Oracle Financial Services Analytical Applications Infrastructure

Administration and Configuration Guide

Release 8.0.6+

March 2023

OFS Analytical Applications Infrastructure Administration and Configuration Guide

Document Control

Version Number	Revision Date	Change Log
1.0	Created May 2018	Added Configurations for 8.0.6.0.0 version.
2.0	Updated Jul 2018	Updated for OFSAAAAI-13230 and OFSAAAAI-15150.
3.0	Updated Aug 2018	Updated for 8.0.6.1.0 ML changes.
4.0	Updated Sep 2018	Updated the HTTPS Protocol section for Bug 27821807.
5.0	Updated Oct 2018	Added sections Enabling Unlimited Cryptographic Policy for Java for Doc 28771653 and Setting Access-Control-Allow-Origin Header for Doc 28317239.
6.0	Updated Jan 2019	Added section Knowing Additional Cross-Origin Resource Sharing (CORS) Configuration (Doc 29016707).
7.0	Updated May 2019	• Added a section for Configurations for Document Upload to Multiple Libraries • Added a new section Configurations for Oracle Wallet to Secure Database Connection • Updated rest to rest-api in URLS in section Understanding REST API Specifications (Doc 29640491). • Updated R directories to working directory in note in section Configurations (Doc 29208913). • Updated section Running Port Changer Utility with note for JDBC_URL (Doc 29617782).
8.0	Updated Jun 2019	Added additional information for Tectia configuration in section Other SSH Software (Doc 29771662).
9.0	Updated Oct 2019	Added Java 8 information section Enabling Unlimited Cryptographic Policy for Java (Doc 30467066).
10.0	Updated Jan 2020	Added the section SSO Authentication (SAML) Configuration in OFSAA 8.0.7.1.0 (Doc 30587003).
11.0	Updated Feb 2020	• Added for Doc 30881993 in the section Running Port Changer Utility: ▪ Information to create and deploy EAR/WAR. ▪ Note for table batch_parameter. • Updated the section Configurations for Connecting OFSAA to Oracle Database using Secure Database Connection (TCPS) for version 8.0.6.2.0 and higher (Doc 30736818).
12.0	Updated Apr 2020	• Modified the SSO Authentication (SAML) Configuration in OFSAA 8.0.7.1.0 section to SAML Service Provider Metadata Configuration with Certificate (Doc 31073093).

Version Number	Revision Date	Change Log
13.0	Updated May 2020	• A new section Delink ICC Server from FICServer is added in the Operations chapter. • Modified the Distributed Activation Manager (AM) Based Processing section based on Bug 31282944 - SECONDARY AM CONFIGURATION INFORMATION.
14.0	Updated June 2020	Added the Configure Document Upload Settings section (Doc 31379149).
15.0	Updated July 2020	Added the Configure Document Upload File Timeout and File Transfer section.
16.0	Updated September 2020	Added the GET APIs in the Using REST APIs for User Management from Third-Party IDMs section.
17.0	Updated October 2020	Added the Configuring Apache Livy Interface section.
18.0	Feburary 2021	Added the GET APIs in the Using REST APIs for User Management from Third-Party IDMs section.
19.0	August 2021	Updated the Changing IP/ Hostname, Ports, and Deployed paths of the OFSAA Instance section (Doc 33165413).
20.0	March 2022	Updated the Sqoop Configuration Section (Doc 33934629).
21.0	July 2022	Removed the Internet Explorer information (Doc 34318534).
22.0	March 2023	Replaced/deleted references to include Apache big data in the relevant sections.

Table of Contents

1 Preface

This Preface provides supporting information for the Oracle Financial Services Analytical Applications Infrastructure Administration Guide and includes the following topics:

- Summary
- Audience
- Related Documents
- Conventions

1.1 Summary

This document includes the necessary instructions for module specific configurations. We recommend you to download the latest copy of this document from OHC Documentation Library which includes all the recent revisions (if any) done till date.

1.2 Audience

Oracle Financial Services Analytical Applications Infrastructure Administration Guide is intended for administrators and implementation consultants who are responsible for installing and maintaining OFSAAI.

1.3 Related Documents

This section identifies additional documents related to OFSAA Infrastructure. You can access the following documents from OHC Documentation Library.

- Oracle Financial Services Advanced Analytical Applications Infrastructure Application Pack Installation and Configuration Guide
- Oracle Financial Services Analytical Applications Environment Check Utility Guide
- Oracle Financial Services Analytical Applications Infrastructure User Guide
- Oracle Financial Services Analytical Applications Infrastructure Security Guide

1.4 Conventions

The following text conventions are used in this document:

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

1.5 Abbreviations

The following table lists the abbreviations used in this document:

Abbreviations	Meaning
AIX	Advanced Interactive eXecutive
EPM	Enterprise Performance Management
F2H	HDFS File/Flat File to HDFS target
HDFS	Hadoop Distributed File System
H2T	HDFS-Hive source to RDBMS target mapping
H2H	HDFS-Hive source to HDFS target
H2F	HDFS-Hive source to Flat File target
JCE	Java Cryptography Extension
KBD	Key Business Dimensions
MFA	Multi-Factor Authentication
OEL	Oracle Enterprise Linux
OFSAAI	Oracle Financial Services Analytical Applications Infrastructure
OLH	Oracle Loader for Hadoop
PII	Personally Identifiable Information
RDBMS	Relational Database Management System
RHEL	Red Hat Enterprise Linux
RRF	Run Rule Framework
SCD	Slowly Changing Dimension
SQL	Structured Query Language
TDE	Transparent Data Encryption

Abbreviations	Meaning
T2H	RDBMS source to HDFS-Hive target
UDP	User Defined Properties
UMM	Unified Metadata Manager
VM	Virtual Machine

2 Data Management Tools (DMT) Module Configurations

This chapter details about the configurations required in the Data Management Tools module. It includes the following sections:

- Data Mapping Configurations
- Oracle® Loader for Hadoop (OLH) Configuration
- Sqoop Configuration
- SCD Execution on Hive Information Domain
- Heterogeneous Support for SCD to RDBMS
- Configuring Apache Livy Interface

2.1 Data Mapping Configurations

This section talks about the configurations required for the following Data Mapping Definitions:

- RDBMS source to HDFS-Hive target (T2H)
- HDFS Source to RDBMS Target (H2T)
- File source to HDFS-Hive target (F2H)
- HDFS/Local-WebLog Source to HDFS Target (L2H)

2.1.1 Data Movement from RDBMS Source to HDFS Target (T2H)

2.1.1.1 Default Implementation

Step 1: Configuring Properties

1. From *DMT Configurations* window, set T2H mode as **Default**.
2. From the *Register Cluster* tab in the *DMT Configurations* window, register a cluster with Target Information domain name as the Cluster **Name**.

   For more information, see the *DMT Configurations* section in the OFS Analytical Applications Infrastructure User Guide.

Step 2: Copy the required Jars

Copy the following Third Party Jars from the Apache installation libraries into the `$FIC_HOME/ext/lib` folder:

- `re2j-1.1.jarcommons-cli-1.2.jar`
- `htrace-core4-4.1.0-incubating.jar`
- `hadoop-hdfs-3.1.1.jar`

2.1.1.2 Sqoop Implementation

1. From *DMT Configurations* window, set **T2H Mode** as **Sqoop**.
2. Sqoop should have been installed and configured in your system. For more information on how to use Sqoop for T2H, see Sqoop Configuration.

2.1.2 Data Movement from HDFS Source to RDBMS Target (H2T)

2.1.2.1 Default Implementation

From *DMT Configurations* window, set H2T mode as **Default**. For more information, see the *DMT Configurations* section in the OFS Analytical Applications Infrastructure User Guide.

2.1.2.2 OLH (Oracle Loader for Hadoop) Implementation

OLH (Oracle Loader for Hadoop) should have been installed and configured in your system. For more information on required configurations, see Oracle® Loader for Hadoop (OLH) Configuration.

2.1.2.3 Sqoop Implementation

1. From *DMT Configurations* window, set **H2T Mode** as **Sqoop**.
2. Sqoop should have been installed and configured in your system. For more information on how to use Sqoop for T2H, see Sqoop Configuration.

2.1.3 Data Movement from File to HDFS Target (F2H)

This section talks about the configurations required for data movement involving Hive based source or target (F2H).

- HDFS-File to HDFS target
- Local Flat File to HDFS Target

Step 1: Configuring Properties

1. From *DMT Configurations* window, select **Is Hive Local** as **Yes** if HiveServer is running locally to OFSAA, else select **No,** from the drop-down list.

   For more information, see the *DMT Configurations* section in the OFS Analytical Applications Infrastructure User Guide.

2. From the *Register Cluster* tab in the *DMT Configurations* window, register a cluster with Target Information domain name as the Cluster Name for the following scenarios:
   - If Flat File is local and **Is Hive Local** is set as **No**.
   - If Flat File is Remote and **Is Hive Local** is set as **Yes**

Step 2: Copy the required Jars

Copy the following Third Party Jars from the Apache installation libraries into the `$FIC_HOME/ext/lib` folder:

- `commons-cli-1.2.jar`
- `hadoop-hdfs-3.1.1.jar`
- `htrace-core4-4.1.0-incubating.jar`

2.1.4 Data Movement of WebLog Source to HDFS Target (L2H)

2.1.4.1 Prerequisites

- Apache Hadoop must have been installed.
- Create a Folder /<Weblog Working Directory> in HDFS and provide 0777 permissions for the same.

2.1.4.2 Configurations

Following are the configurations required in case of HDFS based WebLog source:

1. From the *DMT Configurations* window > *Register Cluster* tab, register a cluster with Target Information domain name as the Cluster **Name**.

   For details, see *Cluster Registration* section in the OFS Analytical Applications Infrastructure User Guide.

2. Copy the required Third Party Jars shown in the following from the Apache installation libraries into the `$FIC_HOME/ext/lib` directory:

   - `commons-httpclient-3.1.jar`
   - `commons-cli-1.2.jar`
   - `hadoop-hdfs-3.1.1.jar`
   - `protobuf-java-2.5.0.jar`
   - `htrace-core4-4.1.0-incubating.jar`
   - `jackson-mapper-asl-1.9.13.jar`
   - `jackson-core-2.3.1.jar`
   - `avro-1.8.1.jar`
   - `hadoop-mapreduce-client-core-3.1.1.jar`

NOTE Ensure the jars are part of Big Data installation is also present in the above location.

NOTE The version of the aforementioned Jars to be copied differs depending upon the version of the Apache configured based on the Technology Matrix.

3. Copy `core-site.xml, hdfs-site.xml, mapred-site.xml, hive-site.xml`, and `yarn-site.xml` from the Hadoop Cluster to the location mentioned in the **Configuration File Path** field in the *Cluster Configurations* window and `<deployed location>/conf` folder. Note that only Client Configuration Properties are required.

