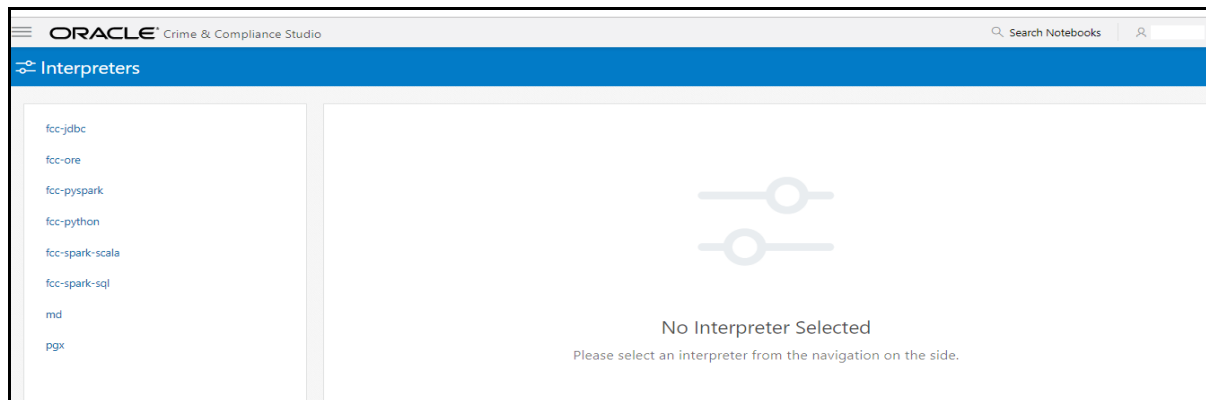
This section covers the following topics:

- [Accessing Interpreters](#)
- [Creating New Interpreter Variant](#)
- [Configure Interpreters](#)

7.1 Accessing Interpreters

To access interpreters, follow these steps:

1. Click the  Menu icon on the upper-left corner on the Studio landing page.
The menu items are listed.
2. Click **Interpreters**.
The **Interpreters** page is displayed.



3. Click the interpreter that you want to access from the list displayed on the LHS.
The default interpreter variant configured is displayed on the RHS.
4. Modify the required values.
5. Click **Update**.
The modified values are updated in the interpreter.

7.2 Creating New Interpreter Variant

In Studio, you can either use a default interpreter variant or create a new variant for an interpreter. You can create more than one variant for an interpreter.

- For a sample on creating a new interpreter variant, see [Creating a New JDBC Interpreter Variant](#)
- To enable a second Spark/PySpark interpreter, see [Enabling a Second Spark/PySpark Interpreter](#) chapter in the [OFS Crime and Compliance Studio Installation Guide \(On-Premise\)](#).

7.2.1 Creating a New JDBC Interpreter Variant

To create a new JDBC interpreter variant:

1. Navigate to the *Interpreters* page.
2. Click the **fcc-jdbc** interpreter from the list displayed on the LHS.
The default interpreter variant is displayed on the RHS.
3. Click the following icon to create a new variant for the selected interpreter:



The **Create Interpreter Variant** dialog box is displayed.

4. Enter the **Name** for the new interpreter variant.
5. Click **Create**.
A new variant is created with name, **<Interpreter Type>.<Variant Name>**.
6. Provide the new schema details such as the **default.url**, **default.user**, and **default.password**.
7. Click **Update**.
A new variant is created for the jdbc interpreter.
8. The Oracle Database schema that you have created must be granted with the same permissions that are granted to the BD atomic schema.

For more information, see the *Prerequisite Environmental Settings* section in the [OFS Crime and Compliance Studio Installation Guide](#).

9. Run the following script after modifying the schema name with the newly created schema:

```
../OFS_FCCM_STUDIO/metaservice/model/SQLScripts/Atomic_Schema/  
FCC_JRSDCN_CONTEXT_ATOMIC.sql  
  
../OFS_FCCM_STUDIO/metaservice/model/SQLScripts/Atomic_Schema/  
PKG_FCC_STUDIO_JURN_VPD.sql  
  
../OFS_FCCM_STUDIO/metaservice/model/SQLScripts/Atomic_Schema/  
PKG_FCC_STUDIO_JURN_VPD_BODY_ATOMIC.sql
```

10. For using the new interpreter variant in the notebook paragraphs, use the following format:

```
%fcc-jdbc.newVariant  
  
<Your SQL query>
```

11. Configure the required values for the properties.
12. Click **Update**.

A new variant is created for the JDBC interpreter.

7.3 Configure Interpreters

The list of interpreters in Studio are as follows:

- **fcc-jdbc Interpreter**

- fcc-ore Interpreter
- fcc-pyspark Interpreter
- fcc-python Interpreter
- fcc-spark-scala Interpreter
- fcc-spark-sql Interpreter
- jdbc
- md Interpreter
- pgql Interpreter
- pgx-algorithm Interpreter
- pgx-java Interpreter
- pyspark Interpreter
- spark Interpreter

7.3.1 fcc-jdbc Interpreter

The configurations for the ofsa-jdbc interpreter are given as follows:

Table 1 fcc-jdbc Interpreter

Field	Description
pgx.baseUrl	Enter the pgx.baseUrl URL in this field. This is the location where the data is pushed. For example: <code>http://<HOSTNAME>:7007</code>
default.url	Enter the ofsa jdbc URL in this field. For example: <code>jdbc:mysql://localhost:5554/world</code>
zeppelin.jdbc.principal	Enter the principal name to load from the keytab.
default.driver	Enter the default ofsa JDBC driver name. For example: <code>com.mysql.jdbc.Driver</code>
default.completer.ttlInSeconds	Enter the time to live sql completer in seconds.
default.password	Enter the default password.
default.splitQueries	This field indicates the presence of default split queries. Enter “true” or “false”.
default.completer.schemaFilters	Enter comma separated schema filters to get metadata for completions.
ofsa.sessionservice.url	Enter the session service URL in this field. For example: <code>http://<HOSTNAME>:7047/sessionservice</code> Here, <HOSTNAME> refers to the server name or IP where fcc-studio will be installed.

Table 1 fcc-jdbc Interpreter

Field	Description
default.user	Enter the name of the default user in this field. For example: root
zeppelin.jdbc.concurrent.max_connection	Enter the number of maximum connections allowed.
ofsa.metaservice.url	Enter the metaservice URL in this field. For example: <code>http://<HOSTNAME>:7045/metaservice</code> Here, <HOSTNAME> refers to the server name or IP where fcc-studio will be installed.
common.max_count	Enter the maximum number of SQL result to display.
zeppelin.jdbc.auth.type	Enter the default jdbc authentication type.
zeppelin.jdbc.precode	Enter the snippet of code that executes after the initialization of the interpreter.
zeppelin.jdbc.concurrent.use	Enter to enable or disable concurrent use of JDBC connections. Enter “true” or “false”.
zeppelin.jdbc.keytab.location	Enter the keytab location.

7.3.2 fcc-ore Interpreter

The configurations for the fcc-ore interpreter are given as follows:

Table 2 fcc-ore Interpreter

Field	Description
ore.sid	Enter the SID of DB server where the fcc-ore interpreter wants to connect.
rendering.row.limit	Indicates the number of rows to be shown in the fcc-ore interpreter output. For example: 1000
ore.conn_string	Enter the DB connection URL with which the fcc-ore interpreter can make the connection to the schema. This field can be left blank.
https_proxy	Enter the Proxy server using which connection to the internet can be established. For example: <code>www-proxy-hqdc.us.oracle.com:80</code>
ore.type	Enter the fcc-ore interpreter type as Oracle.
ore.password	Enter the schema password where the fcc-ore interpreter wants to connect.

Table 2 fcc-ore Interpreter

Field	Description
libpath	Indicates the custom library path from where R packages will be installed via Studio and will be added to R lib Path. Enter the path to be mentioned under the home directory where the studio is installed. For example: If you want the packages to be available under <code>/home/user/library</code> , and Studio is installed at <code>/home/user/datastudio</code> , then mention <code>/library</code> as the libpath.
ore.host	Enter the hostname of the DB server where the fcc-ore interpreter wants to connect.
rserve.password	Indicates the Rserve password.
rendering.numeric.format	Indicates the Number of digits to round off. For example: <code>%.2f</code>
ore.service_name	Enter the Service Name of DB server where the fcc-ore interpreter wants to connect.
rserve.try.wrap	Enter False.
rserve.host	Indicates the Rserve host.
repo_cran	Indicates the CRAN URL from where R libraries are downloaded to install R packages. For example: <code>https://cran.r-project.org/</code>
ofsa.sessionservice.url	Enter the session service URL in this field. For example: <code>http://<HOSTNAME>:7047/sessionservice</code> Here, <code><HOSTNAM></code> refers to the server name or IP where fcc-studio will be installed.
ore.all	Indicates all tables are synced to the fcc-ore interpreter. Enter the value as True.
rserve.plain.qap.disabled	Indicates whether plain QAP is disabled in the server or not. If disabled, the connection will always be attempted using SSL. For example: False
ore.user	Enter the schema name where the fcc-ore interpreter wants to connect.
http_proxy	Enter the Proxy server using which connection to the internet is established. This value is used to set the initial setting that makes the environment compatible to download the libraries available in R. For example: <code>www-proxy-hqdc.us.oracle.com:80</code>

Table 2 fcc-ore Interpreter

Field	Description
rserve.port	Indicates the Rserve port.
rserve.secure.login	Enter TRUE to enforce secure login.
rendering.knitr.options	Enter the Knitr output rendering option. For example: <code>out.format = 'html', comment = NA, echo = FALSE, results = 'verbatim', message = F, warning = F, dpi = 300</code>
rserve.user	Indicates the Rserve username.
ore.port	Enter the port number of the DB server where the fcc-ore interpreter wants to connect.
ofsa.metaservice.url	Enter the metaservice URL in this field. For example: <code>http://<HOSTNAME>:7045/metaservice</code> Here, <HOSTNAME> refers to the server name or IP where fcc-studio will be installed.
rendering.include.row.name	Indicates whether to include row names. For example: <code>false</code>
rendering.knitr.image.width	Indicates the image width specification for ore output. For example: <code>60</code>

7.3.3 fcc-pyspark Interpreter

The configurations for the fcc-pyspark interpreter are given as follows:

Table 3 fcc-pyspark Interpreter

Field	Interpreter
pgx.baseUrl	Enter the pgx.baseUrl URL in this field. This is the location where the data is pushed. For example: <code>http://##HOSTNAME##:7007</code>
livy.spark.executor.instances	Enter the number of executors to launch for the current session.
livy.spark.dynamicAllocation.cachedExecutorIdleTimeout	Enter the cached execution timeout in seconds.
zeppelin.livy.url	Enter the Livy URL in this field. Livy is an interface between Data Studio and Spark. For example: <code>http://##HOSTNAME##:8998</code>
zeppelin.livy.pull_status.interval.millis	Enter the data pull interval in milliseconds.
livy.spark.executor.memory	Enter the amount of memory to use for the executor process.

