

**Oracle® Financial Services Crime and
Compliance Studio Application**

Installation Guide

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Document Control

Version Number	Revision Date	Changes Done
8.0.7.0.0	Created: November 2019	Created the first version of Oracle Financial Services Crime and Compliance Studio Deployment Guide for 8.0.7..0 Release.
8.0.7.1.0	Updated: October 2019	Updated the guide with the following newly introduced Studio services: <ul style="list-style-type: none">• ETL• Data Forwarding• Cross Language Name Matching For more information, see Installing ETL Services .

Preface

Summary

Before you begin the installation, ensure that you have access to the Oracle Support Portal with valid login credentials to quickly notify us of any issues at any stage. You can obtain the login credentials by contacting the Oracle Support.

Audience

This document is intended for System Engineers who are responsible for installing and configuring the OFS Crime and Compliance Studio application.

The document assumes that you have experience in installing Enterprise components. The basic knowledge of the following is recommended:

- UNIX commands
- Database concepts
- Big Data

Related Documents

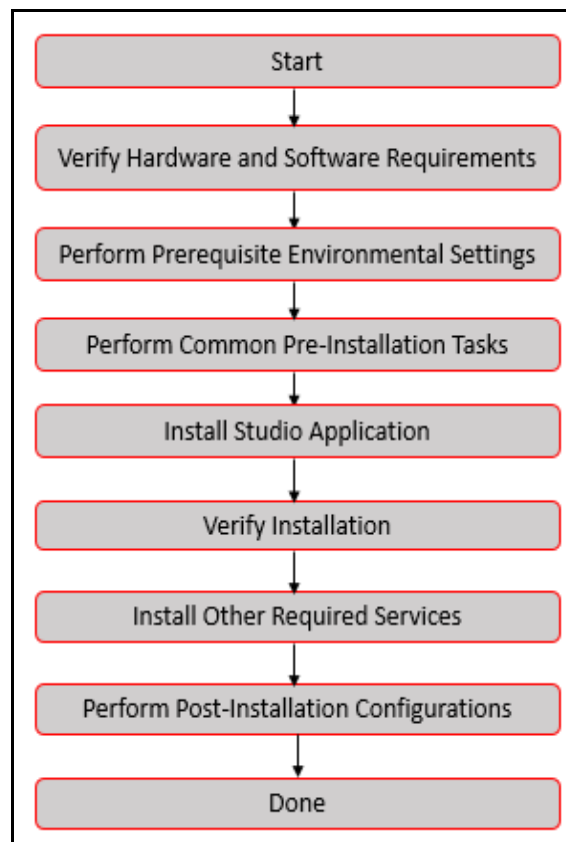
- You can access the additional documents related to the OFS Crime and Compliance Studio application from the [Oracle Help Center \(OHC\)](#) Documentation Library.
- *Oracle Financial Services Crime and Compliance Studio Deployment Guide (Using Kubernetes)*
- *Oracle Financial Services Crime and Compliance Studio Administration Guide*
- *Oracle Financial Services Crime and Compliance Studio User Guide*

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

Installation Overview

Figure 1–1 shows the sequence of steps to follow to install a new instance of the Studio application.

Figure 1–1 *Installation Overview*



The following table provides additional information on the documentation required for each step mentioned in the flowchart.

Table 1–1 Studio Application Installation Tasks and Descriptions

Tasks	Details and Documentation
Verify Hardware and Software Requirements	To verify if your system contains the necessary hardware and software required for installing and hosting the Studio application, see Hardware and Software Requirements
Perform Prerequisite Environment Settings	To perform the prerequisite environmental settings, see Prerequisite Environmental Settings .
Perform Common Pre-Installation Tasks	To perform the common pre-installation tasks, see Performing Common Pre-Installation Tasks .
Install Studio Application	To install the Studio application, see, Installing the Studio Application
Verify Installation	To verify the installation, see Verifying the Installation .
Install Other Required Services	To install additional services required for the Studio application, see Installing PGX and Installing ETL Services
Perform Post-Installation Configuratiосn	To perform the post-installation configuration, see Post-Installation Configurations

Preparing for Installation

This chapter provides the necessary information to review before installing the OFS Crime and Compliance Studio application. It includes the following sections:

- [Prerequisites](#)
- [Hardware and Software Requirements](#)
- [Prerequisite Environmental Settings](#)
- [Performing Common Pre-Installation Tasks](#)

Prerequisites

The BD Application Pack must be installed.

Hardware and Software Requirements

The hardware and software required to install Studio are as follows:

Table 2–1 Hardware and Software Requirements

Hardware/Software Category	Component Version
Browser	<ul style="list-style-type: none"> • Chrome 57.x • Firefox 52.x
Java Version	java 8
Processing Server	<ul style="list-style-type: none"> • RHEL 7.4+ • SFTP • Oracle JRE Standard Edition 1.8.x(with JCE)
Database Server	<ul style="list-style-type: none"> • Oracle Database Server 12c Release 2 (12.2.0.1+) Enterprise Edition • Oracle R Enterprise 1.5.1 with Oracle R Distribution 3.3.0
PGX (Graph) Server	RHEL 7.4+

Table 2–1 (Cont.) Hardware and Software Requirements

Hadoop Cluster	<ul style="list-style-type: none"> • HDP Version 2.5 • Hadoop-2.7.3+hdp2.5+844 • Hive-1.2.1+hdp2.5+350 • Sqoop1 V 1.4.4+hdp2.5+67 • Sqoop2 V 1.99.4+hdp2.5+23 • Oracle Loader For Hadoop (OLH) V 3.2 • Hive JDBC Connectors V 2.5.15 • Spark 2.4.0
ETL Namematching Server	RHEL 7.4+
BIG DATA	
Cloudera Distribution Hadoop 5.12	<ul style="list-style-type: none"> • CDH Version 5.12 • Hadoop-2.5.0+cdh5.3.3+844 • Hive-0.13.1+cdh5.3.3+350 • Sqoop1 V 1.4.4+cdh5.3.3+67 • The <code>.profile</code> file must be present with the <code>SPARK_HOME</code> and <code>PYTHON_HOME</code> parameters already set. • Set <code>spark2-shell</code> alias in the <code>.profile</code> file as follows: <pre>alias spark2-shell=spark-shell</pre>
Cloudera Hive Connectors	Hive JDBC Connectors V 2.5.15
Hadoop Security Protocol	<ul style="list-style-type: none"> • Kerberos R release 1.6.1 • Sentry-1.4.0

Prerequisite Environmental Settings

The prerequisite environmental settings to be performed before beginning the installation of Studio are as follows:

Table 2–2 Prerequisite Information

Category	Expected Value
PGX Settings	PGX version 19.2.1 Set the following paths in the environment variables in the <code>.profile</code> file: <ul style="list-style-type: none"> • <code>PGX_HOME</code>: Indicates the path of the server where PGX client is installed. For more information, see Installing PGX. • <code>PGX_TMP_DIR</code>: Indicates the path of the PGX temporary directory. • <code>SPARK_HOME</code>: Indicates the path where <code>SPARK_HOME</code> is installed by the client.
Java Settings	<ul style="list-style-type: none"> • <code>PATH</code> in the <code>.profile</code> file must be set to include the Java Runtime Environment (java 8) absolute path. <p>Note:</p> <ul style="list-style-type: none"> • Ensure the absolute path to <code>JRE/bin</code> is set at the beginning of the <code>PATH</code> variable. For example, <code>PATH=/usr/java/jre1.8/bin:\$PATH</code> • Ensure no <code>SYMBOLIC</code> links to <code>JAVA</code> installation are set in the <code>PATH</code> variable.