NOTE If proxy user is enabled and the Job is submitted by the same, the user should be created in every node of the Hadoop Cluster.

4. Restart all the OFSAAI services. For more information, refer to the Start/Stop Infrastructure Services section in the Oracle Financial Services Analytical Applications Infrastructure Installation & Configuration Guide 8.0.2.0.0.

2.1.4.3 Logger Types Seeded Table

Standard logger types and their details are seeded in `AAI_DMT_WEBLOG_TYPES` table. By default, details for Apache and Microsoft-IIS logs are pre-populated. You can add other logger methods to the table to make them visible in the UI.

Below are the sample entries for the logger types.

V_LOG_TYPE	V_LOG_COLUMNS	V_LOG_COL_DATATYPE	V_LOG_REGEX
Apache Sample	IP,Identity,User,Time,URL,Status,Size,Referer,Agent,Bytes	string,string,string,string,string,string,string,string,string,string	([^]*) ([^]*) ([^]*) (-|\[[^\]]*\]) ([^ \"]*|\"[^\"]*\") ([0-9]*) ([0-9]*) ([^ \"]*|\"[^\"]*\") ([^ \"]*|\"[^\"]*\") ([0-9]*)
Microsoft-IIS Sample	IP,User,Date,Time,Service,ServerName,ServerIP,TimeTaken,ClientBytesSent,ServerBytesSent,ServiceStatus,WindowsStatus,RequestType,TargetOperation,Parameters	string,string,string,string,string,string,string,string,string,string,string,string,string,string,string,	DELIMITED~,

To add a new logger type, add a new entry in the `AAI_DMT_WEBLOG_TYPES` table as explained:

- `V_LOG_TYPE`- Enter a name for the custom logger type. The values in this column are displayed as **Logger Type** drop-down list in the *Preview* pane of *Source Model Generation* window for WebLogs. `V_LOG_COLUMNS`- Enter appropriate column names separated by commas, which will be displayed in the *Data Model Preview* pane as **Column Names**.

- `V_LOG_COL_DATATYPE`- Enter the data type for the corresponding column names entered in the `V_LOG_COLUMNS`, separated by commas. The supported Data Types are String and Int. The values in this column are displayed as the **Data Type** for the corresponding **Column Names.** If you do not specify Data Type for a column, Integer is selected by default. User can change it to String if required from the *Source Model Generation* window.
- `V_LOG_REGEX`- Enter the Regular expression for each Column Name separated by a space. This will be displayed as **Input Regex** in the *Source Model Generation* window.

2.2 Oracle® Loader for Hadoop (OLH) Configuration

Oracle® Loader for Hadoop (OLH) is a Map Reduce utility to optimize data loading from Hadoop into Oracle Database. OFSAAI supports OLH as one of the modes for loading data into RDBMS Tables from Hive Tables.

2.2.1 Prerequisite

- Apache Hive
- Hadoop Client (version compatible with the Hadoop Cluster) should have been installed on OFSAAI VM. (If OFSAAI and Hadoop are not on the same VM)
- Oracle Loader for Hadoop v 3.9.0 should have been installed on the OFSAAI VM.

2.2.2 Steps for Configuring OLH

Step 1: Installing OLH in the OFSAAI VM

1. Unzip the OLH Package downloaded from the Oracle site in the VM where OFSAAI is installed.

   Location: Inside the Home Directory of the user where OFSAAI is installed.

2. Set `OLH_HOME` environment variable in the `.profile`.

   OLH_HOME contains the directories such as `bin, examples, jlib` and `lib`.

Step 2: Configuring the Property

1. Set the following property in the `jdbcOutput.xml` file, which is present in the location `$FIC_DB_HOME/conf/`:

   ```
   <property>

   <name>oracle.hadoop.loader.connection.defaultExecuteBatch</name>

    <value>100</value>

   </property>
   ```

2. From the *DMT Configurations* window, set **H2T Mode** as **OLH**.
3. From the *Register Cluster* tab in the *DMT Configurations* window, register a cluster with Source Information domain name as the Cluster Name.

   For more information, see the *DMT Configurations* section in the OFS Analytical Applications Infrastructure User Guide.

Step 3: Copy Configuration xmls from Hadoop Cluster

1. Copy the following files from the Hadoop Cluster to the **Configuration File Path** given in the *Cluster Configurations* window of the registered cluster. .
   - core-site.xml
   - hdfs-site.xml
   - mapred-site.xml
   - hive-site.xml
   - yarn-site.xml

> **NOTE** Only Client Configuration Properties are required.

2. Modify the following property in `mapred-site.xml` in `$FIC_HOME/conf:`

```
<property>
    <name>mapred.child.java.opts</name>
    <value>-Xmx4096m</value>
  </property>
<property>
<name>mapreduce.job.outputformat.class</name>
<value>oracle.hadoop.loader.lib.output.JDBCOutputFormat</value>
</property>
<property>
 <name>mapreduce.output.fileoutputformat.outputdir</name>
 <value>(Any temporary directory)</value>
 </property>
<property>
    <name>oracle.hadoop.loader.defaultDateFormat</name>
    <value>yyyy-MM-dd</value>
  </property>
```

> **NOTE** If proxy user is enabled and the Job is submitted by the same, the user should be created in every node of the Hadoop Cluster.

Step 4: Copy the required Jars

1. Copy `commons-httpclient-3.1.jar` from the Apache installation libraries into the `$OLH_HOME/jlib` folder.

2. If OFSAA is using Apache driver:
   - Usually jars such as `hive-exec-*.jar, libfb303-*.jar, hive-service-*.jar, hive-metastore-*.jar` are present in the `ext/lib` folder and are added to the Classpath. In case of any ClassNotFound Exception, do the following steps:
     - **i.** Edit the `oracle.hadoop.loader.libjars` property present in `OLH_HOME/doc/oraloader-conf.xml` to accommodate the newly added jars. That is, `$FIC_HOME/ext/lib/ hive-exec-*.jar` (repeat for each of the mentioned jars)
3. Copy the entire property to `FIC_DB_HOME/conf/dtextInput.xml.`

> **NOTE** Add the above-mentioned jars only if OLH task is to be run. If any other OFSAA task is running, do not keep a copy of the jars in the `OLH_HOME/jlib`.

2.2.3 Limitations

- OLH can read data from a Single Source Table (ANSI joins are not supported) and load it into a single target RDBMS table.
- OLH 2.3.1 is built against HIVE 0.10. It works well with HIVE 0.12 too; however, Data Type DATE (that is supported in HIVE 12) is not supported by OLH.
- Mapping a Hive column with Data Type STRING (even if it contains a single character) to a RDBMS Column with Data Type CHAR is not allowed. The Destination Column should be at least VARCHAR2 (1) or the Source Column Data Type should be CHAR.
- Joins/Filters/Expressions are not supported in OLH.

2.3 Sqoop Configuration

Apache Sqoop installation allows the user to load Data from RDBMS Tables into Hive Tables.

Two types of Sqoop implementations are supported:

- **Sqoop** – in Client mode. Using Sqoop export
- **Sqoop 1** – in Cluster mode. OFSAAI first SSHs to the Sqoop node on the cluster, and then executes the export command.

2.3.1 Prerequisites

- Apache Sqoop Server must be up and running.
- Ensure that an appropriate JDBC driver is present in Sqoop library path on the cluster.

2.3.2 Steps for Configuring Sqoop

2.3.2.1 Sqoop Cluster Mode

1. From the *DMT Configurations* window, set **Sqoop Mode** as **Cluster**.
2. Specify the path of the HDFS working directory for Sqoop related operations in the **Sqoop Working Directory** field.
3. From the *Register Cluster* tab in the *DMT Configurations* window, register a cluster with Target Information domain name as the Cluster **Name** in case of T2H or register a cluster with Source Information domain name as the Cluster **Name** in case of H2T.

   To enable the Sqoop Cluster in SSH mode, provide the appropriate SSH details in the **SSH Server name**, **SSH Port**, and **SSH Auth Alias** fields.

   To create **SSH Auth Alias**, follow these steps:

   a. Log in as SYSADMN and navigate to the **Database Details** window.

   b. Click **Add** (+ symbol) to view the **Database Details** window.

   c. Do not enter **Name** or **Schema** name. Select **ORACLE** for **DB Type** and **DEFAULT** for **Auth Type**.

   d. Click **Add** for **Alias Name**.

   e. Enter an auth alias in **Auth Alias**, enter a valid SSH user name in **User/Principal Name**, and enter an SSH password in **Auth String**.

   f. Click **Save** to create and register a new Auth Alias in OFSAA.

   g. Close the **Database Details** window without saving the details in any of the other fields.

   For details, see *DMT Configurations* section in the OFS Analytical Applications Infrastructure User Guide.

4. Open the command prompt and execute a manual **kinit** on the Sqoop node with SSH user credentials before Sqoop execution. Execute the kinit periodically based on the Kerberos settings for the life time of the ticket. Also, ensure that the Sqoop commands are executable from the default shell of the SSH user.
5. Copy the following Third Party Jars from the Apache installation libraries into the `$FIC_HOME/ext/lib` Directory for the Apache Hadoop Server:

   - `hadoop-mapreduce-client-core-3.1.1.jar`
   - `re2j-1.1.jar`
   - `commons-cli-1.2.jar`
   - `hadoop-hdfs-3.1.1.jar`
   - `hadoop-hdfs-client-3.1.1.jar`
   - `protobuf-java-2.5.0.jar`
   - `htrace-core4-4.1.0-incubating.jar`
   - `commons-net-3.6.jar`

- `commons-codec-1.11.jar`
- `sqoop-test-1.4.7.jar`
- `sqoop-1.4.7.jar`
- `jackson-mapper-asl-1.9.13.jar`
- `jackson-core-2.3.1.jar`
- `avro-1.8.1.jar`

2.3.2.2 Sqoop Client Mode

Step 1: Configuring the Properties

1. From the *DMT Configurations* window, set **Sqoop Mode** as **Client**.
2. Specify the path of the HDFS working directory for Sqoop related operations in the **Sqoop Working Directory** field.
3. From the *Register Cluster* tab in the *DMT Configurations* window, register a cluster with Target Information domain name as the Cluster **Name** in case of T2H or register a cluster with Source Information domain name as the Cluster **Name** in case of H2T.

   For details, see *DMT Configurations* section in the OFS Analytical Applications Infrastructure User Guide.