Table 3 fcc-pyspark Interpreter

Field	Interpreter
livy.spark.dynamicAllocation.enabled	This field indicates whether Dynamic Allocation is enabled or not. Enter “true” or “false”.
livy.spark.dynamicAllocation.minExecutors	Enter the minimum number of required Dynamic Allocation executors.
livy.spark.executor.cores	Enter the number of executor cores to use for the driver process.
zeppelin.livy.session.create_timeout	Enter the Zeppelin session creation timeout in seconds.
zeppelin.livy.spark.sql.maxResult	Enter the maximum number of results that need to be fetched.
livy.spark.jars.packages	Enter to add extra libraries to a livy interpreter.
livy.spark.driver.cores	Enter the number of driver cores to use for the driver process.
zeppelin.livy.displayAppInfo	This field indicates whether the application information needs to be displayed or not. Enter “true” or “false”.
livy.spark.driver.memory	Enter the amount of memory to use for the driver process.
zeppelin.livy.principal	Enter the principal name to load from the keytab.
ofsaa.sessionservice.url	Enter the session service URL in this field. For example: http://##HOSTNAME##:7047/session-service Here, ##HOSTNAME## refers to the server name or IP where fcc-studio will be installed.
ofsaa.metaservice.url	Enter the metaservice URL in this field. For example: http://##HOSTNAME##:7045/metaservice Here, ##HOSTNAME## refers to the server name or IP where fcc-studio will be installed.
zeppelin.livy.keytab	Enter the keytab location.
livy.spark.dynamicAllocation.maxExecutors	Enter the maximum number of required Dynamic Allocation executors.

7.3.4 fcc-python Interpreter

The configuration for the fcc-python interpreter are given as follows:

Table 4 fcc-python Interpreter

Field	Description
zeppelin.python	Enter the Python installed path.

Table 4 fcc-python Interpreter

Field	Description
zeppelin.python.usePython	
zeppelin.python.maxResult	Enter the maximum number of results that need to be fetched.

To add desired packages to fcc-python interpreter, see [Chapter 14, "Adding Packages to Python Interpreter"](#).

7.3.5 fcc-spark-scala Interpreter

The configurations for the fcc-spark-scala interpreter are given as follows:

Table 5 fcc-spark-scala Interpreter

Field	Description
pgx.baseUrl	Enter the pgx.baseUrl URL in this field. This is the location where the data is pushed. For example: <code>http://<HOSTNAME>:7007</code>
livy.spark.executor.instances	Enter the number of executors to launch for the current session.
livy.spark.dynamicAllocation.cachedExecutorIdleTimeout	Enter the cached execution timeout in seconds.
zeppelin.livy.url	Enter the Livy URL in this field. Livy is an interface between Data Studio and Spark. For example: <code>http://<HOSTNAME>:8998</code>
zeppelin.livy.pull_status.interval.millis	Enter the data pull interval in milliseconds.
livy.spark.executor.memory	Enter the amount of memory to use for the executor process.
livy.spark.dynamicAllocation.enabled	This field indicates whether Dynamic Allocation is enabled or not. Enter "true" or "false".
livy.spark.dynamicAllocation.minExecutors	Enter the minimum number of required Dynamic Allocation executors.
livy.spark.executor.cores	Enter the number of executor cores to use for the driver process.
zeppelin.livy.session.create_timeout	Enter the Zeppelin session creation timeout in seconds.
zeppelin.livy.spark.sql.maxResult	Enter the maximum number of results that need to be fetched.
livy.spark.jars.packages	Enter to add extra libraries to a livy interpreter.
livy.spark.driver.cores	Enter the number of driver cores to use for the driver process.

Table 5 fcc-spark-scala Interpreter

Field	Description
zeppelin.livy.displayAppInfo	This field indicates whether the application information needs to be displayed or not. Enter “true” or “false”.
livy.spark.driver.memory	Enter the amount of memory to use for the driver process.
zeppelin.livy.principal	Enter the principal name to load from the keytab.
ofsaa.sessionservice.url	Enter the session service URL in this field. For example: <code>http://<HOSTNAME>:7047/sessionservice</code> Here, <HOSTNAME> refers to the server name or IP where fcc-studio will be installed.
ofsaa.metaservice.url	Enter the metaservice URL in this field. For example: <code>http://<HOSTNAME>:7045/metaservice</code> Here, <HOSTNAME> refers to the server name or IP where fcc-studio will be installed.
zeppelin.livy.keytab	Enter the keytab location.
livy.spark.dynamicAllocation.maxExecutors	Enter the maximum number of required Dynamic Allocation executors.
livy.spark.dynamicAllocation.initialExecutors	Enter the initial Dynamic Allocation executors.

7.3.6 fcc-spark-sql Interpreter

The configurations for the fcc-spark-sql interpreter are given as follows:

Table 6 fcc-spark-sql Interpreter

Field	Description
pgx.baseUrl	Enter the pgx.baseUrl URL in this field. This is the location where the data is pushed. For example: <code>http://<HOSTNAME>:7007</code>
livy.spark.executor.instances	Enter the number of executors to launch for the current session.
livy.spark.dynamicAllocation.cachedExecutorIdle-Timeout	Enter the cached execution timeout in seconds.
zeppelin.livy.url	Enter the Livy URL in this field. Livy is an interface between Data Studio and Spark. For example: <code>http://<HOSTNAME>:8998</code>
zeppelin.livy.pull_status.interval.millis	Enter the data pull interval in milliseconds.
livy.spark.executor.memory	Enter the amount of memory to use for the executor process.

Table 6 fcc-spark-sql Interpreter

Field	Description
livy.spark.dynamicAllocation.enabled	This field indicates whether Dynamic Allocation is enabled or not. Enter “true” or “false”.
livy.spark.dynamicAllocation.minExecutors	Enter the minimum number of required Dynamic Allocation executors.
livy.spark.executor.cores	Enter the number of executor cores to use for the driver process.
zeppelin.livy.session.create_timeout	Enter the Zeppelin session creation timeout in seconds.
zeppelin.livy.spark.sql.maxResult	Enter the maximum number of results that need to be fetched.
zeppelin.livy.spark.sql.field.truncate	Indicates to truncate field values longer than 20 characters or not. Enter "true" or "false".
livy.spark.jars.packages	Enter to add extra libraries to a livy interpreter.
livy.spark.driver.cores	Enter the number of driver cores to use for the driver process.
zeppelin.livy.displayAppInfo	This field indicates whether the application information needs to be displayed or not. Enter “true” or “false”.
livy.spark.driver.memory	Enter the amount of memory to use for the driver process.
zeppelin.livy.principal	Enter the principal name to lead from the keytab.
ofsaa.sessionservice.url	Enter the session service URL in this field. For example: <code>http://<HOSTNAME>:7047/sessionservice</code> Here, <HOSTNAME> refers to the server name or IP where fcc-studio will be installed.
ofsaa.metaservice.url	Enter the metaservice URL in this field. For example: <code>http://<HOSTNAME>:7045/metaservice</code> Here, <HOSTNAME> refers to the server name or IP where fcc-studio will be installed.
zeppelin.livy.keytab	Enter the keytab location.
livy.spark.dynamicAllocation.maxExecutors	Enter the maximum number of required Dynamic Allocation executors.

7.3.7 jdbc

The configurations for the jdbc interpreter are given as follows:

Table 7 jdbc Interpreter

Field	Description
pgx.baseUrl	Enter the pgx.baseUrl URL in this field. This is the location where the data is pushed. For example: <code>http://<HOSTNAME>:7007</code>
default.url	Enter the jdbc URL in this field.
zeppelin.jdbc.principal	Enter the principal name to load from the keytab.
default.driver	Enter the default JDBC driver name.
default.completer.ttlInSeconds	Enter the time to live sql completer in seconds.
default.password	Enter the default password.
default.splitQueries	This field indicates the presence of default split queries. Enter “true” or “false”.
default.completer.schemaFilters	Enter comma separated schema filters to get metadata for completions.
ofsaa.sessionservice.url	Enter the session service URL in this field. For example: <code>http://<HOSTNAME>:7047/sessionservice</code> Here, <HOSTNAME> refers to the server name or IP where fcc-studio will be installed.
default.user	Enter the name of the default user in this field.
zeppelin.jdbc.concurrent.max_connection	Enter the number of maximum connections allowed.
ofsaa.metaservice.url	Enter the metaservice URL in this field. For example: <code>http://<HOSTNAME>:7045/metaservice</code> Here, <HOSTNAME> refers to the server name or IP where fcc-studio will be installed.
common.max_count	Enter the maximum number of SQL result to display.
zeppelin.jdbc.auth.type	Enter the default jdbc authentication type.
zeppelin.jdbc.precode	Enter the snippet of code that executes after the initialization of the interpreter.
zeppelin.jdbc.concurrent.use	Enter to enable or disable concurrent use of JDBC connections. Enter “true” or “false”.
zeppelin.jdbc.keytab.location	Enter the keytab location.

7.3.8 md Interpreter

The configurations for the md interpreter are given as follows:

Table 8 md Interpreter

Field	Description
markdown.parser.type	Enter the markdown parser type.

7.3.9 pgql Interpreter

The configurations for the pgql interpreter are given as follows:

Table 9 pgql Interpreter

Field	Description
graphviz.formatter.class	For example: oracle.datastudio.graphviz.formatter.DataStudioFormatter
graphviz.driver.class	For example: oracle.pgx.graphviz.driver.PgxDriver
base_url	Enter the base URL in this field. This is the location where the data is pushed. For example: http://<HOSTNAME>:7007
zeppelin.interpreter.output.limit	For example: 102,400

7.3.10 pgx-algorithm Interpreter

The configurations for the pgx-algorithm interpreter are given as follows:

Table 10 pgx-algorithm Interpreter

Field	Description
graphviz.formatter.class	For example: oracle.datastudio.graphviz.formatter.DataStudioFormatter
graphviz.driver.class	For example: oracle.pgx.graphviz.driver.PgxDriver
base_url	Enter the base URL in this field. This is the location where the data is pushed.

7.3.11 pgx-java Interpreter

The configurations for the pgx-java interpreter are given as follows:

Table 11 pgx-java Interpreter

Field	Description
graphviz.formatter.class	For example: oracle.datastudio.graphviz.formatter.DataStudioFormatter
graphviz.driver.class	For example: oracle.pgx.graphviz.driver.PgxDriver
base_url	Enter the base URL in this field. This is the location where the data is pushed.
zeppelin.interpreter.output.limit	For example: 102,400

7.3.12 pyspark Interpreter

The configurations for the pgx-java interpreter are given as follows:

Table 12 pyspark Interpreter

Field	Description
zeppelin.pyspark.python	For example: python
zeppelin.pyspark.usePython	

7.3.13 spark Interpreter

The configurations for the spark interpreter are given as follows:

Table 13 spark Interpreter

Field	Description
pgx.baseUrl	Enter the pgx.baseUrl URL in this field. This is the location where the data is pushed. For example: http://<HOSTNAME>:7007
spark.executor.memory	Enter the amount of memory to use for the executor process.
spark.master	Enter the cluster manager to connect to. For example: local[*]
spark.yarn.archive	

Table 13 spark Interpreter

Field	Description
spark.app.name	Enter the name of the application. For example: zeppelin
zeppelin.spark.ui.hidden	
zeppelin.spark.maxResult	Enter the maximum number of results that need to be fetched.
spark.pyspark.python	Enter the Python binary executable to use for PySpark in both driver and executors. For example: python
zeppelin.spark.enableSupportedVersionCheck	
args	Enter the Spark commandline args.
zeppelin.spark.useNew	
zeppelin.spark.useHiveContext	
zeppelin.spark.uiWebUrl	This value overrides Spark UI default URL. Note: The value must be a complete URL.
zeppelin.spark.printREPLOutput	Indicates to print the REPL output.
spark.cores.max	Enter the total number of cores to use.