Table 2–2 (Cont.) Prerequisite Information

Category	Expected Value
ETL Services	<p>The following packages must be installed or present in the server where ETL services will be deployed:</p> <ul style="list-style-type: none"> • krb5-libs • krb5-workstation • procps-ng • nc <p>Execute the following command to install the above-mentioned packages:</p> <pre>yum install -y krb5-libs krb5-workstation procps-ng nc</pre> <p>For information on installing ETL Services, see Installing ETL Services.</p>
Oracle Database Settings	<p>Note: This setting is required only if the Wallet has to be created on the same server as that of the Studio server.</p> <p>Oracle Processing Server</p> <ul style="list-style-type: none"> • ORACLE_HOME must be set in the .profile file pointing to the appropriate Oracle DB Client installation. • PATH in the .profile file must be set to include the appropriate \$ORACLE_HOME/bin directory.
Download Directory	<p>Indicates the directory where the product installer zip file will be downloaded/ copied. The user permission must be set to 755 for this Download directory.</p>
Installation Directory	<p>Indicates the directory where the product installer zip file is extracted and the installation files will be placed. The user permission must be set to 755 for this installation directory.</p> <p>Note: The Installation and the Download Directory can be the same if the product installer zip file is not copied separately to another directory.</p>
OS Locale	<p>Linux: en_US.utf8</p> <p>To check the locale installed, execute the following command:</p> <pre>locale -a grep -i 'en_US.utf'</pre> <p>The installed locale is displayed.</p>
Studio Schema	<ol style="list-style-type: none"> 1. Create a new Oracle Database schema user using the following script: <pre>CREATE USER <Studio Schema User Name> IDENTIFIED BY <Password>;</pre> A new Oracle Database schema is created. 2. Grant the permissions that are given in the next row. This newly created schema is referred to as Studio Schema.

Table 2–2 (Cont.) Prerequisite Information

Category	Expected Value
Oracle Database Schema Settings	<p>Grant the following permissions to the newly created Oracle Database Schema:</p> <pre>GRANT create session TO <Studio Schema User>; GRANT create table TO <Studio Schema User>; GRANT create view TO <Studio Schema User>; GRANT create any trigger TO <Studio Schema User>; GRANT create any procedure TO <Studio Schema User>; GRANT create sequence TO <Studio Schema User>; GRANT execute on dbms_ols TO <Studio Schema User>; GRANT execute on sys.dbms_session TO <Studio Schema User>; ALTER USER <Studio Schema User> QUOTA 100M ON users; GRANT create sequence TO <Studio Schema User>; GRANT create SYNONYM TO <Studio Schema User>; GRANT create any context TO <BD Schema User>; GRANT execute on dbms_ols TO <BD Schema User>; GRANT ALL privileges TO <Studio Schema User>;</pre>
Wallet Settings	<p>Set a password store with Oracle Wallet. For more information, see Appendix C, "Setting Up Password Stores with Oracle Wallet"</p>
Interpreter Settings	<p>Note: Perform the following pre-requisite settings only for the interpreters that you need.</p> <ul style="list-style-type: none"> • fcc-jdbc: No additional configuration is required. • fcc-ore. For more information, see Appendix D, "Installing RServe Manually". • pgx: No additional configuration is required. • fcc-pyspark <ul style="list-style-type: none"> • Install the py4j package in the spark cluster. • Install the Livy server (0.5.0) on the master node of the Big Data cluster. • fcc-python. <ul style="list-style-type: none"> • Install the py4j package. • fcc-spark-scala <ul style="list-style-type: none"> • Install the Livy server (0.5.0) on the master node of the Big Data cluster. • fcc-spark-sql <ul style="list-style-type: none"> • Install the Livy server (0.5.0) on the master node of the Big Data cluster. <p>Note: Livy server must be installed as per the configuration of the Big Data server.</p>

Performing Common Pre-Installation Tasks

The common pre-installation tasks that you must perform before installing Studio are as follows:

- [Obtaining the Software](#)
- [Extracting the Software](#)

- [Required File Structure](#)

Obtaining the Software

To download and copy the Studio application installer software, follow these steps:

1. Login to [My Oracle Support](#) with a valid Oracle account and search for the Bug ID **30437775** under the *Patches & Updates* tab.
2. Download the installer archive `OFS_FCCM_STUDIO_8.0.7.1.0_LINUX.zip` file to the download directory (in Binary Mode) on the setup identified for Studio installation.

Extracting the Software

1. Extract the contents of the `OFS_FCCM_STUDIO-8.0.7.1.0_Linux.zip` installer archive file in the download directory using the following command:

```
unzip -a OFS_FCCM_STUDIO_8.0.7.1.0_LINUX.zip
```

The Studio installer file is extracted and the `OFS_FCCM_STUDIO` folder is obtained. The `OFS_FCCM_STUDIO` folder will be referred to as `<Studio_Installation_Path>`.

Note:

Do not rename the Application installer folder name on extraction from the archive.

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

```
chmod 0755 OFS_FCCM_STUDIO-8.0.7.1.0_Linux -R
```

Required File Structure

The Studio application must be installed with certain additional services such as Cross Language Name Matching, Data Forwarding Service, ETL, and Hadoop/Spark services.

To install the additional services, you must obtain the required configuration files as follows from the Big Data installation path.

Note:

These files must be kept ready and provided in the following file structure which will be used during Studio installation.

- Hadoop Cluster
 - `core-site.xml`
 - `hadoop-env.sh`
 - `hdfs-site.xml`
 - `hive-env.sh`
 - `hive-site.xml`
 - `log4j.properties`
 - `mapred-site.xml`
 - `redaction-rules.json`

- spark-defaults.conf
- spark-env.sh
- ssl-client.xml
- topology.map
- topology.py
- yarn-site.xml
- Kerberos Files
 - krb5.conf
 - ofsaa.keytab

Note:

Rename your .keytab file to ofsaa.keytab.