Step 2: Copy Third Party Jars

Copy the following Third Party Jars from the installation libraries into the `$FIC_HOME/ext/lib` directory for either the Apache Hadoop Server:

- `hadoop-mapreduce-client-core-3.1.1.jar`
- `re2j-1.1.jar`
- `commons-cli-1.2.jar`
- `hadoop-hdfs-3.1.1.jar`
- `hadoop-hdfs-client-3.1.1.jar`
- `protobuf-java-2.5.0.jar`
- `htrace-core4-4.1.0-incubating.jar`
- `commons-net-3.6.jar`
- `commons-codec-1.11.jar`
- `sqoop-test-1.4.7.jar`
- `sqoop-1.4.7.jar`
- `jackson-mapper-asl-1.9.13.jar`
- `jackson-core-2.3.1.jar`
- `avro-1.8.1.jar`

NOTE	Ensure that the jars are part of Big Data Installation is also present in the above location.

Step 3: Copy Configuration XMLs from Hadoop Cluster

Copy `core-site.xml, hdfs-site.xml, mapred-site.xml, hive-site.xml`, and `yarn-site.xml` from the Hadoop Cluster to the **Configuration File Path** given in the *Cluster Configurations* window of the registered cluster. Note that only Client Configuration Properties are required.

NOTE	If proxy user is enabled and the Job is submitted by the same, the user should be created in every node of the Hadoop Cluster.

2.3.2.3 Limitations of Sqoop

- Derived Column cannot be used as the split by column, hence should not have field order 1.
- Date Type Column cannot be used as the split by column. (Sqoop Limitation: Sqoop-1946). Hence it should not have field order 1.

2.4 SCD Execution on Hive Information Domain

You need to consider the following constraints and assumptions for Slow Changing Dimension (SCD) execution on Hive Infodom:

2.4.1 Constraints

1. Default Columns with Surrogate Key (SK) as 0 and -1 will be inserted into destination (DIM) table, only if data is present in the table `DIM_SCD_SEEDED`.
2. `PRTY_LOOKUP_REQD_FLG` should always be set to ‘N’.
3. The data type of SK column in destination (DIM) table should always be INT/BIGINT and it will be generated using the following logic:

   `MAX_SKEY + row_number(n)` where (n) is rowid.
4. Query to fetch Maximum SKEY value will give performance improvement, if indexing is done on DIM table.
5. Stage Column where Column Type = ‘ED’ should be updated with Date in Hive Format – ‘yyyy-mm-dd’.

   Apart from this only ‘dd-Mon-yyyy’ format is supported to keep the current seeding intact. Final data in Date column will always be inserted in ‘yyyy-mm-dd’ format.
6. Columns which are not part of STG and DIM mapping will be passed as ‘’ (empty strings).

7. Columns with column type STRING/VARCHAR/CHAR will be inserted as empty strings and all other column types will be inserted as NULL.
8. Stage table should not contain duplicate records for the same MISDATE.
9. Two or more SCDs executing in parallel should not update the same Dimension table. In such cases, ensure the processing is sequential. Similar limitation is applicable for the option Map Ref No: =-1.

2.4.2 Assumptions:

1. Primary Key (PK) and Surrogate Key (SK) Columns are mandatory to map, else SCD will fail.
2. Since Hive does not have PK functionality, you should map an ID Column as PK, on the basis of which STG and DIM tables will be matched for TYPE1 and TYPE2.
3. SK column in destination (DIM) table will always be of data type INT/BIGINT.
4. `DIM_SCD_SEEDED` table will be created automatically. You need to insert data manually as mentioned in the following table:

SEEDED_SKEY	SEEDED_CODE	SEEDED_DESC
0	MSG	Missing
-1	OTH	Other

2.5 Heterogeneous Support for SCD to RDBMS

After SCD execution on Hive Information Domain, you can update the data from Hive DIM table to RDBMS DIM table. Consider the following assumptions:

2.5.1 Assumptions

DIM table in Hive and RDBMS should have the same table and column names, though column order may differ but not the data type.

Pass 2 extra parameters `DBSERVERNAME` and `DBSERVERIP` in SCD call to update data from Hive to RDBMS. This is done using RUN EXECUTABLE.

```
<SCD EXECUTABLE NAME>,<REFRENCE NUMBER>,<TARGET RDBMS NAME>,<TARGET RDBMS
SERVER>
```

For example:

```
scd,78,devofsatm,192.0.2.1
```

Relevant entry should be present in `AAI_DB_DETAIL` table corresponding to `<TARGET RDBMS SERVER>` and `<TARGET RDBMS NAME>`.

2.6 Configuring Apache Livy with Spark and Hive

Apache Livy enables easy interaction with a Spark and Hive cluster over a REST interface. It enables easy submission of Spark jobs or snippets of Spark code, synchronous or asynchronous result retrieval, and Spark Context management, through a simple REST interface or an RPC client library. Perform the following configurations to enable Apache Livy:

- Configuring Apache Livy
- Configuring a Cluster

2.6.1 Configuring Apache Livy

To configure Apache Livy, perform the following steps:

1. Download Apache Livy version 0.4 or 0.5 from the Apache website.
   File Name: `apache-livy-0.5.0-incubating-bin.zip`

   > **NOTE** File name for version 0.4 is `apache-livy-0.4.0-incubating-bin.zip`.

2. Extract the file under the edge node or named node of the **Apache** cluster, where you have access to `HADOOP HOME` and `SPARK HOME` directory.

   The extracted folder is created as **LIVY_HOME**.

3. Configure the `$LIVY_HOME/conf/livy.conf` file for the following properties:

```
livy.server.port = 8998

livy.spark.master = yarn
livy.repl.enable-hive-context = true
livy.server.launch.kerberos.keytab = /scratch/ofsaa/ofsaa.keytab
livy.server.launch.kerberos.principal = ofsaa@OFS682.ORACLE.COM
livy.repl.enableHiveContext = true
```

4. Configure the following environment variables for Apache Livy in the `$LIVY_HOME/conf/livy-env.sh` file:

```
### directory of JDK used for Apache

export JAVA_HOME=/scratch/software/jdk1.8.0_101

### spark 2.x home directory from Apache

export SPARK_HOME=/scratch/Apache/parcels/SPARK2/lib/spark2

export SPARK_CONF_DIR=/etc/spark2/conf

export HADOOP_CONF_DIR=/etc/hadoop/conf:/etc/hive/conf
```

5. After configuring the Apache Livy, restart using the following commands:

```
$LIVY_HOME/bin/livy-server stop

$LIVY_HOME/bin/livy-server start
```

To verify the server log, see the `$LIVY_HOME/logs/livy-<user>-server.out` file.

2.6.1.1 Configuring Apache Livy to use HTTPS or SSL-TLS 1.2

If you want to use Sparkmagic to communicate with Apache Livy through `HTTPS` or `SSL-TLS 1.2`, you must perform the following actions to configure Apache Livy as a secure endpoint:

- Generate a keystore file, certificate, and truststore file for the Apache Livy server or use a third-party SSL certificate.
- Update Apache Livy with the keystore details.
- Restart the Apache Livy server.

Following are the steps to create the self-signed certificate and configure Apache Livy to use HTTPS or SSL-TLS 1.2:

1. Generate a keystore file for the Apache Livy server using the following command:

   ```
   keytool -genkey -alias <host> -keyalg RSA -keysize 1024 –dname
   CN=<host>,OU=ofsaa,O=ofsaa,L=redwood,ST=ca,C=us –keypass <keyPassword>
   -keystore <keystore_file> -storepass <storePassword>
   ```

2. Create a certificate using the following command:

   ```
   keytool -export -alias <host> -keystore <keystore_file> -rfc –file
   <cert_file> -storepass <StorePassword>
   ```

3. Create a truststore file using the following command:

   ```
   keytool -import -noprompt -alias <host> -file <cert_file> -keystore
   <truststore_file> -storepass <truststorePassword>
   ```

4. Update the `livy.conf` file with the keystore details. For example:

   ```
   livy.keystore = /home/ofsaa/livy-0.5.0-incubating-bin/keystore.jks

   livy.keystore.password = storepass123

   livy.key-password = keypass123
   ```

5. After configuring the Apache Livy server, restart using the following commands:

   ```
   $LIVY_HOME/bin/livy-server stop

   $LIVY_HOME/bin/livy-server start
   ```

   To verify the server log, see the `$LIVY_HOME/logs/livy-<user>-server.out` file.

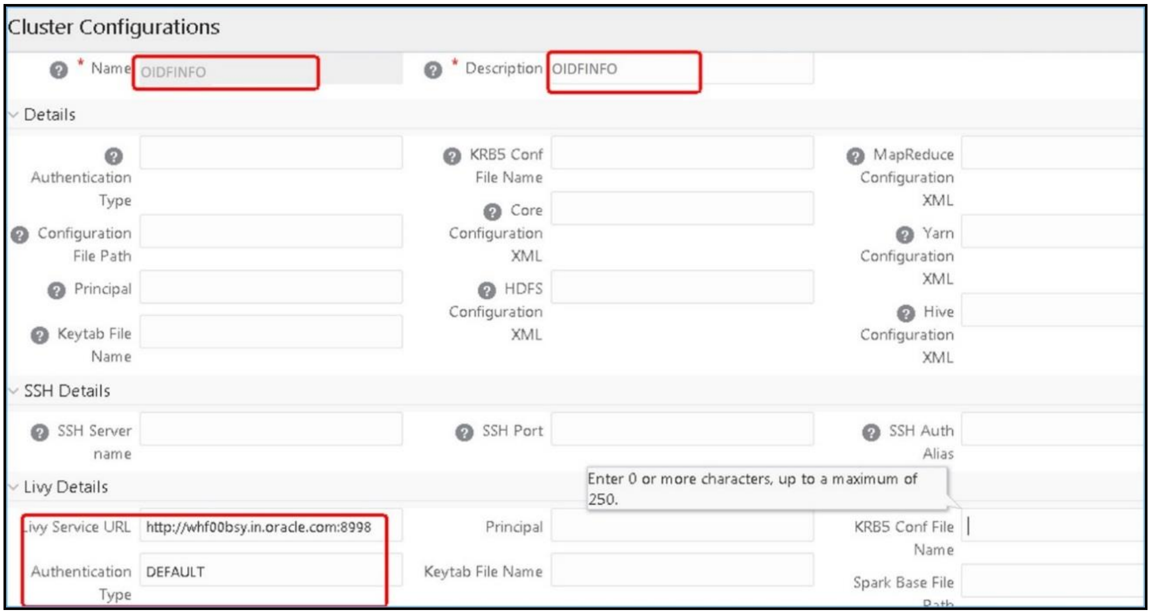
2.6.2 Configuring a Cluster

NOTE

- This section is applicable only during Stage and Results on Hive installation.
- Ensure that you have the proper role to access this screen.