8 Managing Tasks

This section includes the following topics:

- [Accessing Tasks](#)
- [Task Statuses](#)
- [Table Columns](#)
- [Table Filters](#)

8.1 Accessing Tasks

To access Tasks, follow these steps:

1. Navigate to the Studio workspace.
2. Click the menu icon in the upper-left corner.

The menu items are listed.

3. Click **Tasks**.

The **Tasks** page lists all tasks of Studio and displays the notebook, paragraph, interpreter, and user associated with each task.

Notebook	Paragraph	Interpreter	Status	Creation Time	Queue Time	Run Time	User
RMF Scenario - CU Focus	Alert Generation Condition on High Risk Customer	fcc-spark-scala	success	10 Feb 2020 03:49 pm	-	-	
RMF Scenario - CU Focus	Aggregate Transaction on Customer	fcc-spark-scala	success	10 Feb 2020 03:49 pm	-	-	
RMF Scenario - CU Focus	Event Creation	fcc-spark-scala	success	10 Feb 2020 03:49 pm	-	-	
RMF Scenario - CU Focus	Alert Generation Condition on Low Risk Customer	fcc-spark-scala	success	10 Feb 2020 03:49 pm	-	-	
RMF Scenario - CU Focus	Alert Result	fcc-spark-scala	success	10 Feb 2020 03:49 pm	-	-	
RMF Scenario - CU Focus	List Dataset	fcc-spark-scala	success	10 Feb 2020 03:49 pm	-	-	
RMF Scenario - CU Focus	Wire Transaction - Both Credit and Debit	fcc-spark-scala	success	10 Feb 2020 03:49 pm	-	-	
RMF Scenario - CU Focus	Monetary Instrument - Both Credit and Debit	fcc-spark-scala	success	10 Feb 2020 03:49 pm	-	-	

8.2 Task Statuses

The tasks can have the following possible statuses:

Table 1 Task Statuses

Field	Description
created	Indicates that the task is just created.
queued	Indicates that the task is in a queue, waiting to be run. This can happen when the same user runs multiple paragraphs of the same interpreter in the same notebook - the interpreter will first finish executing the first paragraph (i.e., task) and then moves onto the second one which will have status queued until then.

Table 1 Task Statuses

Field	Description
running	Indicates that the tasks are being executed.
rejected	
success	Indicates that the task is successfully completed.
cancelled	Indicate that the execution of the task is cancelled.(For example, by clicking the 'Cancel Execution' ("Stop") button on a paragraph).
error	<p>Indicates that an error has occurred during execution of a task. The error can be one of the following:</p> <ul style="list-style-type: none"> • The concerned interpreter is unsupported • The interpreterClient is disconnected • The task is not found • The status of the task cannot be changed to running or success

8.3 Table Columns

Table 2 Table Columns

Field	Description
Notebook	Indicates the name of the notebook for which the task was created for.
Paragraph	Indicates the title of the paragraph associated with the task, or if there is no title, the first line of code of the paragraph
Interpreter	Indicates the name of the interpreter that the task was created to run against
Status	Indicates the status of the task
Creation Time	Indicates the time (in device-local time) when the task was created
Queue Time	Indicates the total time spent by the task in the queue, that is, the time between the creation of the task and the beginning of the task execution
Run Time	Indicates the time taken for the task to run, that is, the time between the beginning and the end of the task execution
User	Indicates the username of the user who created the task

8.4 Table Filters

The list of tasks can be filtered in a number of ways to make it easy to search specific tasks. You can filter a task by the following categories:

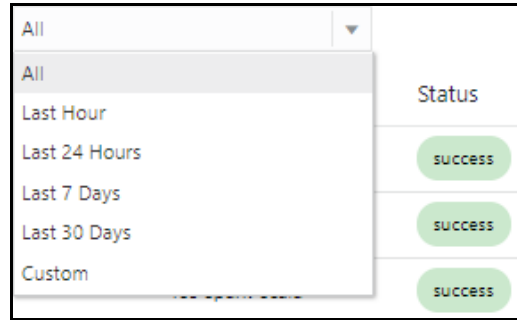
- **Task status:** Filters the tasks based on the statuses that match the selected statuses.



- **Text:** The search box allows the user to filter the tasks based on notebook name, paragraph title, paragraph code, interpreter, and user.



- **Date and Time:** Filters the tasks based on task creation time. The following option are available:



- Last Hour
- Last 24 Hours
- Last 7 days
- Last 30 days
- Custom: Allows the user to enter a custom from and/or to date-time. If empty, it assumes infinite past/future.

9 Managing Permissions

This section includes the following topics:

- [Permissions Overview](#)
- [Accessing Permissions Page](#)

9.1 Permissions Overview

This section provides information on users, groups, roles, and other permissions. It includes the following topics:

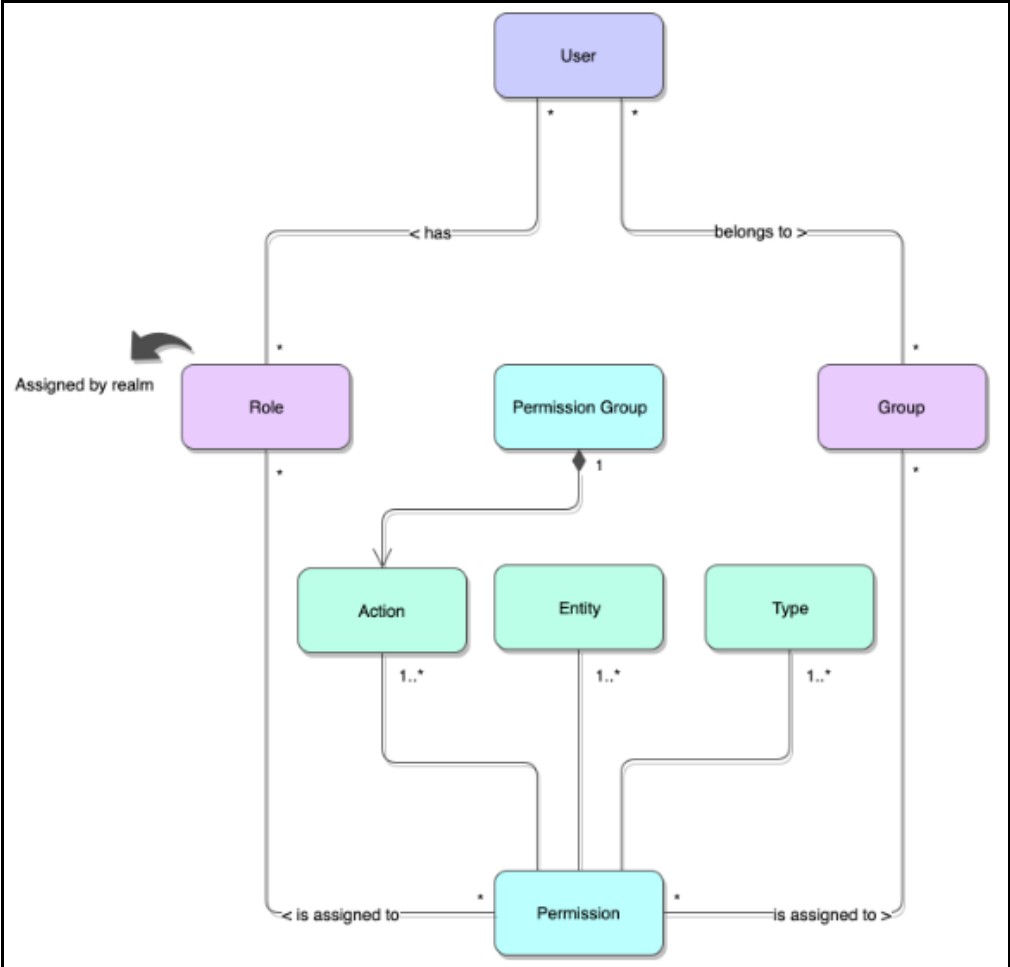
Studio offers a rich permission system. The four key components are permissions, permission templates, roles, and groups.

A permission is an action that applies to entities and types. A permission can be a general action, an action on all entities of a particular type, or an action on a specific entity of a particular type.

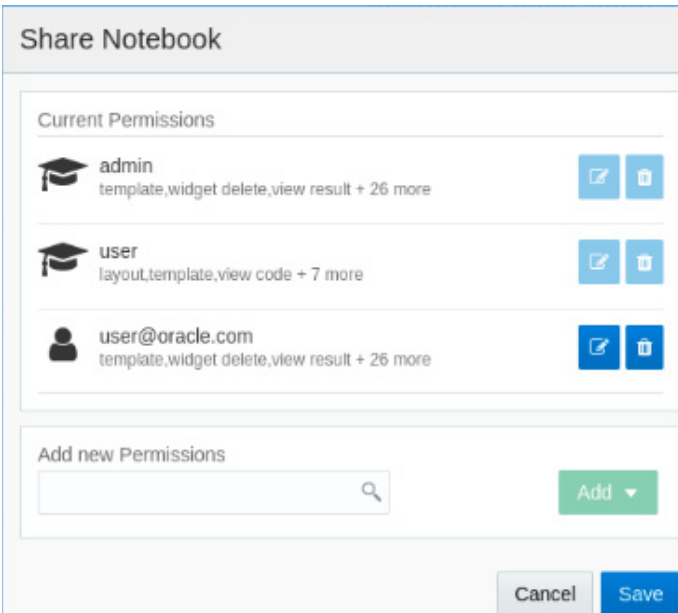
For example:

- `general:create_notebook` - The general action to create a notebook.
- `graph:graph_update` - The action to update all entities of type graph, that is, the action to update all the graphs in the **Graphs** page.
- `notebook:export` - The action to export a specific entity of type notebook, that is, the action to export a particular notebook.

To evaluate whether a user can perform an action on an entity of a type, the permission must be assigned to the user, to one of their roles, or groups.



When sharing a notebook, you can select the user(s)/member(s) to share a notebook and grant the required permission.



Select Permissions

Permission-Group

read write own

limited_read

▲ Advanced Mode

<input type="checkbox"/> *	<input checked="" type="checkbox"/> attach	<input checked="" type="checkbox"/> clear
<input checked="" type="checkbox"/> clone	<input checked="" type="checkbox"/> detach	<input checked="" type="checkbox"/> export
<input checked="" type="checkbox"/> iframe	<input checked="" type="checkbox"/> layout	<input checked="" type="checkbox"/> restart_cluster
<input checked="" type="checkbox"/> run_all	<input checked="" type="checkbox"/> snapshot	<input checked="" type="checkbox"/> template
<input checked="" type="checkbox"/> toggle_show_code	<input checked="" type="checkbox"/> update	<input checked="" type="checkbox"/> view
<input checked="" type="checkbox"/> view_code	<input checked="" type="checkbox"/> view_result	<input checked="" type="checkbox"/> widget_create
<input checked="" type="checkbox"/> widget_delete	<input checked="" type="checkbox"/> widget_execute	<input checked="" type="checkbox"/> widget_modify
<input checked="" type="checkbox"/> widget_move	<input checked="" type="checkbox"/> widget_view	

Save Cancel

9.2 Accessing Permissions Page

To access permissions, follow these steps:

1. Navigate to the **Studio** workspace.
2. Click the menu icon in the upper-left corner.
The menu items are listed.
3. Click **Permissions**.

The **Permissions** page lists the following:

- **Users**
- **Groups**
- **Roles**
- **Permission Templates**

The screenshot shows the 'Permissions' page with three main sections: Users, Groups, and Roles. Each section has a table listing items and their associated permissions.