- Certificates
 - key.store.jks
 - trusted.store.jks
- Additional Jars
 - hive-exec-1.1.0-cdh5.13.0.jar
 - HiveJDBC4.jar
 - hive-metastore-1.1.0-cdh5.13.0.jar
 - hive-service-1.1.0-cdh5.13.0.jar

Note:

- The version of the jars will be client/user-specific. These jars can be obtained from existing jars of Cloudera installation.
 - The HiveJDBC4.jar file is not available in the Cloudera setup. You must download the same from the Cloudera website.
-
-

Installing the Crime and Compliance Studio Application

This chapter provides the necessary information to install the Crime and Compliance Studio application. It includes the following topics:

1. [Installing the Studio Application](#)
2. [Verifying the Installation](#)
3. [Installing PGX](#)
4. [Installing ETL Services](#)
5. [Launch FCC Studio Application](#)

Installing the Studio Application

To install the Studio application, follow these steps:

1. [Placing Required Files](#)
2. [Configuring the config.sh File](#)
3. [Running the Installer](#)

Placing Required Files

To install Studio, you must obtain and place the required files in the required locations.

1. To place the additional jar files, follow these steps:
 1. Navigate to the `<Studio_Installation_Path>/batchservice/user/lib` directory.
 2. Place the following additional jar files:
 - `hive-exec-1.1.0-cdh5.13.0.jar`
 - `HiveJDBC4.jar`
 - `hive-metastore-1.1.0-cdh5.13.0.jar`
 - `hive-service-1.1.0-cdh5.13.0.jar`

Note: •The version of the jars will be client/user-specific. These jars can be obtained from existing jars of Cloudera installation.

- The `HiveJDBC4.jar` file is not available in the Cloudera setup. You must download the same from the Cloudera website.
-
-

2. To place the Kerberos Files, follow these steps:
 1. Navigate to the <Studio_Installation_Path>/batchservice/user/conf directory.
 2. Place the following Kerberos files:
 - krb5.conf
 - ofsa. keytab

Configuring the config.sh File

To configure the config.sh file, follow these steps:

1. Login to the server as a non-root user.
2. Navigate to the <Studio_Installation_Path>/bin/config.sh file.
3. Configure the config.sh file as mentioned in Table 3–1, "config.sh Parameters".

You must manually set the InteractionVariable parameter values as mentioned in Table 3–1.

1. If a value is not applicable, enter NA and ensure that the value is not entered as NULL.

Note:

- Depending upon the installation architecture, ensure to enter the correct hostname for URL of ETL and PGX services in the config.sh file.
 - Do not alter the parameter values that are already set in the config.sh file.
-
-

Table 3–1 config.sh Parameters

InteractionVariable Name	Significance	Used for Hive DataBase	Used for Oracle Database
FCC_STUDIO_INSTALLATION_PATH	Indicates the path where Studio is extracted.	Yes	Yes
External Services			
OFSAA_SERVICE_URL	Indicates the URL of the OFSAA instance. Do not enter '/' at the end of the URL. Note: <ul style="list-style-type: none"> • For OFSAAAI, the value must be set in the following format: https://<HostName>:<PortNo>/<ContextName>/rest-api 	Yes	Yes
PGX_SERVER_URL	Indicates the URL of the PGX server. Example: http://<HostName>:<PortNo>/ The value for PortNo must be 7007.	Yes	Yes
LIVY_HOST_URL	Indicates the URL of the Livy application. The format for the URL is as follows: http://<HostName>:<PortNo>	Yes	No
Internal Services			

Table 3–1 (Cont.) config.sh Parameters

InteractionVariable Name	Significance	Used for Hive DataBase	Used for Oracle Database
AUTH_SERVICE_URL	Indicates the AUTH service URL which will get activated once the <code>fcc-studio.sh</code> file runs. The format for the auth service URL is as follows: <code>http://<HostName>:7041/authservice</code>	Yes	Yes
BATCH_SERVICE_URL	Indicates the batch service URL which will get activated once the <code>fcc-studio.sh</code> file runs. The format for the batch service URL is as follows: <code>http://<HostName>:7043/batchservice</code>	Yes	Yes
META_SERVICE_URL	Indicates the metaservice URL which will get activated once the <code>fcc-studio.sh</code> file runs. The format for the metaservice URL is as follows: <code>http://<HostName>:7045/metaservice</code>	Yes	Yes
SESSION_SERVICE_URL	Indicates the session service URL which will get activated once the <code>fcc-studio.sh</code> file runs. The format for the session service URL is as follows: <code>http://<HostName>:7047/session-service</code>	Yes	Yes
ETL_SERVICE_URL	Indicates the ETL Service URL.	Yes	Yes
FCC_STUDIO_URL	Indicates the Studio URL. The format for the FCC Studio URL is as follows: <code>http://<HostName>:7008</code>	Yes	Yes
ORE Interpreter Settings			
RSERVE_USERNAME	Indicates the RServe username.	No	Yes If the ORE interpreter is to be used.
RSERVE_PASSWORD	Indicates the RServe password.	No	Yes If the ORE interpreter is to be used.
HTTP_PROXY	Indicates the HTTP proxy.	No	Yes If the ORE interpreter is to be used.
HTTPS_PROXY	Indicates the HTTPS proxy.	No	Yes If the ORE interpreter is to be used.
REPO_CRAN_URL	Indicates the URL from where the R packages are obtained. The format for the REPO_CRAN_URL is as follows: https://cran.r-project.org/	No	Yes If the ORE interpreter is to be used.

Table 3–1 (Cont.) *config.sh* Parameters

InteractionVariable Name	Significance	Used for Hive DataBase	Used for Oracle Database
USERS_LIB_PATH	Indicates the path where the R packages will be installed.	No	Yes If the ORE interpreter is to be used.
RSERVE_CONF_PATH	Indicates the path where the <code>Rserve.conf</code> file is present.	No	Yes If the ORE interpreter is to be used.
DB Details for Studio Schema			
STUDIO_DB_HOSTNAME	Indicates the hostname of the database where Studio schema is created.	Yes	Yes
STUDIO_DB_PORT	Indicates the port number where Studio schema is created.	Yes	Yes
STUDIO_DB_SERVICE_NAME	Indicates the service name of the database where Studio schema is created.	Yes	Yes
STUDIO_DB_SID	Indicates the SID of the database where Studio schema is created.	Yes	Yes
STUDIO_DB_USERNAME	Indicates the username of the Studio Schema (newly created Oracle Schema).	Yes	Yes
STUDIO_DB_PASSWORD	Indicates the password for the newly created schema.	Yes	Yes
Studio DB Wallet Details			
STUDIO_ALIAS_NAME	Indicates the Studio alias name. For more information, see Appendix C, "Setting Up Password Stores with Oracle Wallet,"	Yes	Yes
STUDIO_WALLET_LOCATION	Indicates the Studio wallet location. For more information, see Appendix C, "Setting Up Password Stores with Oracle Wallet,"	Yes	Yes
STUDIO_TNS_ADMIN_PATH	Indicates the path of the <code>tnsnames.ora</code> file where an entry for the <code>STUDIO_ALIAS_NAME</code> is present. For more information, see Appendix C, "Setting Up Password Stores with Oracle Wallet,"	Yes	Yes
DB Details for BD Config Schema			
BD_CONFIG_HOSTNAME	Indicates the hostname of the database where BD config schema is installed.	Yes	Yes
BD_CONFIG_PORT	Indicates the port of the database where BD config schema is installed.	Yes	Yes
BD_CONFIG_SERVICE_NAME	Indicates the service name of the database where BD config schema is installed.	Yes	Yes
BD_CONFIG_SID	Indicates the SID of the database where BD config schema is installed.	Yes	Yes
BD_CONFIG_USERNAME	Indicates the username for the BD config schema.	Yes	Yes
BD_CONFIG_PASSWORD	Indicates the password for the BD config schema.	Yes	Yes
BD Config Wallet Details			