To configure a Cluster, you must configure DMT and provide the Apache Livy Interface details to add a New Cluster, add appropriate roles to the user:

1. Navigate to **Data Management Framework**, select **Data Management Tools**, select **DMT Configuration**, select **Register Cluster,** and then select **Edit Cluster**.
2. Specify the following details in the **Cluster Configurations** window:
   - **Name**
   - **Description**
   - **Livy Details**



Cluster Configurations

* Name: OIDFINFO
* Description: OIDFINFO

Livy Service URL: http://whf00bsy.in.oracle.com:8998

Authentication Type: DEFAULT

Enter 0 or more characters, up to a maximum of 250.

3. In the **Livy Service URL** field, enter the **Apache Livy Server URL** (HTTP or HTTPS) of your environment.
4. Click **Save** to save the Cluster Configurations. The service URL enables easy interaction with a Spark and Hive cluster over a REST interface.

3 Dimension Management Module Configurations

This chapter details about the configurations required in the Dimension Management Module. It consists of the following sections:

- Configurations to use Alphanumeric and Numeric Codes for Dimension Members
- General Configurations for Dimension Management Module

3.1 Configurations to use Alphanumeric and Numeric Codes for Dimension Members

This section explains the configuration required if you want to enable alphanumeric codes for Dimension Members in the Dimension Management module. This feature can be used if you want to use dimensions that are available in external source systems, for which the members may be maintained as a Number or alpha numeric text. For example, for dimensions like currency, alphanumeric codes can be used to denote the currency codes such as INR, USD, and so on, along with the exact amount.

OFSAAI supports both numeric and alphanumeric codes for Members of a Dimension. Both dimension types require a numeric member code. An alphanumeric dimension will additionally store an alphanumeric member code. After performing the Dimension configuration explained in this section, the Alphanumeric Code field in the Member Definition (New Mode) window becomes editable. For more information, see *Adding Member Definition* section in OFS Analytical Applications Infrastructure User Guide.

The REV_DIMENSIONS_B table stores the required dimension metadata including dimension member data type and the member column names for dimension member tables where the numeric and alphanumeric codes are stored.

In the REV_DIMENSIONS_B table:

- The column MEMBER_DATA_TYPE_CODE with value 'NUMBER' identifies a dimension as numeric and value 'VARCHAR2' identifies a dimension as alphanumeric.
- MEMBER_CODE_COLUMN specifies the member table column which holds the alphanumeric member code. This is optional for numeric dimensions, where alphanumeric and numeric member codes would be equivalent.
- MEMBER_COL specifies the numeric member code column.

> **NOTE** Any change done in REV_DIMENSIONS_B table requires restart of the web server because the dimension definitions data in cache memory has to be refreshed.

A new installation by default will have the seeded key dimensions configured as numeric, although those dimension member tables include a column for alphanumeric member codes. You can configure any of these dimensions as alphanumeric. For more information, see Configure Alphanumeric Dimensions.

You might also need to run some SQL updates for numeric dimensions. For more information, see Configure Numeric Dimensions.

3.1.1 Configure Alphanumeric Dimensions

To configure a numeric dimension as alphanumeric and to remove the optional code attribute from prior releases you have to back up the affected dimension tables (like REV_DIMENSIONS_B, REV_DIM_ATTRIBUTES_B, REV_DIM_ATTRIBUTES_TL, and DIM_<DIMENSION>_ATTR) and perform the following steps on each applicable dimension.

1. Set the member type as alphanumeric (VARCHAR2) in REV_DIMENSIONS_B and identify the member table's alphanumeric code column name if it is not populated already using the following code:

   ```
   Update REV_DIMENSIONS_B SET
   
   Member_Data_Type_Code = ’VARCHAR2’ [, Member_Code_Column =
   ‘{Alphanumeric Column Name}’] Where Dimension_ID = {Dimension ID}
   ```

   Example:

   ```
   Update REV_DIMENSIONS_B SET
   
   Member_Data_Type_Code = 'VARCHAR2', Member_Code_Column =
   'TP_PRODUCT_CODE' Where Dimension_ID = 5;
   ```

   > **NOTE** In OFSAAI 8.0, the seeded key dimensions have already populated MEMBER_CODE_COLUMN.

2. In case, any rows in the Dimension member table contain a null alphanumeric code, you can populate the Numeric Member ID itself as alphanumeric member code as illustrated in the following example. This is to ensure that there is no null value for the Alphanumeric Member Code:

   ```
   Update DIM_GENERAL_LEDGER_B set GL_Account_Code = GL_Account_ID Where
   GL_Account_Code is null;
   
   Commit;
   ```

3.1.2 Configure Numeric Dimensions

If REV_DIMENSIONS_B.Member_Code_Column is populated for a dimension, any UI which displays an alphanumeric code will look in the specified column for the member's alphanumeric code. If REV_DIMENSIONS_B.Member_Code_Column is null, the UI will assume no alphanumeric code column exists in the member table and will display the alphanumeric code with the same value as the numeric code. Therefore, for numeric dimensions, you may want to update the metadata.

There are two options available to configure Numeric dimension.

- Option 1: When the dimension does not have <DIM>_CODE column in <DIM>_B table
- Option 2: When the dimension have <DIM>_CODE column in <DIM>_B table

NOTE By default, no configuration changes are required in Rev_Dimensions_B for Numeric dimension, since the REV_DIMENSIONS_B.MEMBER_CODE_COLUMN column has value either <Dim>_Code or null depending on the availability of <Dim>_Code column.

Option 1: When the dimension does not have <DIM>_CODE column in <DIM>_B table.

In this case, the alphanumeric and numeric code value are stored in the same <DIM>_ID column.

- Back up the table REV_DIMENSIONS_B, if you have not done it already.
- Clear the Member Code Column entries for applicable dimensions.

  Example:

  - For specific numeric dimensions, use the following code:

    ```
    Update REV_DIMENSIONS_B Set Member_Code_Column = null Where
    Dimension_ID in([values]);
    ```

    ```
    Commit;
    ```

  - For all editable numeric dimensions, use the following code:

    ```
    Update REV_DIMENSIONS_B Set Member_Code_Column = null Where
    Member_Data_Type_Code = 'NUMBER' and DIMENSION_EDITABLE_FLAG = 'Y';
    ```

    ```
    Commit;
    ```

NOTE If the dimension has <Dim>_Code column and Option 1 is used (that is, the REV_DIMENSIONS_B.MEMBER_CODE_COLUMN is set to null), this will cause the dimension loaders and seeded T2T extracts to fail.

Option 2: When the dimension have <DIM>_CODE column in <DIM>_B table.

In this case, the alphanumeric and numeric code value are stored separately in <DIM>_CODE and <DIM>_ID column (though both the values are same).

- Back up the table REV_DIMENSIONS_B, if you have not done it already.
- Populate the Member Code Column entries for applicable dimensions.

  Example:

  - For specific numeric dimensions:

    ```
    Update REV_DIMENSIONS_B Set Member_Code_Column = <dim>_code Where
    Dimension_ID in([values]);
    ```

    ```
    Commit;
    ```

  - For all editable numeric dimensions:

    ```
    Update REV_DIMENSIONS_B Set Member_Code_Column = <dim>_code Where
    Member_Data_Type_Code = 'NUMBER' and DIMENSION_EDITABLE_FLAG = 'Y';
    ```

    ```
    Commit;
    ```

3.1.3 Configure Alphanumeric Code in Simple Dimension Tables

For some editable seeded and user-defined simple dimensions, the alphanumeric code column currently might not be present in the data model. To add this column to a user-defined simple dimension table, you can use Model Upload. You will also need to update the REV_DIMENSIONS_B table as indicated in Dimension Configuration section, to configure alphanumeric properties.

> **NOTE** You should not modify the structure of any seeded simple dimensions.

3.1.4 Create Index on Code Column

You need to create a unique index on the alphanumeric code column if an index does not exist. While creating index, you need to ensure that the index uniqueness should be case insensitive.

Example:

```
Create unique index IDX1_DIM_PRODUCTS_B on DIM_PRODUCTS_B
Upper(PRODUCT_CODE)

Commit;
```

3.2 General Configurations for Dimension Management Module

These configuration changes are applicable when Dimension Management features provided in OFSAAI are used. You can open `AMHMConfig.properties` file present in the `$FIC_WEB_HOME/webroot/conf` directory to set the properties for the following:

- Member Deletion
- Attribute Default Date Format
- Members Reverse Population
- Hierarchy Reverse Population
- Maximum levels allowed in Hierarchies
- Node Limit for a Hierarchy Tree

Configuration for Dimension and Hierarchy Management has to be done only after the Application Pack installation is done. The properties specific to Information Domain are:

- `$INFODOM$`=<Name of the Information Domain>
- `$DIMENSION_ID$`=<Dimension ID for which the property to be set>

3.2.1.1 Configure Member Deletion

This property should be set to allow the user to delete the Members for the Dimension.

Value	Code	Example
# Member Deletion Configuration - VALUE- Y/N	MEMBER_DEL-$INFODOM$-$DIMENSION_ID$=$VALUE$	MEMBER_DEL-ORAFUSION-1=Y

3.2.1.2 Configure Attribute Default Date Format

This property should be set to display the Default Date Format for Date type Attribute in Attributes window.

Value	Code	Example
# Attribute Default Date Format - DB_DATE_FORMAT:DD-MON-YYYY	ATTR_DEF_DATE_FORMAT-$INFODOM$=$DB_DATE_FORMAT$	ATTR_DEF_DATE_FORMAT-ORAFUSION=DD/MON/YYYY

3.2.1.3 Configure Members Reverse Population

This property should be set for reverse population of Members for the Dimensions in required Information Domains.

Value	Code	Example
# Members Reverse population - VALUE- Y/N	MEMBER_REVERSE_POP-$INFODOM$-$DIMENSION_ID$=$VALUE$	MEMBER_REVERSE_POP-ORAFUSION-1=Y

3.2.1.4 Configure Hierarchy Reverse Population

This property should be set for reverse population of Hierarchies for the Dimensions in required Information Domains.

Value	Code	Example
#Hierarchy Reverse population - VALUE- Y/N	HIERARCHY_REVERSE_POP-$INFODOM$-$DIMENSION_ID$=$VALUE$	HIERARCHY_REVERSE_POP-ORAFUSION-1=Y

3.2.1.5 Configure Maximum Levels allowed in Hierarchies

This property is required to set the maximum levels allowed to build the Hierarchies tree structure.

Value	Code	Example
#Hierarchy Maximum level allowed for the hierarchy in particular Information Domain - VALUE - Integer number	MAX_DEPTH-$INFODOM$=$VALUE$	MAX_DEPTH-FUSION=15

The Maximum Levels allowed in the hierarchies is less than or equal to 15. If the Hierarchy Reverse population is set as "**Y**" and more than 15 levels are created. Then an alert is displayed as "The number of levels exceeding the limit".