Username	Last Login	Roles	Groups	Permissions	Creation Time	Actions
admin@oracle.com	05 Sep 2019 05:21 pm	admin	-		05 Sep 2019 05:08 pm	
guest@oracle.com	-	-	-		05 Sep 2019 02:23 pm	
user10@oracle.com	-	-	-	view_sessions, view, paragraph_comment, export, iframe, paragraph_view, view_code, view_result, graph_view, export_all	05 Sep 2019 02:23 pm	

Name	Permissions	Creation Time	Actions
group1		05 Sep 2019 02:23 pm	
group2	view_result, clone, iframe, view, paragraph_comment, view_code, snapshot, paragraph_view, view_sessions, export, Show More ...	05 Sep 2019 02:23 pm	
group3	view_sessions, view, paragraph_comment, view_result, paragraph_view, export, view_code, iframe, graph_view, export_all	05 Sep 2019 02:23 pm	

9.2.1 Users

The Users section lists all the users, the date of their last login, and their roles, groups, other permissions. Users cannot be added or deleted in this section, but the groups they belong to can be updated.

This screenshot shows the 'Users' section of the Permissions page, displaying a table with columns for Username, Last Login, Roles, Groups, Permissions, Creation Time, and Actions. The data is identical to the first screenshot.

9.2.2 Groups

A Group consists of one or more permissions. A user can belong to multiple groups. For example, Oracle Labs, General, and External. The **Groups** section allows users to view and manage all groups. Groups can be added, updated, and deleted.

This screenshot shows the 'Groups' section of the Permissions page, displaying a table with columns for Name, Permissions, Creation Time, and Actions. The data is identical to the second screenshot.

9.2.3 Roles

A Role consists of one or more permissions. A user can have multiple roles that are typically assigned by the realm. For example, admin, user, and guest. All the listed roles can be added, updated, and deleted.

Roles			
Roles are sets of users. Roles can have permissions assigned to them just like permissions can be assigned to users. Users inherit the permissions from all the roles they have. Role assignment is controlled by the realm.			
Name	Permissions	Creation Time	Actions
admin	+	05 Sep 2019 02:23 pm	
user	view_result view_sessions paragraph_view snapshot iframe clone view export view_code paragraph_comment Show More ...	05 Sep 2019 02:23 pm	

9.2.4 Permission Templates

A Permission Template is a set of actions. For example, limited_read, read, and write. All the listed Permission Templates can be added, updated, and deleted.

Permission Templates			
Set of (often logically related) actions to simplify applying multiple permissions (e.g. when assigning permissions in the "Share Notebook" dialog)			
Name	Permissions	Creation Time	Actions
read	iframe view export paragraph_view view_code clone paragraph_comment view_sessions snapshot view_result Show More ...	05 Sep 2019 02:23 pm	
write	view_sessions toggle_show_code update paragraph_execute paragraph_create template clone paragraph_delete attach clear Show More ...	05 Sep 2019 02:23 pm	
own	+	05 Sep 2019 02:23 pm	
limited_read	iframe paragraph_comment view_code view_result view_sessions view export paragraph_view graph_view export_all	05 Sep 2019 02:23 pm	

10 Managing Credentials

FCC Studio provides a secure and safe credential management. For example, passwords, Oracle Wallets, or KeyStores. The credentials can be used to connect to data sources.

This section includes the following topics:

- [Accessing Credentials](#)
- [Using Credentials](#)

10.1 Accessing Credentials

To access credentials page, follow these steps:

1. Navigate to the Studio workspace.
2. Click the menu icon in the upper-left corner.
The menu items are listed.
3. Click **Credentials**.

Name	Type	Content	Creation Date
My Password	Password	*****	02 Dec 2019
My Wallet	Oracle Wallet	wallet_DB201902061356.zip	03 Dec 2019
Keystore	KeyStore file	keystore.jks	03 Dec 2019
Properties	Credential file	test.zip	03 Dec 2019
DB Password	Password	*****	03 Dec 2019

4. Click **Create** on the top right corner to create a new credential. The maximum file size allowed for the credential file is 128Kb.

5. To download the credential files, click the credential file name.
6. To delete a credential, click the trash bin button in the last column of the row of the credential.

10.2 Using Credentials

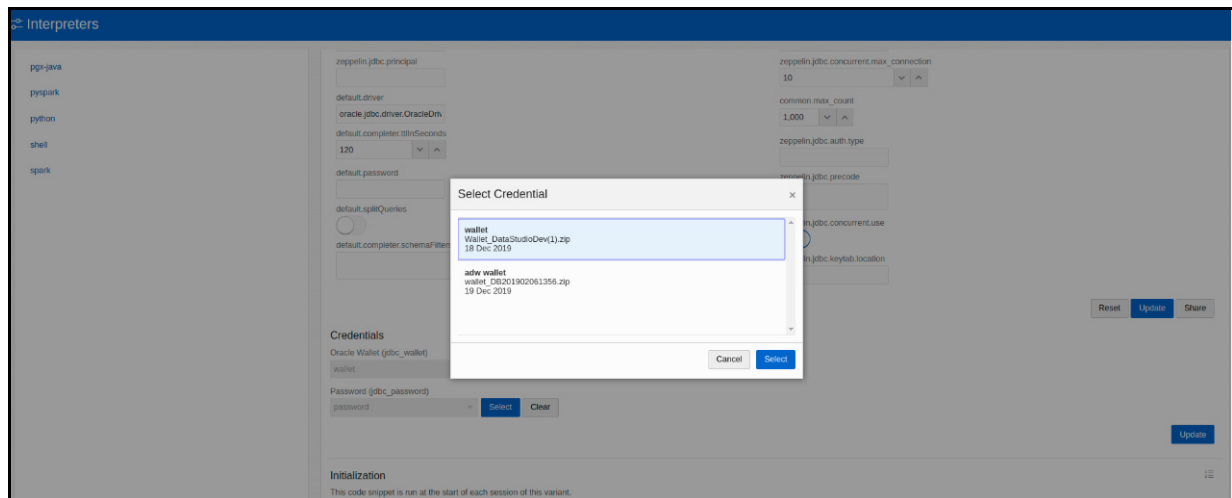
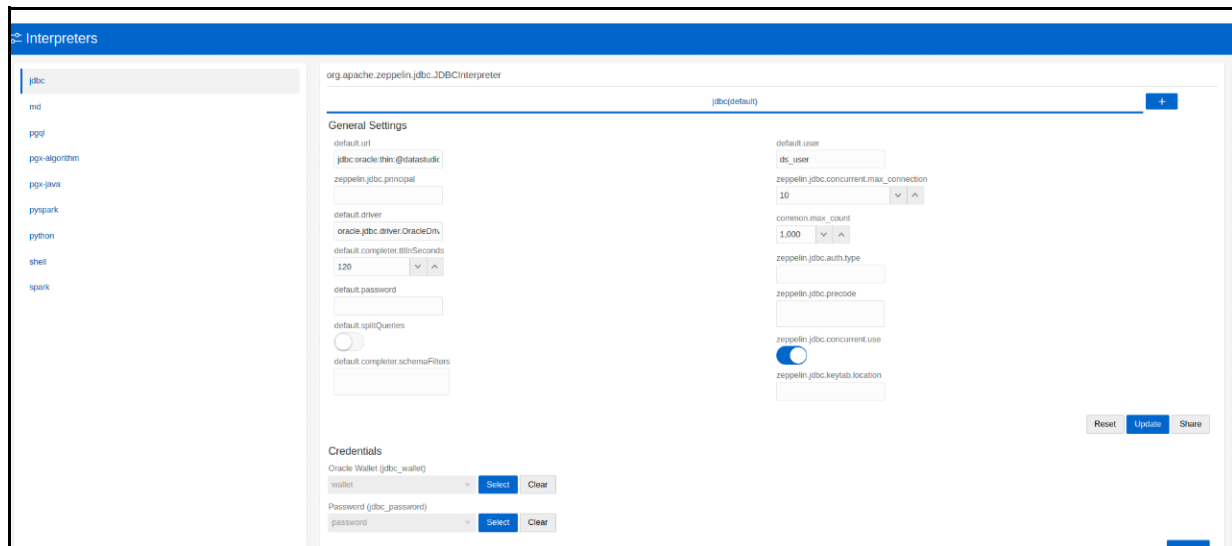
10.2.1 Link Credentials to Interpreter Variants

You can use your credentials and link them to certain interpreter variants to enable secure data access. If an interpreter variant is enabled to accept credentials, the **Credentials** section is displayed in the **Interpreters** page.

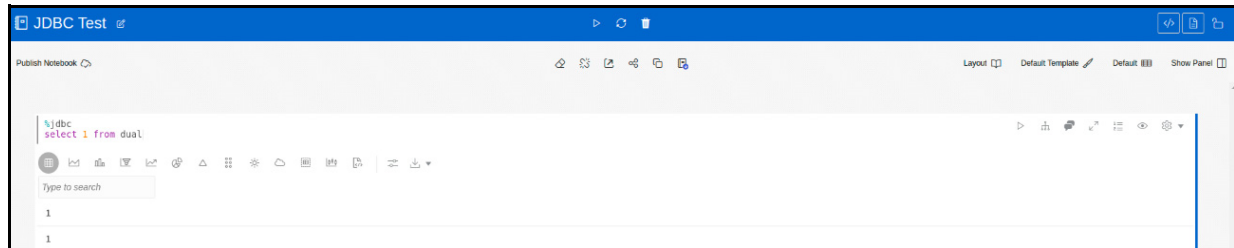
To link a credential to an interpreter variant, follow these steps:

1. Navigate to the **Interpreters** page
2. Select the credential that you want to link from the displayed popup and Click **Select**.
3. After you have linked your credentials, click **Update** to save the changes.

For example, you can link credentials (a wallet and a password) to JDBC interpreter variants. Link your wallet and password credentials to connect to an Oracle DB.



Use the JDBC interpreter to connect to the specified DB.



An Oracle Wallet provides a simple and easy method to manage database credentials. The wallet zip file includes the following:

- cwallet.sso
- ewallet.p12
- tnsnames.ora (optional)

11 Configuring Data Sources for Graph

To configure a new data source for a graph, follow these steps:

1. Navigate to the `fcc_studio_etl_queries` table in the Studio Schema.
The FCDM related nodes and edges are available in the table.
2. If you want to add additional nodes or edges, you can add a new entry in the `fcc_studio_etl_queries` table.
3. Enter the following details in the `fcc_studio_etl_queries` table to add a new node or edge:

Table 1 `fcc_studio_etl_queries` Table Details

Column Name	Description
Type	Indicates the column name. Enter the value as NODE or EDGE.
DF_NAME	Indicates the name for the node or edge.
SOURCE	Indicates the source of the data. For example: FCDM or ICIJ
DATAFRAME	Indicates the properties of the node or edge. NOTE: Enter this value only if the data source is Hive and not .a CSV file.
QUERY	<ul style="list-style-type: none"> • If the source is Hive, provide the Hive query. • If the source is a .CSV file, provide the query in the following format: <pre>spark.read.format("csv").option("header", "true").option("mode", "DROPMALFORMED").load(("#FILEPATH##")).select("node_1", "node_2", "rel_type", "SourceID").withColumn("Label", lit("address of")).withColumnRenamed("node_1", "from").withColumnRenamed("node_2", "to").withColumnRenamed("rel_type", "EDGE_TYPE").withColumnRenamed("SourceID", "Source").filter(col("EDGE_TYPE")=="registered_address").withColumn("node_ID", concat(lit("#NUMBER#"), col("node_ID")))</pre> <p>For information on the query parameters, see Table 2, "Query Parameter Details".</p> <p>NOTE: Ensure that the source .CSV file is UTF-8 compatible.</p>

Table 2 Query Parameter Details

Query Parameter	Description
<code>spark.read.format("csv")</code>	Indicates the input file format. For example: .csv.
<code>option("header", "true")</code>	Indicates the presence of a header in the input file. <ul style="list-style-type: none"> • true indicates that the header is available in the input file. • false indicates that the header is absent in the input file.
<code>load("Path").</code>	<ul style="list-style-type: none"> • Load indicates to load the data from the mentioned file path. • Path indicates the path where the files are placed. <p>You can load to multiple paths using the following format: ("Path1", "Path2", ...)</p>
<code>select("Col1","Col2","Col3","Col4")</code>	Indicates the columns to be selected in the input file.
<code>withColumn("A",lit("Test1"))</code>	Indicates to add a new column with column name A and column value Test1.
<code>withColumnRenamed("A","B")</code>	Indicates to rename a column with a different name. For example: rename column from A to B.
<code>filter(col("A")==="Test1")</code>	Indicates the "Where" filter condition. Here, the value for column A is Test1.
<code>withColumn("B",concat(lit("Test1"),col("A")))</code>	Indicates to add a new column B, whose value is the concatenated value of Test1 and column A. For example: Test1=ABC Column A contains Country and Pincode as the column values. Column B gets ABCCountry and ABCPincode as column values.