Table 3-1 (Cont.) config.sh Parameters

InteractionVariable Name	Significance	Used for Hive DataBase	Used for Oracle Database
BD_CONFIG_ALIAS_NAME	Indicates the BD config alias name. For more information, see Appendix C, "Setting Up Password Stores with Oracle Wallet,"	Yes	Yes
BD_CONFIG_WALLET_LOCATION	Indicates the BD config wallet location. For more information, see Appendix C, "Setting Up Password Stores with Oracle Wallet,"	Yes	Yes
BD_CONFIG_TNS_ADMIN_PATH	Indicates the path of the tnsnames.ora file where an entry for the BD_CONFIG_ALIAS_NAME is present. For more information, see Appendix C, "Setting Up Password Stores with Oracle Wallet,"	Yes	Yes
DB Details for BD Atomic Schema			
BD_ATOMIC_HOSTNAME	Indicates the BD atomic schema hostname.	Yes	Yes
BD_ATOMIC_PORT	Indicates the BD atomic schema port number.	Yes	Yes
BD_ATOMIC_SERVICE_NAME	Indicates the BD atomic schema service name.	Yes	Yes
BD_ATOMIC_SID	Indicates the BD atomic schema SID.	Yes	Yes
BD_ATOMIC_USERNAME	Indicates the username of the BD atomic schema.	Yes	Yes
BD_ATOMIC_PASSWORD	Indicates the password of the BD atomic schema.	Yes	Yes
BD Atomic Wallet Details			
BD_ATOMIC_ALIAS_NAME	Indicates the BD atomic alias name. For more information, see Appendix C, "Setting Up Password Stores with Oracle Wallet,"	Yes	Yes
BD_ATOMIC_WALLET_LOCATION	Indicates the BD atomic wallet location. For more information, see Appendix C, "Setting Up Password Stores with Oracle Wallet,"	Yes	Yes
BD_ATOMIC_TNS_ADMIN_PATH	Indicates the path of the tnsnames.ora file where an entry for the BD_ATOMIC_ALIAS_NAME is present. For more information, see Appendix C, "Setting Up Password Stores with Oracle Wallet,"	Yes	Yes
SQL Scripts			
FSINFODOM	Indicates the name of the BD Infodom.	Yes	Yes
FSSEGMENT	Indicates the name of the BD segment.	Yes	Yes
DATAMOVEMENT_LINK_NAME	<ul style="list-style-type: none"> If the newly created schema is in a different database host, then you must create a DB link and provide the same link in this parameter. If no DB link is present then provide the <SCHEMA_NAME> in this parameter. If the newly created schema is in the same database host, the value for this parameter will be the user name of the BD atomic schema. 	Yes	Yes
DATAMOVEMENT_LINK_TYPE	If the DB link is used, enter DBLINK in this field. If the DB link is not used, enter SCHEMA in this field.	Yes	Yes
PGX Setup Details			

Table 3–1 (Cont.) config.sh Parameters

InteractionVariable Name	Significance	Used for Hive DataBase	Used for Oracle Database
PGX_INSTALLATION_PATH	Indicates the installation path of the PGX server. Example: <STUDIO_INSTALLATION_PATH>/pgx/server/pgx-19.2.1	Yes	Yes
PGX_PGB_PATH	Indicates the path where you want to obtain the output graph PGB file. Example for Hive Installation: hdfs: /user/ofsa Example for Oracle DB Installation: /scratch/ofsa	Yes	Yes
Cloudera Setup Details			
HADOOP_CREDENTIAL_PROVIDER_PATH	Indicates the path where Hadoop credential is stored. Note: Indicates the Hadoop alias given while creating the Hadoop credentials. For information on how to create a credential keystore, see Creating Credential Keystore .	Yes	No
HADOOP_PASSWORD_ALIAS	Indicates the Hadoop alias given while creating the Hadoop credentials.	Yes	No
Hive_Host_Name	Indicates the Hive hostname.	Yes	No
Hive_Port_number	Indicates the Hive port number. Contact System Administrator to obtain the port number.	Yes	No
HIVE_PRINCIPAL	Indicates the Hive Principal. Contact System Administrator to obtain HIVE_PRINCIPAL.	Yes	No
HIVE_SCHEMA	Indicates to create a schema in HIVE.	Yes	No
JAAS_CONF_FILE_PATH	Created for future use.	No	No
Krb_Host_FQDN_Name	Indicates the Krb host FQDN name.	Yes	No
Krb_Realm_Name	Indicates the Krb realm name.	Yes	No
Krb_Service_Name	Indicates the Krb service name. Example, Hive	Yes	No
KRB5_CONF_FILE_PATH	Created for future use.	No	No
security_krb5_kdc_server	Created for future use.	No	No
security_krb5_realm	Created for future use.	No	No
server_kerberos_keytab_file	Created for future use.	No	No
server_kerberos_principal	Created for future use.	No	No
SQOOP_HOSTMACHINE_USER_NAME	Indicates the user name of the Host machine where sqoop will run.	Yes	No

Table 3–1 (Cont.) config.sh Parameters

InteractionVariable Name	Significance	Used for Hive DataBase	Used for Oracle Database
SQOOP_PARAMFILE_PATH	<ol style="list-style-type: none"> 1. Create a file with the name <code>sqoop.properties</code> in the Big Data server and make the following entry: <code>oracle.jdbc.mapDateToTimestamp=false</code> 2. Enter the location of the <code>sqoop.properties</code> file in the <code>SQOOP_PARAMFILE_PATH</code> parameter. Example, <code>/scratch/ofsaas/</code> Note: Ensure that the location name ends with a <code>'/'</code>. 	Yes	No
SQOOP_PARTITION_COL	Indicates the column in which the HIVE table is partitioned. The value must be <code>SNAPSHOT_DT</code> .	Yes	No
SQOOP_TRG_HOSTNAME	Indicates the hostname of the SQOOP server. Example, <code><HostName></code>	Yes	No
SQOOP_WORKDIR_HDFS	Indicates the SQOOP working directory in HDFS. Example, <code>/user/ofsaas</code>	Yes	No

Running the Installer

To run the installer, follow these steps:

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

```
./install.sh
```

Note: Execution of `install.sh` command does not generate any log file.

3. Execute the following command in the console:

```
./fcc_studio.sh
```

The OFS Crime and Compliance Studio application is installed. The Data Studio and all the interpreters are started.