If the maximum level allowed is set as more than 15 and hierarchy reverse population is set as "**Y**" then an error is displayed as "Error occurred in Reverse populating the hierarchy".

3.2.1.6 Configure Node Limit for a Hierarchy Tree

This property is required to display the Hierarchy as a small or a large hierarchy. If the tree node limit exceeds the set limit, the Hierarchies are treated as large Hierarchy.

Value	Code	Example
#Tree node limit for the hierarchy - Values is Integer number	TREE_NODE_LIMIT=$VALUE$	TREE_NODE_LIMIT=30

4 Rule Run Framework Configurations

This chapter details about the configurations required in the Rule Run Framework module. It consists of the following sections:

- Performance Optimization Setting for RRF Module
- Component Registration in RRF
- Configure Forms XML to Execute Server Side Rule

4.1 Performance Optimization Setting for RRF Module

The Process engine and Rule engine has been enhanced to take advantage of ORACLE's fast insertion into table and partition swap mechanism.

Based on the new enhancement, Rule and Process Execution supports two additional execution modes (apart from the Merge execution mode where Oracle MERFGE query is used). They are:

- Select (select insert query is used) - In this execution mode, all records are moved to a temporary table with the updated records and then moved back to the original table. This improves the performance since INSERT is faster than MERGE. In this execution mode, the actual updated record count cannot be known since all records are moved back from the temporary table to the original.
- Partition (partition swap query is used) - This is somewhat similar to Select execution mode. This also moves all the records to a temporary table with the updated records. However, while moving back, the whole temporary table will be moved as a partition of the original table using the Oracle Partition Swap mechanism. In this mode the record count cannot be known as you are swapping the partitions.

The execution mode can be set in the `QRY_OPT_EXEC_MODE` parameter of the CONFIGURATION table as well as `V_EXECUTION_MODE` parameter in the `AAI_OBJ_QUERY_OPTIMIZATION` table. The parameter value can be set as SELECT, MERGE or PARTITION. The optimization table is newly introduced. Both the tables reside in the Configuration schema.

The Configuration table setting is for global level (applies to all rules and processes execution) and the Optimization setting is for rule/process level.

NOTE The Optimization table setting has preference over the Configuration table setting. That is, if `V_EXECUTION_MODE` in `AAI_OBJ_QUERY_OPTIMIZATION` table is set, that will be considered. If it is not set, then the execution mode will be as per the value given in the `QRY_OPT_EXEC_MODE` parameter in the Configuration table. By default, its value will be MERGE.

The columns and the values to be given in the `AAI_OBJ_QUERY_OPTIMIZATION` table are indicated as follows:

Column Name	Description	Value

V_OBJ_CODE	Rule/Process/Run Code	Rule(PR2_RULE_B.V_RULE_NAME)
		Process(PR2_PROCESS_B.V_PROCESS_NAME)
		Run (PR2_RUN_B.V_RUN_NAME)

V_INFODOM_CODE	Infodom Code	Infodom

V_OBJ_TYPE	Rule/Process/Run Type	Rule(RL)
		Process(PT)
		Run (RN)

V_EXECUTION_MODE	Type of query used while executing.	MERGE- Merge statement will be used SELECT- Select Insert will be used PARTITION- Partition swap will be used
F_USE_PARTITION	If partition is used as a filter	Y/N
F_USE_ROWID	If ROWID is used other than primary key in MERGE. This is used only for MERGE query execution.	Y/N
V_MERGE_HINT	Used for MERGE or INSERT hint.	
V_SELECT_HINT	Used for SELECT hint	
V_PRE_SCRIPT	Used for alter statements executed before rule execution	
V_POST_SCRIPT	Used for alter statements executed after rule execution.	

4.1.1 Behavior of Execution Modes

Merge, Select and Partition execution modes are supported. If any value is there in the Optimization table, then the execution mode set in the Configuration table will be ignored and it follows a waterfall model as explained:

For Rule Execution:

With Rule Code - checks if rule level execution mode is set. If it is not set, it checks for the next level.

> **With Process Code** - checks if process level execution mode is set. If it is not set, it checks for the next level.
>
> > **With Run Code** - checks if run level execution mode is set. If it is not set, it checks for the next level, that is, `QRY_OPT_EXEC_MODE` parameter in the Configuration table.

For Process Execution:

> **With Process Code** (Process Execution) - checks if process level execution mode is set. If it is not set, it checks for the next level.
>
> > **With Run Code** - checks if run level execution mode is set. If it is not set, it checks for the next level, that is, `QRY_OPT_EXEC_MODE` parameter in the Configuration table.

Consider an example where you have a Run definition (say Run1) with two rules (Rule1 and Rule 2). For Rule1, the execution mode is set as SELECT and Rule 2, it is not set. For Run1, the execution mode is set as PARTITION. In this case, Rule1 will be executed using Select query (as it is set in rule level) and Rule 2 will be executed using PARTITION query (as it is set in the Run level).

4.1.2 Use ROWID

If this is set to Y, ROWID will also be used along with Primary Key in MERGE query. This entry should be made for MERGE execution mode only. This also follows a waterfall model same like execution mode.

- If Use ROWID is set (as Y/N) in the Optimization table, it will take preference over the Configuration table entry.
- If Use ROWID is set as N in Optimization table and
  - It is set to Y in Configuration table, for all the rules ROWID will be used, irrespective of what is set in rule level.
  - It is set to N in Configuration table, then it will check for rule level setting and behave accordingly.
- If Use ROWID is left blank in the Optimization table, it will be considered as N.

4.1.3 Use PARTITION

This has been newly introduced. If a table used in a Rule has partition and is registered with OFSAA Object Registration, then the partition columns will be added as a filter to all the type of rule queries (MERGE/SELECT/PARTITON); provided the USE PARTITION is set to Y. The behavior is same as that of Use ROWID.

4.1.4 Hints/ Scripts

You can enter Merge/ Select Hints and Post/ Pre Scripts in the Optimization table.

- If Hints/ Scripts are given in the Optimization table, those will be considered and it will not check in the Configuration table.
- If no entry is there in the Optimization table, it will check in the Configuration table and Rule level, and both will be considered during execution.

4.2 Component Registration in RRF

A Component in the context of OFSAAI is an entity which can be executed individually in Operations module to carry out some definite job for which it has been formed. Components within OFSAAI and its application need to be registered so that it is configurable for different installations with very minimal change.

The component registration process helps you to make the components of Process and Run module configurable inside Run Rule Framework (RRF). With component registration, components can be added, modified and deleted from RRF by doing very minimal changes to the system. For registering a component in RRF, the same should be present in ICC also.

Steps to Register Component

Registering Component has been divided into the following steps respectively:

- Component Detailed Implementation Class
- Deployment
- Entry to PR2_COMPONENT_MASTER Table

4.2.1 Component Detailed Implementation Class

The component implementation class has to be made for all the components which are inserted to the `PR2_COMPONENT_MASTER` table.

This class has to extend **com.ofs.aai.pr2.comp.PR2ComponentProps**, in turn to implement the following methods.

- getComponentDescription
- getPorbableParamValues (optional)

Implementation of interface com.ofs.aai.pr2.comp.PR2Component is optional. This interface will be implemented for only the components which can be directly used in a Process or Run. By implementing this class file following methods has to be over written.

- getSummay
- getCompDescMap
- fillTaskParameter
- getUsedTables

Each method takes current username and locale by default.

4.2.1.1 getComponentDescription

This method is used to get the description for all the components which are show in the component tree.

The Input Parameters are:

- String username
- String locale

Return is:

- String

It returns the localized string that has to be displayed for the component in the component tree.

4.2.1.2 getPorbableParamValues

This method is used to identify if a parameter input should be a text box or a drop down field.

The Input Parameters are:

- String username
- String locale
- String infodom

Return is:

- Map<String, String>

It returns map containing entry key as the value which is shown to the user. The entry value is stored in database.

4.2.1.3 getSummary

This method is used to get all existing definition of the component type existing in the system.

The Input Parameters are:

- String username
- String locale
- String infodom

Return is:

- Hashtable<String, Vector<com.ofs.aai.pr2.comp.bean.TaskDefinition>>

It returns a Hashtable of <String, Vector<TaskDefinition>>. Where key denotes any specific sub-levels to be shown, which in turn contains a JSON object with compName, compDesc, isDinamic, levelImg properties for that sub-level and the Vector<TaskDefinition> contains all the data needed for using the component in a process or run.

4.2.1.4 getCompDescMap

This method is used to find all details about all specified definitions.

The Input Parameters are:

- String username
- String locale
- String infodom
- Map<String, String> descMap
- Boolean allData

Return is:

- Map<String, String>

Passed to the method in Map<String, String>, where key is the definition unique code. The value is a JSON object with defnDesc property with the value same as code. The same JSON has to be replaced with another JSON object containing defnDesc, defnSubType, defnRef1Name, defnRef1Value, defnRef2Name, defnRef2Value, defnRef3Name, defnRef3Value, defnRef4Name, defnRef4Value, defnOptParamName properties. The values populated for these properties as follows.

Property Name	Description
defnDesc	Populated with <name> for the <code> of the definition, if <name> exists. If <name> does not exist, then populated with <code>:SD. If definition does not exist, then populated with <code>:NA.
defnSubType	Sub-Type of the definition
defnRef1Name defnRef1Value defnRef2Name defnRef2Value defnRef3Name defnRef3Value defnRef4Name defnRef4Value	Any references which can be used to Identify the definition uniquely. There are four of them. So can be put as name and value pairs.
defnOptParamName	If any optional parameter exits and has to be taken as input from user, then only the name can be provided by this property.

There is another input called **allData**, which is a flag. If it is false then only **defnDesc** has to be passed and when true all the data has to be passed.

After putting the corresponding JSON Object to its <code> the same map is returned back.

4.2.1.5 fillTaskParameter

This method is used to get the parameters for the component which will be used to execute the component in Operations module.

The Input Parameters are:

- String username
- String locale
- String infodom
- String uniqueName
- String subtype
- Map<String, String> allParams

Return is:

- Map<String, String>

It takes uniqueName which is nothing but the <code> of the definition. It also takes subType of the definition and an allParams which is of data type Map<String, String>. This map contains all the probable parameters with it, where key is the parameter name and value is the parameter value. This map contains following params.

- Dollar variables ($RUNID, $RUNSK, $EXEID, $RUNEXECID, $MODE).
- All reference name and value.
- Optional parameter if any.

By using the map another LinkedHashMap will be created in this method with all the parameters needed to run the component in Operations module. Al the parameter in this map has to be put in correct order. This LinkedHashMap will be returned back to the calling method.

4.2.1.6 getUsedTables

This method is used to get the dependent tables for specified definition of the component type.