4. If the source is a .CSV file, configure the file path in the `fcc_studio_etl_files` table.

NOTE Ensure that the source .CSV file is UTF-8 compatible.

5. Enter the following details in the `fcc_studio_etl_files` table to add file path:

Table 1 fcc_studio_etl_files Table Details

Column Name	Description
DF_NAME	Indicates the name of the node or edge.

Table 1 fcc_studio_etl_files Table Details

Column Name	Description
DF_SEQ_NO	Indicates the unique sequence ID for each file.
FILEPATH	Enter the path where the .CSV files are stored. NOTE: If one data frame has multiple .CSV files, then make separate entries for all the files. For example: see Figure 1, "fcc_studio_etl_files Table" .
FILEORDER	If data must be imported from multiple files, specify the order in which the files must be read.

Figure 1: 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

6. Navigate to the <ETL_Installation_Path>/etl/conf/ directory.
7. Follow these steps to configure the etl.properties file to add a new property:
 - [Adding a New Connector in the etl.properties File](#)
 - [Adding a New Property in the etl.properties File](#)
8. Redeploy the FCC Studio application. For more information, see the *Redeploy Studio Application* chapter in the [OFS Crime and Compliance Studio Deployment Guide \(Using Kubernetes\)](#).

11.1 Adding a New Connector in the etl.properties File

To add a new connector, follow these steps:

1. Add a new connector label to the connectors field.

NOTE Ensure that the labels are separated by a semicolon (;).

2. Provide a location for the node or edge files as follows:

- For node:

```
<connector label>.nodes.location / <connector label>.nodes.location.<serial number>
```

- For edge:

```
<connector label>.edges.location / <connector label>.edges.location.<serial number> keys
```

3. For each node or edge file provide list of optional properties:

- For node:

```
<connector label>.node.property.list / <connector label>.node.property.list.<serial number>
```

- For edge:
`<connector label>.edge.property.list / <connector label>.edge.property.list.<serial number>`

11.2 Adding a New Property in the etl.properties File

To add a new property, follow these steps:

1. Add the property name to the appropriate list of optional properties if it is a node or edge property.

The property is either `optional.node.property.list` or `optional.edge.property.list`.

NOTE

- Ensure that the labels are separated by a semicolon (;).
- Ensure that the property name is spelled exactly the same as it appears in the connector output.
- No escaping is required in this field if the property name contains spaces.

2. Add default value to the following property if you are adding a node or edge property:

- For node:
`<property name>.node.property.default`
- For edge:
`<property name>.edge.property.default`

NOTE

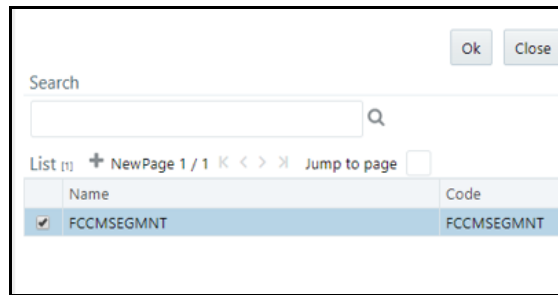
Use a backslash to escape space in the property name. For example, `Further\ Information.node.property.default`.

3. Add the property name list of the connector provided properties, to connector(s) providing new property. See `<connector label>.node.property.list` or `<connector label>.edge.property.list`.
4. (Optional) If the property must be renamed, you can use the renaming functionality mentioned earlier.
5. (Optional) If the property is not of String type, you can use the data type functionality mentioned earlier to set the PGX-specific data type of the property.

12 Creating and Executing Run Executable

To create and execute run executable, follow these steps:

1. Log in to the OFSAA application with a user who has the privilege to create run executable.
2. Select **Financial Services Anti Money Laundering** from the tiles menu.
The Financial Services Anti Money Laundering Application Home Page is displayed with the Navigation list to the left.
3. Navigate to **Common Tasks > Rule Run Framework > Run** from the navigation list.
The **Run Definition** page is displayed.
4. Click **New** on the List toolbar.
The **Rule Run Framework** window is displayed.
5. Under the **Linked To** toolbar, click the button next to **Folder**.
The **Folder Selector** dialog box is displayed.



6. Select the folder that is to be linked to the run executable.
7. Click **OK**.
8. Enter the following details in the **Master Information** toolbar.



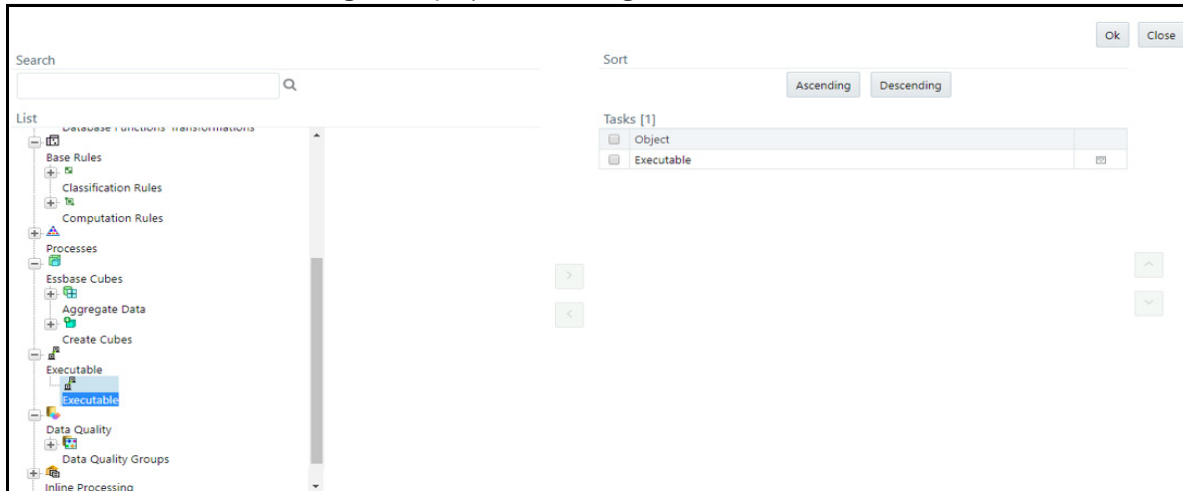
Table 1 Adding Run Definition

Field	Description
Code	Enter the Code of the process.
Name	Enter the Name of the process.
Type	Select Type for the process.

9. Click **OK**.
10. Click **Selector** on the List toolbar. From the options displayed, select **Job**.
The **Jobs** page is displayed.

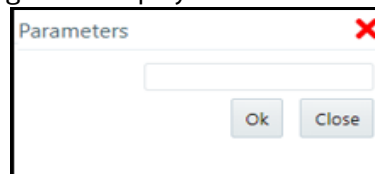
- Click **Executable** on the list. From the options displayed, select **Executable**.

The **Executable** gets displayed on the right.



- Select **Executable** from the Tasks list, click the button next to the Executable option.

The **Parameters** dialog box is displayed.



- Enter the parameters in the following format to create run executable:

"FCCM_Studio_NotebookExecution.sh", "notebookID", "outputParagraphID", "scenarioID", "thresholdsetID", "extraparams"

The following are the list of parameters for batch execution:

Table 1 List of Parameters for Batch Execution

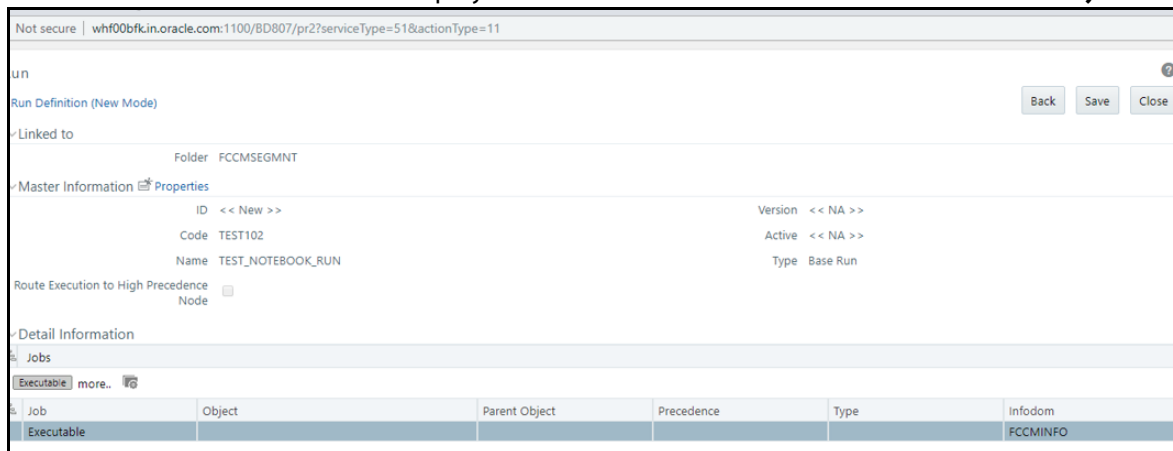
SL. No.	File Name	Parameters	Description
1	FCCM_Studio_SqoopJob.sh		Used for data movement and graph loading in Big Data Environment
		batchId	Indicates the ID of the batch that you want to execute.
		ficmisdate	Indicates the date on which the source data is available.
		userparams	Includes the data movement code and snapshot date.
		source	Indicates the source data type.
		ETL2 Trigger	Indicates to trigger ETL part 2.
For example: "FCCM_Studio_SqoopJob.sh", "batchId", "ficmisdate", "userparams", "source", "ETL2 Trigger"			

Table 1 List of Parameters for Batch Execution

SL. No.	File Name	Parameters	Description
2	FCCM_Studio_Set_UserPas s.sh		Used for setting user name and password for notebook execution.
		username	Indicates the username set for the notebook execution user.
		password	Indicates the password set for the notebook execution user.
	For example: FCCM_Studio_Set_UserPass.sh --username "USERNAME" --password "PASSWORD" or FCCM_Studio_Set_UserPass.sh -u "USERNAME" -p "PASSWORD"		
3	FCCM_Studio_NotebookExe cution.sh		Used for batch execution of scenario notebook
		notebookId	Indicates the ID of the required notebook
		outputParagraphId	Indicates that the value is always "null"
		scenarioId	Indicates the ID of Scenario
		thresholdsetId	Indicates the ID of the threshold set with which notebook will run
		sessionId	Indicates the ID of the session in which notebook will run
		extraParams	For scenario notebook, it will be "null", but for notebook execution, it depends on the paramkeys used in the notebook
	For example: "FCCM_Studio_NotebookExecution.sh", "notebookID", "outputParagraphID", "scenarioID", "thresholdsetID", "extraparams"		