After the successful completion of Studio, the script displays a URL. You can use this URL to launch the FCC Studio Application. For more information, see [Launch FCC Studio Application](#).

For restarting the Studio application, see [Starting/Stopping Studio](#).

4. Verify the Installation. See [Verifying the Installation](#)

Verifying the Installation

To verify the installation, check the log files located in the `<STUDIO_INSTALLATION_PATH>/logs` directory.

If all the servers are up and running, it indicates that the installation is complete.

Note: Any errors encountered in the process is displayed with an appropriate error code in the log file. Do not proceed with the further installation and contact Oracle Support with relevant log files.

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

Installing PGX

Note: PGX can be installed on the same server where Studio is installed or on a different server.

To install PGX, follow these steps:

1. Navigate to the `<Studio_Installation_Path>/pgx/server/` directory.
2. Perform the following:
 - If PGX is to be installed on the same server where Studio is installed, then unzip the `pgx-distribution-19.2.1-server.zip` file.
 - If PGX is to be installed on a different server, follow these steps:
 1. Copy the `pgx-distribution-19.2.1-server.zip` file to the PGX server.
 2. Unzip the `pgx-distribution-19.2.1-server.zip` file.

Note: The path where the `pgx-distribution-19.2.1-server.zip` file is unzipped, will be referred to as `<PGX_Installation_Path>`.

3. Navigate to the `<PGX_Installation_Path>/pgx-19.2.1/conf` directory.
4. Configure the following properties as per the requirement:
 - In the `server.conf` file, set the following:

```
enable_tls: false,  
enable_client_authentication: false
```
 - In the `pgx.conf` file, set the following:

```
allow_local_filesystem: true
```

Here, true indicates to enable, and false indicates to disable.
5. Start the PGX service. For more information, see [Starting/Stopping PGX Service](#).

Installing ETL Services

Installing the ETL service will also install the Data Forwarding and Cross Language Name Matching services.

To install ETL Services, follow these steps:

1. [Configuring ETL Services](#)
2. [Configuring FILEPATH for ICIJ](#)

Configuring ETL Services

Note:

- ETL can be installed on the same server where Studio is installed or on a different server.
 - The following packages should be installed or present in the server where ETL services will be installed:
 - krb5-libs
 - krb5-workstation
 - procps-ng
 - nc
 - Execute the following command to install the above-mentioned packages:


```
yum install -y krb5-libs krb5-workstation procps-ng nc
```
-
-

To install ETL, follow these steps:

1. Navigate to the `<STUDIO_INSTALLATION_PATH>/etl/bin/` directory.
2. Perform the following:
 - If ETL is to be installed on the same server where Studio is installed, then unzip the `OFS_FCCM_STUDIO_ETL-8.0.7.1.0.zip` file.
 - If ETL is to be installed on a different server, follow these steps:
 1. Copy the `OFS_FCCM_STUDIO_ETL-8.0.7.1.0.zip` file to the ETL server.
 2. Unzip the `OFS_FCCM_STUDIO_ETL-8.0.7.1.0.zip` file.

Note: The path where the `OFS_FCCM_STUDIO_ETL-8.0.7.1.0.zip` file is unzipped, will be referred to as `<ETL_INSTALLATION_PATH>`.

3. Navigate to `<ETL_INSTALLATION_PATH>/etl/bin` directory.
4. Configure the `config.sh` file as described in the following table:

Table 3–2 *config.sh* for ETL Services

Interaction Variable Name	Significance
ETL Services	
CROSSLANGNAMEMATCH_SERVICE_URL	Indicates the URL for the Cross language Name Matching service. For example, <code>http://<HostName>:7023</code>
ETL_SERVICE_URL	Indicates the URL for the ETL service. For example, <code>http://<HostName>:7024</code>
HIVE_SCHEMA	Indicates the Hive schema as configured in the <code><Studio_Installation_Path>/bin/config.sh</code> file.
ETL_DRIVER_CORES	Indicates the number of cores present on the ETL Initiation machine host (master of CDH server) that is present/accessible on the server where ETL services are deployed.

Table 3–2 *config.sh* for ETL Services

Interaction Variable Name	Significance
ETL_DRIVER_MEMORY	Indicates how much memory is to be assigned to the ETL service. Note: Ensure that the memory is slightly less than that of the ETL Initiation machine host. For example, 90g.
URL_GLOBAL_GRAPH_NODES_CSV	Indicates the HDFS URL where the CSV file of the global graph will be stored at the end of the ETL. It can either be a local or hdfs path. For example, <code>hdfs:///user/ofsa/ETL_Directory/global_graph_nodes.csv</code> Note: Ensure you have already created the <code>ETL_Directory</code> manually and have provided 775 permission. This directory will be used to store the CSV file at the end of the ETL.
URL_GLOBAL_GRAPH_EDGES_CSV	Indicates the HDFS URL where the CSV file of the global graph will be stored at the end of the ETL. It can either be a local or hdfs path. For example, <code>hdfs:///user/ofsa/STUDIO_ETL/global_graph_edges.csv</code> Note: Ensure this location is already created and available to store the CSV file at the end of the ETL.
URL_GLOBAL_GRAPH_CONFIG_JSON	Indicates the HDFS URL where the PGX graph configuration .json file will be stored at the end of the ETL. The location can be either local or hdfs path. For example, <code>hdfs:///user/ofsa/STUDIO_ETL/config.json</code> Note: Ensure this location is already created and available to store the JSON file at the end of the ETL. If you do not want a graph configuration file written, provide the value as follows: <code>null://EMPTY</code>
URL_GLOBAL_GRAPH_CONFIG_TEMPLATE_JSON	Indicates the information about the <code>output.config.template.location</code> parameter in the <code>etl.properties</code> file. Note: Ensure this location is already created and available to store the JSON file at the end of the ETL.
URL_NAMES_CSV	Indicates the HDFS URL where the names CSV file will be updated at the end of the ETL. It can either be a local or hdfs path. For example, <code>hdfs:///user/ofsa/STUDIO_ETL/name_index.csv</code> Note: Ensure this location is already created and available, and the CSV file is already created and placed in this location. The CSV file values will be replaced with the values in the new CSV file created at the end of the ETL. For information on creating the CSV files, see Appendix E, "Creating Required Index Files" .
URL_ADDRESS_CSV	Indicates the HDFS URL where the addresses CSV file will be updated at the end of the ETL. It can either be a local or hdfs path. For example, <code>hdfs:///user/ofsa/STUDIO_ETL/address_index.csv</code> Note: Ensure this location is already created and available, and the CSV file is already created and placed in this location. The CSV file values will be replaced with the values in the new CSV file created at the end of the ETL. For information on creating the CSV Files, see Appendix E, "Creating Required Index Files" .
Cloudera Setup Details	

Table 3–2 config.sh for ETL Services

Interaction Variable Name	Significance
KERBEROS_KEYTAB_FILENAME	Indicates the information about server_kerberos_keytab_file from studio config.sh file.
KERBEROS_PRINCIPAL	Indicates the information about server_kerberos_principal from studio config.sh file.
KRB5_CONFIG_FILENAME	Indicates the file name of the Kerberos config file. For example, krb5.conf.
ETL Configuration	
KERBEROS_TICKET_RENEWAL_PERIOD	Indicates the interval on which Kerberos ticket will be renewed.