The Input Parameters are:

- String username
- String locale
- String infodom
- String uniqueName
- Map<String, String> allParams

Return is:

- Set<String>

It takes uniqueName which is <code> of the definition and the same allParam map which is used in fillTaskParameter method. By using these inputs a Set<String> will be formed with all the dependant table data. This data is used to identify a Rule Filter / Process Filter can be applied to this component. This Set will be returned to the calling method.

4.2.2 Deployment

Below steps should be followed for deployment of the component.

1. Place all the image files to the folders mentioned in `V_TREE_IMAGE` column of `PR2_COMPONENT_MASTER` table, relative to `<FIC_WEB_HOME>/webroot folder` of the application.
2. The jar containing the component implementation classes has to be placed into `<FIC_WEB_HOME>\webroot\WEB-INF\lib f`older.
3. Rebuild and redeploy the application.

4.2.3 Entry to PR2_COMPONENT_MASTER Table

`PR2_COMPONENT_MASTER` is the table for storing all components which are used in RRF. You can enter either through backend which is explained here or through UI which is explained in the Component Registration section under RRF module in the OFS Analytical Applications Infrastructure User Guide.

An entry contains the following fields.

Column Name	Type	Description	Null
V_PR2_COMPONENT_ID	VARCHAR2(30)	Represents component type in a Process or Run.	N
V_PR2_COMPONENT_PARENT_ID	VARCHAR2(30)	Indicates parentage which refers to V_PR2_COMPONENT_ID.	Y
V_COMPONENT_ID	VARCHAR2(30)	Existing ICC Component Id.	Y
V_PR2_COMPONENT_CLASS	VARCHAR2(100)	Fully qualified class path of the implementation class for this component.	N
V_TREE_IMAGE	VARCHAR2(100)	Name with relative path (with respect to web context) of the image which will be displayed in the component tree.	N
N_TREE_ORDER	NUMBER(9)	Display order of the component in the tree. The order is done upon the peers.	N
V_SEEDED_BY	VARCHAR2(8)	Differentiates user created and system created. The system created will have this field filled with an application name which cannot be edited from the front-end utility. The components created from front-end utility will not populate any value in this field which can be edited or deleted from front-end.	Y
V_CREATED_BY	VARCHAR2(30)	Stores the creator username.	N

Column Name	Type	Description	Null
D_CREATED_DATE	TIMESTAMP(6)	Stores created date and time.	N
V_LAST_MODIFIED_BY	VARCHAR2(30)	Stores the modifier username.	Y
D_LAST_MODIFIED_DATE	TIMESTAMP(6)	Stores modified date and time.	Y

Example:

```
insert into PR2_COMPONENT_MASTER (V_PR2_COMPONENT_ID,
V_PR2_COMPONENT_PARENT_ID, V_COMPONENT_ID, V_PR2_COMPONENT_CLASS,
V_TREE_IMAGE, N_TREE_ORDER, V_SEEDED_BY, V_CREATED_BY) values ('COMPTYP',
null, 'Component Sample', 'com.sample.ComponentSample',
'sampleImages/sampleComp.gif', 0, 'SEEDEDBY', 'USER')
```

4.2.4 Sample Code

The COMPONETSAMPLE.txt file contains the sample code of a created component.

4.3 Configure Forms XML to Execute Server Side Rule

You can execute database stored procedure and RRF Run using the Forms Framework server side rule configuration.

In order to execute RRF Run using Forms xml, the Form where server side rule is being executed with Type as "**REVELEUS_RULE**" you need to manually update the Type as "**FIRERUN**".

For example, the `RiskRecalculate.xml` having server side rule is used to re-calculate the risk. Here the Type needs to be changed as suggested below.

Replace the following attribute **Type** value:

<RULESET ID="110" TYPE="**REVELEUS_RULE**">

With

<RULESET ID="110" TYPE="**FIRERUN**">

5 Operations

This chapter details about the configurations required for ICC delink from FICServer and distribution of multiple Activation Managers (AM) on multiple nodes.

> **NOTE** To use the features explained in this section, additional licenses may apply. For details, contact My Oracle Support.

5.1 Delink ICC Server from FICServer

This section is applicable to OFSAAI 8.0.7.3.0+, 8.0.8.1.0+, and 8.0.9.1.0+ versions only.

OFSAA predominantly has been a batch centric application that runs in the Application layer. With the increase in the number of batches running concurrently, the memory usage within the Application layer is adversely affected and this results in the slow performance of the applications. ICC server also has to-and-fro traffic requests to FICServer during batch executions to fetch its own metadata, which further degrades the performance of the application.

A way to improve the performance is to separate or de-link the ICC server from FICServer. ICC Server is enhanced to get its own metadata during batch executions without any dependency with FICServer.

Following are the advantages of delinking the ICC server from FICServer:

1. The load on FICServer during batch execution is reduced.
2. ICC server deployed on a different instance to FICServer helps in controlling the memory surge observed on FICServer.
3. You can execute batches concurrently even when the load on FICSERVER is at the peak level.
4. Execution engines with component types such as Load Data, Transform Data, Data Quality and RULE_EXECUTION can be successfully executed without any dependency on FICServer.
5. In case the FICServer is down,
    - You can create batches using the Manage Run Execution (`WSMRERequest.sh`) command line utility with any available component types.
    - You can execute batches through the ESIC (External Scheduler Interface Component) command line utility.

This enhancement is available as a licensed option and the existing architecture of co-existence of ICC and FICServer continues as the default option.

5.1.1 Configure ICC Server on a Separate OFSAA Node

5.1.1.1 Prerequisites

1. A separate OFSAA node must be available where ICC server can be run independent of FICServer.
2. Batches for execution should have the component types as Load Data, Transform Data, Data Quality and RULE_EXECUTION.
3. Ensure the new tier on which the ICC server is running is on similar tech stack as the OFSAA application deployed node.

5.1.2 Steps to Deploy ICC Server in Separate OFSAA Node

NOTE In this section, the App layer refers to the OFSAA node where FICServer is already running and the ICC layer refers to the new OFSAA node where ICC server will be deployed.

1. Copy the `.profile` file from the App layer to the new ICC layer.
2. Copy the following Jars from the `$FIC_HOME/ficapp/common/FICServer/lib` folder in the App layer to the `$FIC_HOME/ficapp/common/FICServer/lib` folder in the ICC layer.
   - `icccomm.jar`
   - `FICServer.jar`
   - `aai-core.jar`
   - `AESCryptor.jar`
   - `scheduler.jar`
3. Copy the following libraries from the `$FIC_HOME/ficdb/lib` folder in the App layer to the `$FIC_HOME/ficdb/lib` in the ICC layer.
   - `libDatabase.so`
   - `libI18N.so`
   - `libmisc.so`
   - `librevlog.so`
   - `libSms.so`
4. Copy the following folders from the App layer to ICC layer:
   - `$FIC_HOME/ficapp/icc`
   - `$FIC_HOME/conf`
   - `$FIC_HOME/utility/ES`
5. Modify the following parameters specific to the ICC layer in the `.profile` file:

   a. Set `FIC_HOME` variable to the directory that is created as OFSAA home.

b. Set `FIC_DB_HOME` variable to the directory where the ficdb folder is copied.

c. Set `FIC_APP_HOME` variable to the directory where the ficapp folder is copied.

d. Set `JARPATH` variable to the `$FIC_APP_HOME/lib` path.

e. Set `ES_HOME` to the directory where the `utility/ES` folder is copied.

```
ES_HOME=$FIC_HOME/utility/ES
export ES_HOME
```

f. Configure `ORACLE_HOME` and `JAVA_BIN` to the PATH environment variable as follows:

```
PATH=$JAVA_BIN:$ORACLE_HOME/bin:/usr/bin:/bin:/usr/sbin:$FIC_APP_HOM
E/icc/bin

export PATH
```

g. Modify the `LD_LIBRARY_PATH` to point it to the Java installation directory in the ICC layer as shown:

```
LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/usr/java/jdk1.8.0_172/jre/lib/amd6
4/server
```

6. In ICC layer, modify the `File name` in the `ICCLog4jConfig.xml` file available in the `$FIC_APP_HOME/icc/conf` folder to point it to the new ICC layer `$FIC_HOME` path.

7. In ICC layer, modify the following variables in the `server.conf.properties` file available in the `$FIC_APP_HOME/icc/conf` path:

Variable Name	Description	Example
ICC_SERVER_HOST	The IP address of the ICC server.	ICC_SERVER_HOST=192.0.2.1
OBJECT_SERVER_PORT	The port on which ICC is listening.	OBJECT_SERVER_PORT=6666
ICC_ROUTER_HOST	The IP address of the Router.	ICC_ROUTER_HOST=192.0.2.2
ICC_ROUTER_PORT	The port on which router is listening.	ICC_ROUTER_PORT=7777
MESSAGE_SERVER_HOST	The IP Address of the message server	MESSAGE_SERVER_HOST=192.0.2.3
MESSAGE_SERVER_PORT	The port on which the message server is listening	MESSAGE_SERVER_PORT=8888

8. Execute the following SQL script in the Configuration Schema by replacing <ICCSERVERHOSTIP> with IP address/Hostname of the new ICC layer.

```
UPDATE CONFIGURATION SET PARAMVALUE = '<ICCSERVERHOSTIP>'

WHERE PARAMNAME = '&ICC_SERVER_HOST'
```

9. Navigate to `$FIC_APP_HOME/icc/bin` folder and start the ICC server by executing the following command:

```
./iccserver.sh
```

10. Verify the log file `iccserver.log` under `$FIC_HOME/logs/` folder for any errors.

5.2 Distributed Activation Manager (AM) Based Processing

Distributed AM based processing feature allows you to configure AM engines to run on multiple OFSAA nodes and then ICC Batch Tasks can be configured to get distributed across AM engines on multiple nodes to enable distributed or parallel task executions. Distributed AM based processing is achieved in OFSAA by two mechanisms.

1. Configuring OFSAA processing tier through Load Balancer where Batch Tasks are distributed across multiple AM nodes. In this case, create the FTPSHARE folder on the common file storage (NAS/ NFS) and then create a local mount point on the OFSAA server to access this folder.
2. Manually configuring Batch tasks to run on specific AM nodes. In this case, you can either copy the folder contents of the current FTPSHARE to the newly created folder on secondary AM server or node or create the FTPSHARE folder on the common file storage (NAS or NFS) and then create a local mount point on the OFSAA server to access this folder.

For the both mentioned mechanisms, you should configure the Secondary AM server. For details, see the following section.

NOTE For an illustration of the Distributed Activation Manager deployment, see Appendix A.