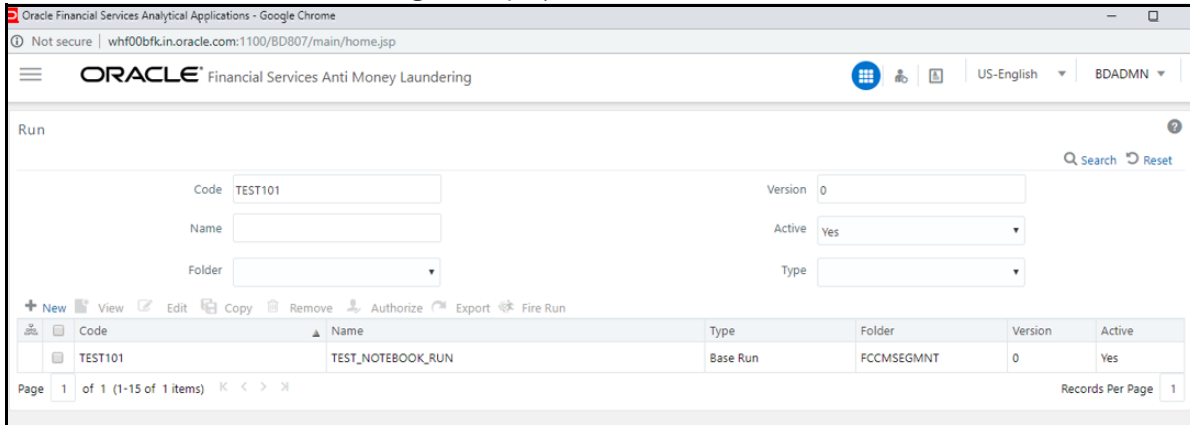
14. Click **OK**.

The run executable is displayed in the Detail Information section on the **Run Definition** page.



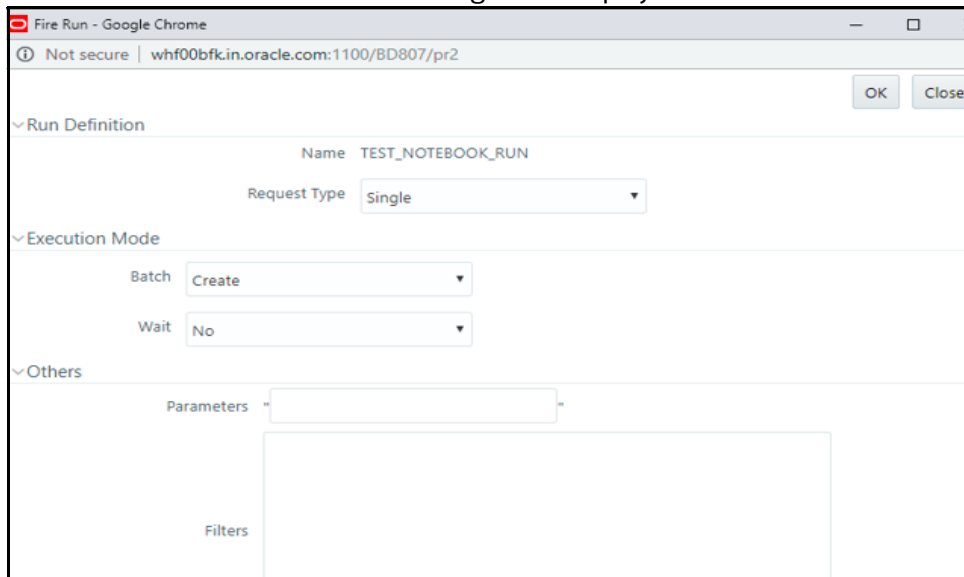
15. Click **Save**.

A confirmation message is displayed. The Run executable is created.



16. Select the newly created run executable from the **Run Definition** page that is to be created and click **Fire Run**.

The **Fire Run Rule Framework** dialog box is displayed.



17. Enter the following details:

Table 1 Adding Fire Run Details

Field	Description
Request Type	Select Request Type based on the following options: <ul style="list-style-type: none"> • Single: If the batch has to be executed once. • Multiple: If the batch has to be executed multiple times at different intervals.

Table 1 Adding Fire Run Details

Field	Description
Batch	Select Batch. It has the following options: <ul style="list-style-type: none"> • Create • Create and Execute From these options, select Create & Execute.
Wait	Select Wait. It has the following options: <ul style="list-style-type: none"> • Yes: This will execute the batch after a certain duration. Enter the duration as required. • No: This will execute the batch immediately.
Filters	Enter the filter details.

18. Click **OK** to run the Run Executable.

The Run executable starts executing.

19. From the Navigation List, navigate to **Common Tasks**, click **Operations**, and then select **Batch Monitor**.

The **Batch Monitor** window is displayed.

20. Select the batch that is run in step 18. Select the Information Date and Batch Run ID from the drop-down.

21. Click on **Start Monitoring** in Batch Run Details.

The Batch Run ID and Batch Status details are displayed in the Batch Status details section.

13 Studio Services

This section includes the following topics:

- [ETL Service](#)
- [Cross Language Name Matching Service](#)

13.1 ETL Service

ETL enables you to prepare a Global Financial Graph from individual data sources. In addition, it identifies similar names and addresses across data sources and connects them with additional edges to simplify the analysis and exploration of relationships.

- [graph.config.template.json File Details](#)
- [etl.properties File Details](#)
- [Sample for etl.properties File](#)

13.1.1 graph.config.template.json File Details

The Graph Configuration Template file, `graph.config.template.json` is present in the `<Studio_Installation_Path>/configmaps/etl/` directory. The `graph.config.template.json` defines a template for the [PGX graph configuration file](#) that the ETL finally produces.

For example:

```
{
  "edge_props" : [
    %EDGE_PROPERTY_LIST%
  ],
  "vertex_props": [
    %NODE_PROPERTY_LIST%
  ],
  "format" : "csv",
  "separator" : ",",
  "vertex_id_type": "long",
  "edge_uris" : [
    %EDGE_FILE_URIS%
  ],
  "vertex_uris" : [
    %VERTEX_FILE_URIS%
  ],
  "local_date_format": [ "M/d/yyyy", "yyyy-MM-dd" ]
}
```

The placeholders %EDGE_PROPERTY_LIST% and %NODE_PROPERTY_LIST% are replaced dynamically by the ETL with the edge and node properties and their types.

13.1.2 etl.properties File Details

The `etl.properties` file is present in the `<Studio_Installation_Path>/configmaps/etl/` directory. The `etl.properties` file contains the following type of keys:

- The fixed set of properties with fixed names. For more information, see [Fixed Set of Properties](#)
- Dynamically named properties with names depending on other properties. The dynamically named properties have a variable prefix (derived from connector name or property name) and fixed suffix. For more information, see [Dynamically Named Properties](#)

13.1.2.1 Fixed Set of Properties

Table 1 Fixed Set of Properties in etl.properties file

Interaction Variable Name	Significance
connectors	A semicolon-separated list of connector labels. Individual labels will be used later to prefix properties connected to the particular connector (table with the connector output).
List of Properties	
required.node.property.list	A semicolon-separated list of mandatory node properties that have to be present in every node table produced by any connector.
required.edge.property.list	A semicolon-separated list of mandatory edge properties that have to be present in every edge table produced by any connector.
optional.node.property.list	<p>A semicolon-separated list of optional node properties that can be present in node table produced by zero or more connectors.</p> <p>NOTE: The property may not be produced by any of the connectors, in that case, it will be constant in all nodes. The value is specified by property, <property name>.node.property.default.</p>
optional.edge.property.list	<p>A semicolon-separated list of optional edge properties that can be present in edge table produced by zero or more connectors.</p> <p>NOTE: The property may not be produced by any of the connectors, in that case, it will be constant in all edges. The value is specified by property, <property name>.edge.property.default.</p>
node.id.col	A string defining column name for Node ID. It has to be produced by all connectors.

Table 1 Fixed Set of Properties in etl.properties file

Interaction Variable Name	Significance
edge.from.id.col	A string defining column name for From ID, one end of an edge. It has to be produced by all connectors.
edge.to.id.col	A string defining column name for To ID, the other end of an edge. It has to be produced by all connectors.
Graph Output	
output.nodes.location	A location for node file. It can either be a local or hdfs path.
output.edges.location	A location for edge file. It can either be a local or hdfs path.
output.config.template.location	A location for the graph configuration template file (see graph.config.template.json File Details) to be used for generating the final graph configuration file. If deploying the ETL with Kubernetes, provide the value as follows: <code>file:///configurations/etl/graph.config.template.json</code>
output.config.location	A location for the final graph configuration file. The location can be either local or hdfs path. If you do not want a graph configuration file written, provide the value as follows: <code>null://EMPTY.</code>
Entity Resolution Related Properties	
output.name.index.condition	A WHERE condition for a SQL statement to identify which nodes are persons or companies and will be put into the name list file of the Cross Language Name Matching. NOTE: This string is directly concatenated into a SQL statement. (if the property contains space or you want to be sure, use `` around column name).
output.name.index.nodes.location	Local or hdfs path to a name list file. It has to be the same as <code>name.index.location</code> property in Cross Language Name Matching property file.
output.name.index.edges.location	The value should be <code>null://EMPTY.</code> The edge file is not considered in this case.

Table 1 Fixed Set of Properties in etl.properties file

Interaction Variable Name	Significance
output.name.index.config.location	The value should be <code>null://EMPTY</code> . The graph configuration file is not considered in this case.
output.address.index.condition	<p>A WHERE condition for a SQL statement to identify which nodes are addresses and will be put in to address list file of the Cross Language Name Matching.</p> <p>NOTE: This string is directly concatenated into a SQL statement. (if the property contains space or you want to be sure, use `` around column name).</p>
output.address.index.nodes.location	Local or hdfs path to an address list file. The value should be the same as the <code>address.index.location</code> property in Cross Language Name Matching property file.
output.address.index.edges.location	The value should be <code>null://EMPTY</code> . The edge file is not considered in this case.
output.address.index.config.location	The value should be <code>null://EMPTY</code> . The graph configuration file is not considered in this case.
name.matching.value.column	When storing the name list file, which node property to store as the name in the file. It has to match the <code>name.matching.value.column</code> property in Cross Language Name Matching property file.
name.matching.filter.column	When storing the name list file, which node property to store as a filter in the file. It has to match the <code>name.matching.filter.column</code> property in Cross Language Name Matching property file.
address.matching.value.column	When storing an address list file, which node property to store as an address in the file. It has to match <code>address.matching.value.column</code> property in Cross Language Name Matching property file.
address.matching.filter.column	When storing an address list file, which node property to store as a filter in the file. It has to match <code>address.matching.filter.column</code> property in Cross Language Name Matching property file.
Similarity Edges Generation Related Properties	