5. Navigate to the <ETL_Installation_Path>/conf/ directory and replace the files present inside the following folders with the required files as per the file structure mentioned in [Required File Structure](#).
 - Hadoop Cluster
 - Certificates
 - Kerberos
6. Navigate to the <ETL_INSTALLATION_PATH>/bin directory.
7. Execute the following command in the console:

```
./install.sh
```

Note: Execution of install.sh command does not generate any log file.

The values configured in the config.sh file will auto-populate the values in the following property files for ETL, Data Forwarding, and Cross Language Name Matching services respectively:

- <ETL_Installation_Path>/etl/conf/etl.properties
- <ETL_Installation_Path>/crosslangnamematch/conf/NameMatchingLocations.properties
- <ETL_Installation_Path>/dataforwardservice/conf/forwarderServer.properties

For more information on the etl.properties, NameMatchingLocations.properties, and forwarderServer.properties file, see the *Studio Services* chapter in the *OFS Crime and Compliance Studio Administration Guide*.

8. Enter the value for the secret.token parameter in the <ETL_Installation_Path>/dataforwardservice/conf/forwarderServer.properties file.

For more information on the secret.token parameter, see the *forwarderServer.properties File Details* section in the *Studio Services* chapter in the *OFS Crime and Compliance Studio Administration Guide*.
9. (Optional) Add a new data source. For more information, see *Configuring Data Sources for Graph* chapter in the *OFS Crime and Compliance Studio Administration Guide*.
10. Start the ETL Services. For more information see [Starting/Stopping ETL Service](#).

Configuring FILEPATH for ICIJ

Note: The FCC Studio graph model is configured to include ICIJ watch list files.

To configure FILEPATH for ICIJ, follow these steps:

- If watch list files are present, follow these steps:
 1. Place the watch list file in HDFS, which is accessible by the user.
 2. Update the FILEPATH of the watch list files in the `fcc_studio_etl_files` table.

Figure 3–1 `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

- If watch list files are absent, follow these steps:
 1. Edit the `<ETL_Installation_Path>/etl/conf/etl.properties` file as follows:

Change the following:

```
connectors=paradise;bahama;offshore;panama;fcdm
```

to

```
connectors=fcdm
```

Note: Ignore the properties that start with parameter values like `bahama`, `offshore`, `paradise`, and `panama`.

Launch FCC Studio Application

1. Enter the URL obtained after successful installation of the Studio application in the following format into the browser:

```
https://<Master_Node>:7008
```

The OFS Crime and Compliance Studio application is launched.

Reinstalling Studio Application

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

To reinstall the Studio application, follow these steps:

1. Navigate to the <Studio_Installation_Path>/bin directory.
2. Create a backup for the existing `config.sh` file.
3. Delete the <Studio_Installation_Path> folder.
4. Unzip the `OFS_FCCM_STUDIO-8.0.7.1.0_Linux.zip` file and extract the software. For more information, see [Extracting the Software](#).
5. Perform database cleanup by performing the following:
 - [Clean up for Studio Schema](#)
 - [Cleanup for BD Atomic Schema](#)
 - [Cleanup for BD Config Schema](#)
6. Install the Studio application. For more information, see [Installing the Crime and Compliance Studio Application](#).

Clean up for Studio Schema

To clean up the Studio schema, follow these steps:

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

Note:

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

2. Grant the following permissions to the newly created Oracle Database Schema:
 - `GRANT create session TO <Schema User>;`
 - `GRANT create table TO <Schema User>;`
 - `GRANT create view TO <Schema User>;`
 - `GRANT create any trigger TO <Schema User>;`
 - `GRANT create any procedure TO <Schema User>;`
 - `GRANT create sequence TO <Schema User>;`

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

Note:

If dropping the schema is not an option, then drop the tables and sequences as mentioned in the [Studio Schema Tables](#) section.

Cleanup for BD Atomic Schema

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

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

```
TRUNCATE TABLE DATABASECHANGELOGLOCK;
```

```
TRUNCATE TABLE DATABASECHANGELOG;
```

Cleanup for BD Config Schema

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

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

```
TRUNCATE TABLE DATABASECHANGELOGLOCK;
```

```
TRUNCATE TABLE DATABASECHANGELOG;
```

Post-Installation Configurations

On successful installation of Studio application, perform the following post-installation configurations:

- [Configuring SSH Connection](#)
- [Interpreter Configurations](#)
- [OFSAA Configurations for Batch Execution](#)
- [Hive Data Movement](#)
- [Starting Studio Services](#)

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

Configuring SSH Connection

To configure SSH connection, follow these steps:

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

Interpreter Configurations

For information on configuring interpreters, see *Configuring Interpreters* in the [Oracle Financial Services Crime and Compliance Studio Administration Guide](#).

OFSAA Configurations for Batch Execution

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

1. Copy the files in the <Studio_Installation_Path>/`ficdb/bin` directory to the server where the BD pack is installed and to the `$FIC_DB_HOME/bin` path of the OFSAA setup.

2. Execute the following command to grant Execute permission to the files:
`chmod +x <filenames>`
3. Copy all the files in the `<Studio_Installation_Path>/ficdb/lib` directory to the `$FIC_DB_HOME/lib` directory.

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

Hive Data Movement

To perform Hive data movement, follow these steps:

- [Configuring Schema Creation](#)
- [Creating Credential Keystore](#)
- [Configuring Data Movement and Graph Load](#)

Configuring Schema Creation

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

Configuring Schema Creation from Studio Server

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

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

Note: The `$FIC_DB_HOME` path can be set from the `.profile` file as well.

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

For information on `config.sh` file, see [Configuring the config.sh File](#).
3. Execute the following shell script in the `<Studio_Installation_Path>/ficdb/bin/` path to create tables in Hive Schema:

`FCCM_Studio_SchemaCreation.sh HIVE`

This creates tables in the Hive Schema.
4. Check the `<Studio_Installation_Path>/logs/batchservice.logs` for more information.

Configuring Schema Creation from OFSAA Server

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

1. Copy all the jar files located in the `<Studio_Installation_Path>/ficdb/lib` path to the `<OFSAA_FIC_HOME_PATH>/ficdb/lib` path.
2. Copy all the `.sh` files located in the `<Studio_Installation_Path>/ficdb/bin` path to the `<OFSAA_FIC_HOME_PATH>/ficdb/bin` path.
3. Create a Hive Schema with the name mentioned in the `HIVE_SCHEMA` parameter in the `config.sh` file.

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

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


```
FCCM_Studio_SchemaCreation.sh HIVE
```

 This creates tables in the Hive Schema.
5. Check the <Studio_Installation_Path>/logs/batchservice.logs for more information.