5.2.1 Setting Up of Secondary AM Server

5.2.1.1 Prerequisites

- For information on hardware and software requirements for setting up of secondary AM server, see *Hardware and Software Requirements* section in OFS AAAI Application Pack Installation Guide.
- Execute the following SQL script on Configuration Schema by replacing `<NEWAMIPADDRESS>` with the IP address/Hostname of the new AM node you want to set up and `<EXISTINGAMIPADDRESS>` with the IP address/IP address of the existing AM server:

```
INSERT INTO ficsysmaster
(WEBIPADDRESS,APPIPADDRESS,DBIPADDRESS,ETLAPPHOME,NOOFCPUS,VMEMORY,PMEMORY,CACHE,NOOFTHREADS,IOTRANSFER,MAXTRANSPERSEC,DISKSDBSTRIPING,DISKSFILESTRIPING,MAXFILESIZE,MAXFTPFILESIZE,MAXFILENAMELEN,OSDATABLOCKSIZE,DATASETTYPE,STAGEPATH,DBFTPSHARE,DBFTPUSERID,DBFTPPASSWD,DBFTPPORT,DBFTPDRIVE,APPFTPSHARE,APPFTPPORT,APPFTPDRIVE,APPFTPUSERID,APPFTPPASSWD,WEBFTPSHARE,WEBFTPPORT,WEBFTPUSERID,WEBFTPDRIVE,WEBFTPPASSWD,OSTYPE,SOCKETSERVERPORT,SEC_SHARE_NAME,SEC_USERID,SEC_PASSWD,F_ISPRIMARY,N_PRECEDENCE)

SELECT
WEBIPADDRESS,APPIPADDRESS,'<NEWAMIPADDRESS>',ETLAPPHOME,NOOFCPUS,VMEMORY,PMEMORY,CACHE,NOOFTHREADS,IOTRANSFER,MAXTRANSPERSEC,DISKSDBSTRIPING,DISKSFILESTRIPING,MAXFILESIZE,MAXFTPFILESIZE,MAXFILENAMELEN,OSDATABLOCKSIZE,DATASETTYPE,STAGEPATH,DBFTPSHARE,DBFTPUSERID,DBFTPPASSWD,DBFTPPORT,DBFTPDRIVE,APPFTPSHARE,APPFTPPORT,APPFTPDRIVE,APPFTPUSERID,APPFTPPASSWD,WEBFTPSHARE,WEBFTPPORT,WEBFTPUSERID,WEBFTPDRIVE,WEBFTPPASSWD,OSTYPE,SOCKETSERVERPORT,SEC_SHARE_NAME,SEC_USERID,SEC_PASSWD,F_ISPRIMARY,N_PRECEDENCE FROM ficsysmaster
```

```
WHERE DBIPADDRESS='<EXISTINGAMIPADDRESS>'
```

To set the newly added AM node as primary node, execute the following SQL script by replacing `<NEWAMIPADDRESS>` with the IP address/Hostname of the newly added AM node:

```
UPDATE FICSYSMASTER SET F_ISPRIMARY = 'Y', N_PRECEDENCE=200 WHERE
DBIPADDRESS = '<NEWAMIPADDRESS>'
```

Following are the steps involved in setting up of secondary AM servers:

1. Copy the following folders to the secondary AM server from the primary OFSAA server:
   - `$FIC_HOME/conf`
   - Entire `ficdb` and its sub-directories
   - The `.profile` file from the `$HOME` directory of the primary OFSAA server
2. Perform the following configurations in the secondary AM server:

   a. Modify the following variables in the `.profile` file:

   i. Set `FIC_HOME` variable to the directory that is created as OFSAA home (should contain `ficdb` and `conf` folders).

> **NOTE** It is advisable to setup the OFSAA secondary AM under the same user as in the primary server. For example, if OFSAA is installed on the primary server under `/scratch/ofsaausr`, you can setup the secondary OFSAA instance as well under `/scratch/ofsaausr` user.

3. Set the `FIC_DB_HOME` variable to the directory where the `/ficdb` folder is copied under secondary AM server.

```
AM_HOME=$FIC_HOME/ficdb
export AM_HOME
AM_CONF_FILE=$FIC_DB_HOME/conf/am.conf
export AM_CONF_FILE
FICTEMP=$FIC_DB_HOME/conf
export FICTEMP
```

4. Ensure the following variables are pointed to valid hostname/IP address on which Message Server, Router server, and Router engines are running.

```
MESSAGE_SERVER_HOST=10.XXX.XXX.XXX
export MESSAGE_SERVER_HOST
MESSAGE_SERVER_PORT=6666
export MESSAGE_SERVER_PORT
FIC_ROUTER_HOST=10.XXX.XXX.XXX
export FIC_ROUTER_HOST
FIC_ROUTER_PORT=7777
export FIC_ROUTER_PORT
```

5. Set `JARPATH` variable to `$FIC_DB_HOME/lib.`
6. Ensure ORACLE_SID variable is pointed to correct Oracle Instance and user can successfully connect to this instance from the Secondary AM server using sql/plus.
7. Update secondary AM node details in the `AM.conf` file present under `$FIC_HOME/ficdb/conf` path.

```
<AM_HOST>`<Secondary AM node host name/IP Address>`

<AM_PORT>`<Secondary AM node Port number>`
```

> **NOTE** Do not alter `<ROUTER_NAME>, <ROUTER_PORT>` and `<ROUTER IP ADDRESS>` values.

8. Modify the logger XML files such as `MFLogger.xml, OFSAALogger.xml, DQLogger.xml,` and `PR2Logger.xml` available under `$FIC_DB_HOME/conf` folder with the secondary AM Server `$FIC_HOME` path.

5.2.2 Configuring OFSAA Instance through Load Balancer to Distribute Batch Tasks on Multiple AM Nodes

See *Configuring OFSAA Load Balancer* section in the Configuration for High Availability (HA) Best Practices Guide for details on how to configure the Load Balancer.

> **NOTE** Message Server should be running in all the nodes where AM servers are configured.

5.2.3 Executing Batches on Multiple AM Nodes

While defining a Task in a Batch from the *Task Definition* window in the Operations module, you can choose on which node each task needs to be executed. The **Primary IP for Runtime Processes** drop-down list in the *New Task Definition* window displays all the registered AM Server nodes. Select the IP address of the AM node where you want the task to be executed. For more information on how to define a Batch, see OFS Analytical Applications Infrastructure User Guide.

> **NOTE** Crash handling of backend servers is supported. For more information, see *Crash Handling of Backend Servers* section in OFS Analytical Applications Infrastructure User Guide.

6 Unified Analytical Metadata Configurations

This chapter details about the configurations required in the Unified Analytical Metadata module. It consists of the following sections:

- Hierarchy Node Internationalization
- Data Element Filters Classification

6.1 Hierarchy Node Internationalization

Hierarchy Node Internationalization is a feature available for Business Hierarchies in Oracle Financial Services Analytical Applications Infrastructure. This feature is introduced to internationalize the node description of Regular Business Intelligence Enabled (BI) and Parent Child (PC) Hierarchies and to display them in Hierarchy Browser.

Each Node has a description. Previously, the node descriptions were fetched from the Description column of the Dimension table to facilitate the node description generation in `REV_LOCALE_HIER` table. Hierarchy node Internationalization feature changes the way in which these descriptions are stored in the `REV_LOCALE_HIER` table. The locale specific node descriptions are fetched from Multi Language Support table (`MLS` table). This table holds the node descriptions in all the installed locales, that is, in the locales in which OFSAAI is available.

6.1.1 Scope

The scope of this enhancement is limited to the Hierarchy Browser window. The hierarchies defined are displayed in Hierarchy Browser and the Hierarchy Browser is used in modules such as Unified Metadata Manager, Rules Framework, Metadata Browser, Map Maintenance, Forms Framework, and Hierarchy Maintenance.

6.1.2 Prerequisites

Following are the prerequisites for creating a Hierarchy with Multi Language Support Descriptions:

- The Hierarchy under creation should be either Regular Business Intelligence Enabled (BI) or Parent Child (PC).
- The Multi Language Support table MLS should be created either through Data Model Upload or manually in atomic schema. For more information on MLS table and structure, refer to Multi Language Support (MLS) Table.
- The Description columns used for node generation should be of **Varchar** / **Varchar2** data type.

6.1.3 Multi Language Support (MLS) Table

The MLS table which is meant to provide multi language support can have any name as per Oracle database nomenclature and details of this table need to be configured for further usage. More details about the configuration are explained below:

> **NOTE** The insertion of data into MLS tables should be performed manually.

6.1.3.1 MLS Table Structure

Following points must be taken care during MLS table creation:

- Description columns on which the Hierarchy definition is based should also be present in the MLS table.
- A column of data type **Varchar** / **Varchar2** should be present in the MLS table. This column should contain the information about the locale (such as **fr_FR**, **ko_KR**). Refer to the MLS Table Configuration section for more details.
- Going forward Dimension related information will be maintained in OFSAAI tables. Before proceeding with the configuration of Dimension and its MLS table, the following master tables need to have data.
  - CSSMS_SEGMENT_MAST

    This table holds information about the segments present in OFSAAI and an entry needs to be present in this table for mapping a dimension to a segment/ folder. The Dimension data to be seeded into AAI tables can be mapped to the folder/segment 'DEFAULT'. So the entry for 'DEFAULT' folder needs to be included in this table.
  - AAI_OBJ_TYPE_B

    This table holds information about various object types supported in OFSAAI such as Dataset, Business Measure, and so on. For Dimension management, the object type will be DIMENSION.
  - AAI_OBJ_TYPE_TL

    This table holds locale specific information about various object types present in OFSAAI. Locale specific information about the object type 'DIMESNION' needs to be added here.
  - AAI_OBJ_SUBTYPE_B

    This table holds information about different objects' sub types supported in OFSAAI. The different sub types associated with a 'DIMENSION' object will be mentioned in this table.
  - AAI_OBJ_SUBTYPE_TL

    This tables hold locale specific information about various object sub types present in OFSAAI and information on the subtypes of 'DIMESNION' are maintained in this table.

NOTE Refer to the HNL_Data for more information on the sample data. The data provided in each of these tables is not exhaustive and has been provided as per requirements of Hierarchy Node Localization only.

6.1.3.2 MLS Table Configuration

Consider a Hierarchy "**Income"** defined on a dimension table "DIM_INCOME". The table structure is as indicated in the following table:

Column Name	Primary Key	Datatype
N_CUST_INCOME_BAND_CODE	PK	Number(5,0)
FIC_MIS_DATE		Date
V_CUST_INCOME_SHORT_DESC		Varchar2(80)
V_INCOME_DESC		Varchar2(80)
N_D_INCOME_UPPER_VALUE		Number(22,3)
N_D_INCOME_LOWER_VALUE		Number(22,3)

The primary key of `DIM_INCOME` table is `PK_DIM_INCOME` and is enforced on the column `N_CUST_INCOME_BAND_CODE`.