Table 1 Fixed Set of Properties in etl.properties file

Interaction Variable Name	Significance
similarity.label.edge.col	An edge property name where to store a label for similarity edge (typically label property).
similarity.value.edge.col	An edge property name, where to store a similarity score.
name.match.property.to.measure	When matching names, the node property that contains person/company names.
name.match.max.matches	When matching names, how many similarity edges create at most.
name.match.min.score	The name similarity edges are created for names with similarity scores specified here or higher.
address.match.property.to.measure	When matching addresses, the node property that contains addresses.
address.match.max.matches	When matching names, how many similarity edges create at most.
address.match.min.score	The address similarity edges are created for names with similarity score specified here or higher.
name.match.similarity.index.query.condition	<p>A WHERE condition for a SQL statement. When adding name similarity edges between persons/companies, which nodes will be used as a basis (index) for matching.</p> <p>NOTE: This string is directly concatenated into a SQL statement. (if the property contains space or you want to be sure, use `` around column name).</p>
name.match.similarity.match.query.condition	<p>A WHERE condition for a SQL statement. When adding name similarity edges, between persons/companies, these nodes will be matched against the basis (index).</p> <p>NOTE: This string is directly concatenated into a SQL statement. (if the property contains space or you want to be sure, use `` around column name).</p>

Table 1 Fixed Set of Properties in etl.properties file

Interaction Variable Name	Significance
address.match.similarity.index.query.condition	<p>A WHERE condition for a SQL statement. When adding address similarity edges between addresses, these nodes will be used as a basis (index) for matching.</p> <p>NOTE: This string is directly concatenated into a SQL statement. (if the property contains space or you want to be sure, use `` around column name).</p>
address.match.similarity.match.query.condition	<p>A WHERE condition for a SQL statement. When adding address similarity edges, between addresses, these nodes will be matched against the basis (index).</p> <p>NOTE: This string is directly concatenated into a SQL statement. (if the property contains space or you want to be sure, use `` around column name).</p>

13.1.2.2 Dynamically Named Properties

Table 2 Dynamically Named Properties in etl.properties File

Interaction Variable Name	Significance
Graph Node/Edge Property related options	
<optional property>.node.property.default	A default value for each node property defined in <code>optional.node.property.list</code> . If a connector does not supply the property, it will be filled automatically, using this default value.
<optional property>.edge.property.default	A default value for each edge property defined in <code>optional.node.property.list</code> . If a connector does not supply the property, it will be filled automatically, using this default value.
<property>.node.property.rename.to	A value to rename the node property defined in either <code>required.node.property</code> or <code>optional.node.property.list</code> in the final output.
<property>.edge.property.rename.to	A value to rename the edge property defined in either <code>required.edge.property</code> or <code>optional.edge.property.list</code> in the final output.

Table 2 Dynamically Named Properties in etl.properties File

Interaction Variable Name	Significance
<property>.node.property.data.type	The PGX type to use for the node property when writing the graph configuration file. ('string' is the default).
<property>.edge.property.data.type	The PGX type to use for the edge property when writing the graph configuration file ('string' is the default).
Connector Related Properties	
If a connector provides a single node/edge table	
<connector label>.nodes.location	A location of the node table. The value can be a local file, hdfs file or hive table. NOTE: The <connector label> is one of the individual values from the connectors option.
<connector label>.node.property.list	A semicolon-separated list of optional node properties provided by the connector (not listing the required properties).
<connector label>.edges.location	A location of the edge table. The value can be a local file, hdfs file or hive table.
<connector label>.edge.property.list	A semicolon-separated list of optional edge properties provided by the connector (not listing the required properties).
If a connector provides multiple node/edge tables	
<connector label>.nodes.location.<serial number>	The location of one of the connector node tables. The value can be a local file, hdfs file or hive table. NOTE: The <connector label> is one of the individual values from the connectors option. The <serial number> is a sequence number, starting from 1.
<connector label>.node.property.list.<serial number>	A semicolon-separated list of optional node properties provided in corresponding table (not listing the required properties).
<connector label>.edges.location.<serial number>	The location of one of the connector edge tables. The value can be a local file, hdfs file or hive table.
<connector label>.edge.property.list.<serial number>	A semicolon-separated list of optional edge properties provided in corresponding table (not listing the required properties).

13.1.3 Sample for etl.properties File

connectors=paradise;bahama;offshore;panama;fcdm

required.node.property.list=node_id;label;original_id

required.edge.property.list=from;to;label

optional.node.property.list=account_type;address;country;customer_type;date;industry;is_pep;jurisdiction;name;reason;risk;rule_name;source;status;List;EntityType;Aliases;Category;External Sources;Further Information;DB Customer Flag;Domicile Address Country;Registered Address Country;Tax Country;Lexis Nexis Match Flag;DB Client ID;Local Name;Naics Code;Tax ID

optional.edge.property.list=currency;date;edge_type;info;is_foreign_transaction;is_path_through_transaction;relationship;source;weight

account_type.node.property.default=

address.node.property.default=

country.node.property.default=

customer_type.node.property.default=

date.node.property.default=1970-01-01

industry.node.property.default=

is_pep.node.property.default=

jurisdiction.node.property.default=

name.node.property.default=

reason.node.property.default=

risk.node.property.default=

rule_name.node.property.default=

source.node.property.default=

status.node.property.default=

List.node.property.default=

EntityType\ Type.node.property.default=

Aliases.node.property.default=

Category.node.property.default=

External\ Sources.node.property.default=

Further\ Information.node.property.default=

DB\ Customer\ Flag.node.property.default=

Domicile\ Address\ Country.node.property.default=

Registered\ Address\ Country.node.property.default=

Tax\ Country.node.property.default=

Lexis\ Nexis\ Match\ Flag.node.property.default=


```
DB\ Client\ ID.node.property.default=  
Local\ Name.node.property.default=  
Naics\ Code.node.property.default=  
Tax\ ID.node.property.default=  
  
currency.edge.property.default=USD  
date.edge.property.default=1970-01-01  
edge_type.edge.property.default=  
info.edge.property.default=  
is_foreign_transaction.edge.property.default=false  
is_path_through_transaction.edge.property.default=false  
relationship.edge.property.default=  
source.edge.property.default=  
weight.edge.property.default=0.0  
  
account_type.node.property.rename.to=Account Type  
address.node.property.rename.to=Address  
country.node.property.rename.to=Country  
customer_type.node.property.rename.to=Customer Type  
date.node.property.rename.to=Date  
industry.node.property.rename.to=Industry  
is_pep.node.property.rename.to=Is PEP  
jurisdiction.node.property.rename.to=Jurisdiction  
name.node.property.rename.to=Name  
reason.node.property.rename.to=Reason  
risk.node.property.rename.to=Risk  
rule_name.node.property.rename.to=Rule Name  
source.node.property.rename.to=Source  
status.node.property.rename.to=Status  
  
currency.edge.property.rename.to=Currency  
date.edge.property.rename.to=Date  
edge_type.edge.property.rename.to=Edge Type  
info.edge.property.rename.to=Info  
is_foreign_transaction.edge.property.rename.to=Is Foreign Transaction  
is_path_through_transaction.edge.property.rename.to=Is Path Through Transaction
```

relationship.edge.property.rename.to=Relationship

source.edge.property.rename.to=Source

weight.edge.property.rename.to=Weight

node.id.col=node_id

edge.from.id.col=from

edge.to.id.col=to

similarity.label.edge.col=label

similarity.value.edge.col=weight

name.match.property.to.measure=name

address.match.property.to.measure=name

fcdm.nodes.location.1=hive://etlnew.fcdm_customer

fcdm.nodes.location.2=hive://etlnew.fcdm_account

fcdm.nodes.location.3=hive://etlnew.fcdm_address

fcdm.nodes.location.4=hive://etlnew.fcdm_derived_entity

fcdm.nodes.location.5=hive://etlnew.fcdm_event

fcdm.nodes.location.6=hive://etlnew.fcdm_institution

fcdm.node.property.list.1=node_id;label;original_id;name;risk;source;date;jurisdiction;industry;customer_type;is_pep

fcdm.node.property.list.2=node_id;label;original_id;name;risk;source;date;jurisdiction;account_type

fcdm.node.property.list.3=node_id;label;original_id;name;risk;source;date;jurisdiction

fcdm.node.property.list.4=node_id;label;original_id;name;risk;source;date;jurisdiction;is_pep

fcdm.node.property.list.5=node_id;label;original_id;name;risk;source;date;jurisdiction;status;reason;rule_name

fcdm.node.property.list.6=node_id;label;original_id;name;risk;source;date;jurisdiction

fcdm.edges.location.1=hive://etlnew.fcdm_end_to_end_wire

fcdm.edges.location.2=hive://etlnew.fcdm_event_on

fcdm.edges.location.3=hive://etlnew.fcdm_has_account

fcdm.edges.location.4=hive://etlnew.fcdm_is_related_to

fcdm.edges.location.5=hive://etlnew.fcdm_send_wire_to

```

fcdm.edges.location.6=hive://etlnew.fcdm_transfer_wire_to
fcdm.edges.location.7=hive://etlnew.fcdm_receive_wire_from
fcdm.edge.property.list.1=from;to;label;info;weight;currency;is_foreign_transaction;is_path_through_transaction
fcdm.edge.property.list.2=from;to;label;info;weight;currency;is_foreign_transaction;is_path_through_transaction
fcdm.edge.property.list.3=from;to;label;info;weight;currency;is_foreign_transaction;is_path_through_transaction
fcdm.edge.property.list.4=from;to;label;info;weight;currency;is_foreign_transaction;is_path_through_transaction
fcdm.edge.property.list.5=from;to;label;info;weight;currency;is_foreign_transaction;is_path_through_transaction;date
fcdm.edge.property.list.6=from;to;label;info;weight;currency;is_foreign_transaction;is_path_through_transaction;date
fcdm.edge.property.list.7=from;to;label;info;weight;currency;is_foreign_transaction;is_path_through_transaction;date

bahama.nodes.location.1=hive://etlnew.icij_bahama_external_address_insert
bahama.nodes.location.2=hive://etlnew.icij_bahama_external_entity_insert
bahama.node.property.list.1=node_id;original_id;address;jurisdiction;country;source;label
bahama.node.property.list.2=node_id;original_id;name;jurisdiction;country;source;label

bahama.edges.location.1=hive://etlnew.icij_bahama_edges_officer_of_insert
bahama.edges.location.2=hive://etlnew.icij_bahama_edges_similar_company_as_insert
bahama.edges.location.3=hive://etlnew.icij_bahama_edges_registered_address_insert
bahama.edges.location.4=hive://etlnew.icij_bahama_edges_same_address_as_insert
bahama.edges.location.5=hive://etlnew.icij_bahama_edges_same_company_as_insert
bahama.edges.location.6=hive://etlnew.icij_bahama_edges_same_intermediary_as_insert
bahama.edges.location.7=hive://etlnew.icij_bahama_edges_same_name_as_insert
bahama.edge.property.list.1=from;to;edge_type;source;label
bahama.edge.property.list.2=from;to;edge_type;source;label
bahama.edge.property.list.3=from;to;edge_type;source;label
bahama.edge.property.list.4=from;to;edge_type;source;label
bahama.edge.property.list.5=from;to;edge_type;source;label
bahama.edge.property.list.6=from;to;edge_type;source;label
bahama.edge.property.list.7=from;to;edge_type;source;label

panama.nodes.location.1=hive://etlnew.icij_panama_external_address_insert