Creating Credential Keystore

To create a credential keystore, follow these steps:

1. Login as HDFS SuperUser.
2. Create a credential keystore on HDFS by executing the following command:


```
hadoop credential create mydb.password.alias -provider
jceks://hdfs/user/root/oracle.password.jceks
```
3. Verify the credential keystore file by executing the following command:


```
hadoop credential list -provider
jceks://hdfs/user/root/oracle.password.jceks
```
4. Grant Read permission to the keystore file by executing the following command:


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

Note: Ensure the credential keystore file path and the alias are correctly provided in the config.sh file.

Configuring Data Movement and Graph Load

Note: The Big Data System Administrator must place the batchservice-8.0.7.1.0.jar file in all nodes of the spark cluster. Ensure that the path of the jar file is present in the Spark classpath in the spark-defaults.conf file.

To configure the Data Movement and Graph Load, follow these steps:

1. Copy the required FCCM_Studio_SqoopJob.sh files from the <Studio_Installation_Path>/ficdb/bin directory to the <FIC_HOME of OFSAA_Installed_Path>/ficdb/bin directory.

For information on performing Data Movement and Graph Load, see the *Data Movement and Graph Loading for Big Data Environment* section in the *OFS Crime and Compliance Studio Administration Guide*.

Configuration for Running Scenario Notebooks

To perform the configuration required to run scenario notebooks, follow these steps:

1. Copy the required FCCM_Studio_NotebookExecution.sh file from the <Studio_Installation_Path>/ficdb/bin directory to the <FIC_HOME of OFSAA_Installed_Path>/ficdb/bin directory.

For information on performing Data Movement and Graph Load, see the *Executing Published Scenario Notebook* section in the *OFS Crime and Compliance Studio Administration Guide*.

Starting Studio Services

Start the services required for the Studio application. For more information, see [Appendix A, "Starting/Stopping Studio Services"](#).

You can access the Studio application using the following URL:

`http://<HostName>:7008`

Starting/Stopping Studio Services

This section describes how to start and stop the services needed for the Studio application. It includes the following sections:

- [Starting/Stopping PGX Service](#)
- [Starting/Stopping ETL Service](#)
- [Starting/Stopping Studio](#)

Starting/Stopping PGX Service

- To start the PGX service:
 1. Navigate to the path where PGX service is installed.
 2. Run the following command:

```
./start-server
```

The start service for PGX will be located in the following directory:

```
<Studio_Installation_Path>/pgx/server/pgx-19.2.1/bin
```
- To stop the PGX service, kill the process.

Starting/Stopping ETL Service

- To start the ETL service:
 1. Navigate to the path where ETL service is installed.
 2. Run the following command:

```
./starter.sh
```
- To stop the ETL service:
 1. Navigate to the path where ETL service is installed.
 2. Run the following command:

```
./stopper.sh
```

Starting/Stopping Studio

- To start Studio:
 1. Navigate to the `<Studio_Installation_Path>/bin/` directory.
 2. Run the following command:

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

- To stop Studio, kill all the Studio processes.

Once all the services are up and running, the Studio application can be accessed using the following URL:

```
http://<HostName>:30078
```

Tables and Sequences

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

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

Studio Schema Tables

The following table includes the details of the Studio Schema tables that must be dropped during the reinstallation of the Studio application.

Table 5–1 Studio Schema Tables

DS_PARAGRAPH	DS_NOTEBOOK_TAGS	DS_TASK_RESULTS
DS_ENTITY_PERMISSIONS	DS_ROLE	DS_PERMISSION_ACTIONS
DS_GROUP	DS_IS_PERMITTED	DS_PERMISSION_MAPPING
DS_USER_PERMS_MAP	DS_USER_ROLES	DS_NOTEBOOK
DS_INTERPRETER_RESULT_MSGS	DS_USER	DS_PERMS_MAP_ACTIONS
DS_ENTITY_PERMS_MAP	DS_TASK	DS_GRAPH
DS_INTERPRETER_RESULT	DS_GROUP_PERMS_MAP	DS_NOTEBOOK_RELATIONS
DS_INTERPRETER_PROPS	DS_JOB	DS_PERMISSION
DS_ROLE_PERMS_MAP	DS_VISUALIZATION_TEMPLATE	DS_RESULT_MESSAGE
DS_INTERPRETER_ABILITIES	DATABASECHANGELOG	DATABASECHANGELOGLOCK
DS_USER_GROUPS	DS_INTERPRETER_VARIANT	DS_COMMENT
DS_PARAGRAPH_RELATIONS		

Studio Schema Sequences

The following table includes the details of the Studio Schema sequences that must be dropped during the reinstallation of the Studio application:

Table 5–2 Studio Schema Sequences

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

Setting Up Password Stores with Oracle Wallet

This section includes the following topics:

- [Overview](#)
- [Setting Up Password Stores for Database User Accounts](#)
- [Verify the Connectivity of the Wallet](#)

Overview

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

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

Setting Up Password Stores for Database User Accounts

After the database is installed and the default database user accounts are set up, administrators must set up a password store using the Oracle Wallet. This involves assigning an alias for the username and associated password for each database user account. The alias is used later during the application installation. This password store must be created on the system where the application server and database client are installed.

This section describes the steps to set up a wallet and the aliases for the database user accounts. For more information on configuring authentication and password stores, refer to the Oracle Database Security Guide.

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

To set up a password store for the database user accounts, follow these steps:

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

```
mkstore -wrl <wallet_location> -create
```

After you run the command, a prompt appears. Enter a password for the Oracle Wallet in the prompt.

Note: The `mkstore` utility is included in the Oracle Database Client installation.

The wallet is created with the auto-login feature enabled. This feature enables the database client to access the wallet contents without using the password. For more information, refer to the Oracle Database Advanced Security Administrator's Guide.

3. Create the database connection credentials in the wallet using the following command:

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

Run the above command for the following `<alias-name>`:

- `BD_Config_Schema`
- `BD_Atomic_Schema`
- `Studio_Schema`

After you run the command, a prompt appears. Enter the password associated with the database user account in the prompt. You are prompted to re-enter the password. Then you are prompted for the wallet password used in Step 1.

4. Repeat step 2 for all the database user accounts.
5. Update the `tnsnames.ora` file to include the following entry for each alias name to be set up.

```
<alias-name> =
(DESCRIPTION =
(ADDRESS_LIST =
(ADDRESS = (PROTOCOL = TCP) (HOST = <host>) (PORT = <port>))
)
(CONNECT_DATA =
(SERVICE_NAME = <service>)
)
)
```

Note:

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

Verify the Connectivity of the Wallet

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

1. Create a `sqlnet.ora` in the wallet directory using the following content:

```
WALLET_LOCATION = (SOURCE = (METHOD = FILE) (METHOD_DATA = (DIRECTORY =  
<Wallet_Location>)) )  
  
SQLNET.WALLET_OVERRIDE=TRUE  
  
SSL_CLIENT_AUTHENTICATION=FALSE
```

2. Test the connectivity using the following command:

Note: The `ORACLE_HOME` used with the wallet must be the same version or higher than what the wallet was created with.

```
$ export WALLET_LOCATION=<wallet_location>
```

```
$ export TNS_ADMIN=<tnsnames.ora_location>, Here ensure to use the wallet to point  
to the alternate tnsnames.ora as created above.
```

```
$ sqlplus /@<alias_name>
```

The output will be similar to:

```
SQL*Plus: Release 11
```

```
Connected to:
```

```
Oracle Database 12c
```

To verify if you are connected to the correct user:

```
SQL> show user
```

The output will be similar to:

```
USER is "<database-user-name>"
```

Installing RServe Manually

Overview

You must install Rserve manually on a host to expose the local R installation on that host to the network, so that remote Rserve clients such as the R interpreter can use the local R installation.