```

```
panama.nodes.location.2=hive://etlnew.icij_panama_external_entity_insert  
panama.node.property.list.1=node_id;original_id;address;jurisdiction;country;source;label  
panama.node.property.list.2=node_id;original_id;name;jurisdiction;country;source;label
```

```
panama.edges.location.1=hive://etlnew.icij_panama_edges_intermediary_of_insert  
panama.edges.location.2=hive://etlnew.icij_panama_edges_officer_of_insert  
panama.edges.location.3=hive://etlnew.icij_panama_edges_registered_address_insert  
panama.edge.property.list.1=from;to;edge_type;relationship;source;label  
panama.edge.property.list.2=from;to;edge_type;relationship;source;label  
panama.edge.property.list.3=from;to;edge_type;relationship;source;label
```

```
paradise.nodes.location.1=hive://etlnew.icij_paradise_external_address_insert  
paradise.nodes.location.2=hive://etlnew.icij_paradise_external_entity_insert  
paradise.node.property.list.1=node_id;original_id;address;jurisdiction;country;source;label  
paradise.node.property.list.2=node_id;original_id;name;jurisdiction;country;source;label
```

```
paradise.edges.location.1=hive://etlnew.icij_paradise_edges_intermediary_of_insert  
paradise.edges.location.2=hive://etlnew.icij_paradise_edges_officer_of_insert  
paradise.edges.location.3=hive://etlnew.icij_paradise_edges_registered_address_insert  
paradise.edge.property.list.1=from;to;edge_type;relationship;source;label  
paradise.edge.property.list.2=from;to;edge_type;relationship;source;label  
paradise.edge.property.list.3=from;to;edge_type;relationship;source;label
```

```
offshore.nodes.location.1=hive://etlnew.icij_offshore_external_address_insert  
offshore.nodes.location.2=hive://etlnew.icij_offshore_external_entity_insert  
offshore.node.property.list.1=node_id;original_id;address;jurisdiction;country;source;label  
offshore.node.property.list.2=node_id;original_id;name;jurisdiction;country;source;label
```

```
offshore.edges.location.1=hive://etlnew.icij_offshore_edges_intermediary_of_insert  
offshore.edges.location.2=hive://etlnew.icij_offshore_edges_officer_of_insert  
offshore.edges.location.3=hive://etlnew.icij_offshore_edges_registered_address_insert  
offshore.edges.location.4=hive://etlnew.icij_offshore_edges_underlying_insert  
offshore.edge.property.list.1=from;to;edge_type;relationship;source;label  
offshore.edge.property.list.2=from;to;edge_type;relationship;source;label  
offshore.edge.property.list.3=from;to;edge_type;relationship;source;label
```

```
offshore.edge.property.list.4=from;to;edge_type;relationship;source;label
```

```
name.match.similarity.index.query.condition=label = 'Customer' AND name != '' AND source = 'Internal'
```

```
name.match.similarity.match.query.condition=label = 'External Entity' AND source != 'Internal'
```

```
address.match.similarity.index.query.condition=label = 'Address' AND name != '' AND source = 'Internal'
```

```
address.match.similarity.match.query.condition=label = 'External Address' AND source != 'Internal'
```

```
name.matching.value.column=name
```

```
name.matching.filter.column=source
```

```
address.matching.value.column=address
```

```
address.matching.filter.column=source
```

```
output.nodes.location=hdfs:///user/ofsa/ETL_FILES/global_graph_nodes.csv
```

```
output.edges.location=hdfs:///user/ofsa/ETL_FILES/global_graph_edges.csv
```

```
output.config.location=hdfs:///user/ofsa/ETL_FILES/config.json
```

```
output.name.index.condition=label='Customer'
```

```
output.name.index.nodes.location=hdfs:///user/ofsa/ETL_FILES/name_index.csv
```

```
output.name.index.edges.location=null://EMPTY
```

```
output.name.index.config.location=null://EMPTY
```

```
output.address.index.condition=label='Address'
```

```
output.address.index.nodes.location=hdfs:///user/ofsa/ETL_FILES/adress_index.csv
```

```
output.address.index.edges.location=null://EMPTY
```

```
output.address.index.config.location=null://EMPTY
```

13.2 Cross Language Name Matching Service

Cross Language Name Matching service matches arbitrary personal and company names provided by an analyst with personal and company names in Global Financial Graph.

- [NameMatchingLocations.properties File Details](#)
- [Sample for NameMatchingLocations.properties File](#)

13.2.1 NameMatchingLocations.properties File Details

The `NameMatchingLocations.properties` file is present in the `<Studio_Installation_Path>/configmaps/crosslangnamematch/` directory. The `NameMatchingLocations.properties` file details is explained in the following table:

Table 3 NameMatchingLocations.properties Parameters

Interaction Variable Name	Significance
<code>listen.port</code>	The port on which the server listens
<code>listen.hostname</code>	The IP address or hostname to which the server is bound to.
<code>allowed.hostnames</code>	A comma-separated list of hostnames that are allowed to communicate with the server or to allow communication with any computer.
<code>name.index.location</code>	A local filesystem or HDFS path to the file containing a list of names (and node IDs).
<code>address.index.location</code>	A local filesystem or HDFS path to the file containing a list of addresses (and node IDs).
<code>node.id.col</code>	The column name in the name and address list files containing node IDs.
<code>name.matching.value.column</code>	The column name in the name list file containing names to be indexed
<code>name.matching.filter.column</code>	The column name in the name list file containing values for source filter. This column can be used to limit the returned names to a particular data source (set of data sources).
<code>address.matching.value.column</code>	The column name in the address list file containing addresses to be indexed.
<code>address.matching.filter.column</code>	The column name in the address list file containing values for source filter. This column can be used to limit the returned address to a particular data source (set of data sources).
<code>max.matches.allowed</code>	A maximal number of results returned from the Name Matching, regardless of the input parameter. It is a protection of the server, so it is not asked to send back a million results.
<code>max.matches.default</code>	The default number of results returned from the Name Matching when no value is specified in the request.
<code>min.score.allowed</code>	Minimal similarity score allowed. The similarity score of results will always be higher than this value, regardless of the input parameter. It is a protection of the name matching server, so it will not have to examine all the string looking for matches above 0.01.

Table 3 NameMatchingLocations.properties Parameters

Interaction Variable Name	Significance
min.score.name.default	Similarity score to be used when matching names if the parameter is missing in the request.
min.score.address.default	Similarity score to be used when matching addresses if the parameter is missing in the request.
input.weight.name.default	Input weight to be used when matching names if the parameter is missing in the request. Input weight influences how much features missing in the input influence the matching score.
input.weight.address.default	Input weight to be used when matching addresses if the parameter is missing in the request.
ssl.enabled	Flag to indicate whether communication will be SSL encrypted.
keystore.file.path	If SSL encryption is enabled, provide a path to the keystore file. Else ignore this parameter.
keystore.password	If SSL encryption is enabled, provide a password to the keystore file. Else ignore this parameter.
trusted.store.file.path	If SSL encryption is enabled, provide a path to the keystore file. Else ignore this parameter.
trusted.store.password	If SSL encryption is enabled, provide a password to the keystore file. Else ignore this parameter.

13.2.2 Sample for NameMatchingLocations.properties File

```
listen.port=7023
listen.hostname=0.0.0.0
allowed.hostnames=*
name.index.location=hdfs:///user/ofsa/ETL_FILES/name_index.csv
address.index.location=hdfs:///user/ofsa/ETL_FILES/adress_index.csv
node.id.col=node_id
name.matching.value.column=name
name.matching.filter.column=source
address.matching.value.column=address
address.matching.filter.column=sources
ssl.enabled=false
keystore.file.path=/configurations/certificates/key.store.jks
keystore.password=password
trusted.store.file.path=/configurations/certificates/trusted.store.jks
```

trusted.store.password=password

14 Adding Packages to Python Interpreter

To add packages to the python interpreter in FCC Studio, follow these steps:

1. Create a folder at the same location as the `<Studio_Installation_Path>`, and create a file inside the folder with the file name, `Dockerfile`.
2. Copy and paste the following content as a template into the `Dockerfile` file:

```
FROM ofsaa-fccm-docker-release-local.dockerhub-den.oraclecorp.com/fcc-studio/fcc-
python:8.0.7.2.0

USER root

RUN pip3 install scipy pandas cx_oracle

USER interpreteruser
```

3. Modify the `Dockerfile` file depending on the following installation method:
 - a. If Internet connectivity is available, follow these steps:

Depending on the version of the Python package, install the Python packages, `scipy` and `cx_oracle` as follows:

```
RUN pip install scipy cx_oracle

or

RUN pip3 install scipy cx_oracle
```

NOTE Ensure to use `pip` for Python2, and `pip3` for Python3..

- b. If Internet connectivity is unavailable, and you have downloaded files of Python packages, follow these steps:

- i. Place the downloaded file(s) in the folder beside the `Dockerfile` file.
 - ii. Execute the shell command to install the offline Python packages.

For example, to install using Python3:

```
RUN pip3 install --no-deps numpy-1.17.4-cp36-cp36m-manylinux1_x86_64.whl
```

- c. Build the docker image using the following command:

```
docker build . --build-arg http_proxy=http://<proxy-url>:<port> --build-arg
https_proxy=http://<proxy_url>:<port> -t <my.docker-registry.com:port>/ofsaa-
fccm-docker-release-local.dockerhub-den.oraclecorp.com/fcc-studio/fcc-
python:<version>
```

Where:

`<my.docker-registry.com:port>` is the docker-registry url with port number and `<version>` is the custom tag for this image.

For example:

```
docker build . --build-arg http_proxy=http://my-proxy-url:80 --build-arg
https_proxy=http://my-proxy-url:80 -t my.docker-registry.com:5000/ofsaa-fccm-
docker-release-local.dockerhub-den.oraclecorp.com/fcc-studio/fcc-
python:8.0.7.2.0-C1
```

- d. Push the images using the following command:

```
docker push <my.docker-registry.com:port>/ofsaa-fccm-docker-release-local.dockerhub-  
den.oraclecorp.com/fcc-studio/fcc-python:<version>
```

4. Update the image name in the `fcc-python.yml` file available in the `<Studio_Installation_path>/deployments/fcc-python.yml` directory:

```
spec:
```

```
  spec:
```

```
    containers:
```

```
      - name: python-interpreter
```

```
        image: ofsaa-fccm-docker-release-local.dockerhub-den.oraclecorp.com/fcc-  
studio/fcc-python:<version>
```

5. Restart the FCC Studio application.

- a. Execute the following command from the Kubernetes master node:

```
kubectl delete namespace fccs
```

- b. Navigate to the `<Studio_Installation_Path>/bin` directory.

- c. Execute the following command:

```
./fcc-studio.sh --registry <registry URL>:<registry port>
```

The desired packages are added to the python interpreter.

15 Setting up Login Credentials for Notebook Execution

To set up login credentials for notebook execution, follow these steps:

1. Navigate to the `<Studio_Installation_Path>/ficdb/bin` directory.
2. Run the `FCCM_Studio_Set_UserPass.sh` command as follows:

```
FCCM_Studio_Set_UserPass.sh --username "Username" --password "Password"
```

The `FCC_Studio_SecretKey.properties` and `NBExecutor.txt` files are created in the `<Studio_Installation_Path>/ficdb/conf` directory.

NOTE

1. Ensure that the `FCC_Studio_SecretKey.properties` and `NBExecutor.txt` files are present in the `<Studio_Installation_Path>/ficdb/conf` directory, before executing a notebook batch.
2. If only the `NBExecutor.txt` file is present in the `<Studio_Installation_Path>/ficdb/conf` directory, then re-execute the `FCCM_Studio_Set_UserPass.sh` command with username and password to create a new `FCC_Studio_SecretKey.properties` file and updated `NBExecutor.txt` file.