The R interpreter always connects to an Rserve instance and runs the R code remotely. The interpreter needs to be configured with the hostname or IP and the port of the remote instance (where Rserve is running). When the interpreter is initialized, it connects to the remote instance.

This section includes the following topics:

- [Prerequisites](#)
- [Installing Rserve](#)
- [Configuring Rserve](#)
- [Starting Rserve](#)
- [Adding the Certificate to the Keystore](#)
- [Installing Additional Libraries](#)

Prerequisites

The following is a list of prerequisites required before beginning the installation of RServe:

- Ensure that Oracle Linux 7.x and Oracle JDK 8 are validated against Oracle Linux 7.4 and Oracle JDK 8u161.
- The user must be a root user.
- 800 MB disk space is required for package installation.

The following subsections provide more details for prerequisites:

- [Install Oracle R Distribution](#)
- [Install Dependencies](#)
- [Install ORE Client](#)

Install Oracle R Distribution

To install the Oracle R Distribution (ORD), enable the **addons** and **optional_latest** channels in yum as shown in the following:

```
```bash
```

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

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

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

To install ORD, see [https://docs.oracle.com/cd/E83411\\_01/OREAD/installing-R-for-ORE.htm#OREAD129](https://docs.oracle.com/cd/E83411_01/OREAD/installing-R-for-ORE.htm#OREAD129).

## Install Dependencies

Rserve has certain dependencies to run correctly. The **openssl-devel** is required for SSL support. The dependencies change based on the libraries you have installed. For example, to let **knitr** send plots as **base64 encoded** strings, you require **pango-devel**.

The following dependent packages must be installed for Rserve to support SSL:

```
^^`bash
(root)# yum install openssl openssl-devel pango-devel
^^^
```

## Install ORE Client

To connect to ORE through Rserve, follow these steps:

- Install the corresponding client libraries. For more information, see [https://docs.oracle.com/cd/E83411\\_01/OREAD/installing-ORE-client.htm#OREAD167](https://docs.oracle.com/cd/E83411_01/OREAD/installing-ORE-client.htm#OREAD167) from the ORE project.
- Install the knitR and PrintR packages.

## Installing Rserve

To install Rserve, call the following code in your R shell:

```
^^`R
> install.packages('Rserve', repos='https://www.rforge.net/')
^^^
```

If you are behind a proxy, ensure that R is communicated about it when you start the R shell.

For example, you can start R shell as shown in the following before installing any package:

```
^^`bash
$ http_proxy=http://your-proxy:80 R
^^^
```

## Configuring Rserve

You can base your config on the following example configuration, which you should store in an `Rserve.conf` file. You will require `Rserve.conf` as a reference when you start Rserve.

```
...

auth required
plaintext disabled
pwdfile /path/to/Rserve.pwd
remote enable
switch.qap.tls enable
tls.port 6311
qap disable
interactive no
rsa.key /path/to/server.key
tls.key /path/to/server.key
tls.cert /path/to/server.crt
```

This configuration tells Rserve to encrypt the communication with TLS and listen for incoming connections on port **6311**. The `Rserve.pwd` file appears as shown in the following example:

```
...

user $5baa61e4c9b93f3f0682250b6cf8331b7ee68fd8
...
```

The file contains one line per user, where the first part is the username and the second part is the password. The password can either be plain text or a **MD5/SHA1** hash. In this example, the password `password` is hashed with SHA1. If you use hashed passwords, the password must start with a ``$`` sign.

The `rsa.key`, `tls.key`, and `tls.cert` settings point to the private key files you require for TLS. These keys can be generated using the **openssl** command-line tool as shown in the following example:

```
```bash

$ openssl genrsa -out server.key 2048

$ openssl req -new -key server.key -out server.csr

$ openssl x509 -req -days 265 -in server.csr -signkey server.key -out
server.crt

...`
```

The preceding sample is an example and for a production deployment, you should use relevant certificates. You can find more information about configuration options on the Rserve homepage - <https://www.rforge.net/Rserve/doc.html>.

Starting Rserve

After installing Rserve and placing configuration files in the correct location, start the Rserve as given here:

```
```bash
```

```
$ R CMD Rserve --no-save --RS-conf /path/to/Rserve.conf
```

Rserve starts in the background. After it starts, the R Interpreter will be able to connect to it. The Rserve process is running before you start the R Interpreter.

## Adding the Certificate to the Keystore

The certificates that were generated in the previous step to configure Rserve to encrypt the communication must be added to the Java keystore in order to be used by the R interpreter. The add procedure depends on your setup.

Add the certificate to a keystore as given here:

```
``bash
$ $JAVA_HOME/bin/keytool -import -alias rserve -file /path/to/server.crt -keystore
/path/to/keystore-storepass storepassword -noprompt
...

```

The certificate must be imported correctly and the correct keystore is used by the Java process you use to start the R interpreter. Else you will get SSL related exceptions when the interpreter attempts to connect to Rserve.

You can specify the keystore when starting the R interpreter as shown in the following example:

```
``bash
$ $JAVA_HOME/bin/java -Djavax.net.ssl.trustStore=/path/to/keystore -
Djavax.net.ssl.trustStorePassword=storepassword <additional paramters>
...

```

## Installing Additional Libraries

Depending on your use case, you must install other R libraries. For example, you can install **knitr** or **ggplot2**, in the same manner, that you installed Rserve previously. You can use the *package.install* within your R shell to perform the installation.

For example:

```
``R
> install.packages('knitr')
...

```

---



---

## Creating Required Index Files

### Creating Required Index Files

To create the required index files, follow these steps:

1. Create the index files, `name_index.csv` and `address_index.csv` with the column names as per the configurations mentioned in the `<ETL_Installation_Path>/crosslangnamematch/conf/NameMatchingLocations.properties` file with dummy values.

For more information on `NameMatchingLocations.properties` file, see the *Cross Language Name Matching Service* section in the *Studio Services* chapter in the *OFS Crime and Compliance Studio Administration Guide*.

---



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**Note:** The entries in the CSV file must be tab-separated.

---



---

For example,

**Table E-1** `name_index.csv`

node_id	name	source
1	dummy	dummy

**Table E-2** `address_index.csv`

node_id	address	source
1	dummy	dummy