An MLS table with name, say "`DIM_INCOME_LANG`" can be created in the atomic schema to provide MLS support for `DIM_INCOME`. The structure of this table can be as indicated in the following table:

Column Name	Primary Key	Datatype
N_INCOME_BAND_CODE	PK	Number(5,0)
LOCALE_CD		Varchar2(10)
V_CUST_INCOME_SHORT_DESC		Varchar2(80)

The MLS table corresponding to the Dimension DIM_INCOME can be created as follows:

- Create a table to provide MLS support for the Dimension DIM_INCOME. For example, assume the name of the table is `DIM_INCOME_LANG`. This table which is to provide MLS related information for DIM_INCOME ,needs to be configured:
  - AAI_OBJECT_B

    This table registers information about an AAI object. Since Dimension is considered as an AAI object, the data corresponding to the Dimension DIM_INCOME needs to be maintained in this table.
  - AAI_OBJECT_TL

    This table holds locale specific information about an object in AAI. So locale specific information pertaining to the Dimension, DIM_INCOME, needs to be maintained in this table.
  - AAI_DIMENSION

    This table will provide further information about the DIMENSION table. Information such as whether the data in dimension table is in PC structure, whether the members are acquired in the dimension, and so on are maintained in this table.

- AAI_DIM_META_TABLE

  This is the metadata table for a DIMESNION. Information about the table such as the MLS table meant for the Dimension, the hierarchy table, the attribute table, and so on will be maintained in this table.

- AAI_DIM_META_COLUMN

  This table provides information about various columns that will be used for a Dimension table. From Hierarchy Node Localization perspective, the name of the locale column which will hold locale information needs to be maintained here.

- AAI_DIM_META_JOIN

  This table holds information about the columns that will be used for joining the Dimension table with other tables such as the MLS table, Hierarchy table, Attribute table, and so on. Here multiple join conditions can be specified as well. Refer to HNL_Data excel for further information on providing joining columns information with respect to Hierarchy Node Localization.

The following table displays sample data which can be populated in `DIM_INCOME_MLS` table in a setup where there are 2 locales installed say, English (en_US) and Chinese (zh_CN).

N_CUST_BAND_CODE	V_INCOME_DESC	LOCALE_CD
1	AAA	en_US
2	BBB	en_US
1	CCC	zh_CN
2	DDD	zh_CN

Note the following:

- In Regular BI enabled and PC Hierarchies, the Level Description expression **should not** contain columns with Number or Date data types. The inclusion of such a column in the Level Description expression would prevent the Business Hierarchy from generating nodes.
- There is no concept of **default** locale. Whenever a Hierarchy is saved, the translated node descriptions present in MLS table are saved in the corresponding columns of the `REV_LOCALE_HIER` table depending on the availability of translated values in the MLS table.
- The inclusion or exclusion of nodes from a Hierarchy will be reflected in Forms once the Hierarchy is resaved.

6.1.4 Node Generation Process

During Hierarchy definition, the nodes get generated depending on the structure of the Hierarchy. Node generation is possible in the following two scenarios:

- Node Generation when <DIM>_MLS Table is Present & Configured
- Node Generation when <DIM>_MLS Table is Not Present or Not Configured

6.1.4.1 Node Generation when MLS Table is Present and Configured

When MLS table is present, the nodes are generated by fetching the Description from the MLS table. Thus, entry in the Description columns of MLS table is mandatory.

6.1.4.2 Node Generation when MLS Table is Not Present or Not Configured

When MLS table is not present, by default the nodes are generated by fetching the Description from the Dimension table.

6.1.5 Configure Mapper for Multiple Locales

This step is optional and is required if Node Generation Process explained in the previous section is done.

To configure mapper for multiple locales:

1. Duplicate the data in `REVELEUS_MASTER` table with different locales in `LOCALE_ID` column.
2. Translate `V_OBJECT_DESC` column in `REVELEUS_MASTER` table to the desired locale.
3. Duplicate data in `LOCALE_ID` column in `REV_MAST_MAP_ITEMS` table for different `LOCALE_ID`.

Example:

An existing mapper namely **Mapper A** (created in any locale) can be translated into other locales as indicated in the following example:

4. Login to the configuration schema and duplicate the data in `REVELEUS_MASTER` table by changing the locale in `LOCALE_ID` column.
5. Change `V_OBJECT_DESC` for the corresponding locale in `REVELEUS_MASTER` table.
6. Duplicate the data in `REV_MAST_MAP_ITEMS` table by changing locale in `LOCALE_ID` column.

> **NOTE** 2nd and 3rd steps need to be performed for all the locales to which you wish to translate mapper A.

6.1.6 Update Nodes in Existing Regular BI and PC Hierarchies

Currently, the node description is generated only for one locale on which the Hierarchy is saved. With the introduction of Hierarchy Node Internationalization, the nodes will be generated in all the installed locales.

To generate the localized node descriptions for the existing Hierarchies, you need to edit and re-save the Hierarchies post MLS table creation and configuration. You can also mass update the existing Hierarchies from **Administration** > **Save Metadata** section. The node description data for all the installed locales will be populated in `REV_LOCALE_HIER` table.

NOTE If an SCD (Slowly Changing Dimension) is configured on a Dimension table, synchronize the new entries with the corresponding MLS table also.

6.1.7 Limitations

If the Hierarchies are accessed via Modeling Framework module, the node descriptions of the same will be displayed only in English, despite the locale you have logged in to the application.

6.2 Data Element Filters Classification

This section explains the option to categorize "Filter classification Types" as **Classified, UnClassified**, or **All** which can be used to define Data Element filters on Business Metadata Management objects.

To classify the tables available for a Filter in an existing information domain, perform a Model upload (Incremental / Sliced / Complete) to trigger object registration, which in turn will populate all the necessary entries to the registration tables. This is an optional one-time activity required to register all the tables, so that the tables without classification code are also made available in the Data Element filters.

During Model upload, Object Registration is done for all Tables and columns.

- Tables with the classification code will continue to have entry in `REV_TABLE_CLASS_ ASSIGNMENT` with the appropriate classification code.
- Tables without classification code will also have entry in `REV_TABLE_CLASS_ ASSIGNMENT` with the value as 1000 (UnClassified).

Once tables are registered successfully, you can go to the *Filter* window to Define Data Element Filters on any tables and columns. Based on the Classification, the appropriate Classification type option has to be selected in the *Data Element Selection* window to list the tables.

Note the following:

- If the field value in `CLASSIFICATION_FLG` column of `REV_TABLE_CLASSIFICATION_B` table is set to '**1**', then it is considered as a **Classified** table.

  By Default, the classification codes 20, 200, 210, 310, 370, 50, 300, and 500 will have the `CLASSIFICATION_FLG` set to "**1**".

- The `REV_TABLE_CLASSIFICATION_TL` table will have an entry `TABLE_CLASSIFICATION_CD` = "**1000**", `TABLE_DESCRIPTION` = "**UnClassified**" to identify UnClassified Tables (that is, tables which are not classified in the ERwin through UDP).
- The category "**All**" option will select all the tables available in the infodom, irrespective of whether table is classified or not.

  Since the previous option doesn't check the classification type, even the table which has `CLASSIFICATION_FLG` = **Blank**, in the `REV_TABLE_CLASSIFICATION_B` table will also be listed. These tables will not be displayed under Classified or Unclassified Category.

6.2.1 Limitations

Following are the limitations with Data Element Filters classification:

- While defining Data Element Filter/Group Filter, it is not recommended to use features like using an Expression in a Filter and Macro Columns, since the generated SQL query for these features is unresolved.
- Defining Hierarchy/Attribute Filter is not recommended using BMM objects since the underlying Dimension and Hierarchy data are more specific to EPM Apps, and data will be available only if EPM Apps are installed in same Information Domain.
- Dependency check is not available when any of the BMM objects uses Filters. To maintain dependency between parent and child objects, an appropriate entry has to be added in to the `REV_OBJECT_DEPENDENCIES` table. Since the BMM object definition details are stored in Config schema, and do not populate entry into the `FSI_M_OBJECT_DEPENDENCY_B/TL` tables, the dependency check will not happen especially while deleting a Filter.

6.3 Configuring Essbase Connectivity Check

Essbase connectivity check is required to verify if the client is successfully connecting to the server. Server connectivity is required for creating and maintaining Essbase Cube details in OFSAA.

> **NOTE** Essbase Cube is available to users in the path `OFSAA Applications > Common Tasks > Unified Analytical Metadata > Analytics Metadata`.

6.3.1 Settings in .profile

Perform the following settings in the `.profile` file:

1. Open `.profile` file from $HOME directory of primary OFSAA server.
2. Set `ARBORPATH` to `EPMSystem11R1/common/EssbaseRTC-64/11.1.2.0` path.
3. Set `ESSBASEPATH` to `EPMSystem11R1/common/EssbaseRTC-64/11.1.2.0` path.
4. Set `export ESSLANG=English_UnitedStates.Latin1@Binary`.
5. Save and close the file.

6.3.2 Checking the Connection

Perform the following procedure on the command prompt to check the connection:

1. Login to the OFSAA Server.
2. Navigate to `$HYPERION_HOME/products/Essbase/EssbaseServer/bin` directory.
3. Execute command `./ESSCMD`.
4. Enter `:::[0]-> login`.

5. Enter the following details for the Login:
   a. Host Node >`<ESSBASE_SERVER_HOST_NAME>`
   b. User >`<ADMINISTRATOR_USER_NAME>`
   c. Password >`<PASSWORD>`

7 Enterprise Modeling Framework Configurations

This chapter details about the configurations which are required only if OFS Enterprise Modeling is licensed and enabled in the OFSAA instance on which this release is being installed. This chapter includes the following sections:

- Configuration of Oracle R distribution and Oracle R enterprise (ORE)
- Configurations for OFSAAI Remote Invocation of Scripted Models Using Standard R Distributions
- Configurations for Open-R with HDFS
- Support for Scripts which work on HDFS Files Directly
- User Configurable Execution Implementation
- Configuration for Parallel Execution of Models
- Configurations for ORE Execution
- Variable Migration Utility
- Model Execution Venue Migration Utility

7.1 Configuration of Oracle R distribution and Oracle R enterprise (ORE)

You can refer the Oracle Financial Services Advanced Analytical Applications Infrastructure Application Pack Installation and Configuration Guide for information on configuration of Oracle R distribution and Oracle R Enterprise.

7.2 Configurations for OFSAAI Remote Invocation of Scripted Models Using Standard R Distributions

OFSAAI Remote invocation of “R” distribution (Open-R, Revo-R & others) is an enhancement to the framework which enables execution of “R” scripted Models to be executed on a remote “R” server instance (node). By configuring the OFSAAI with a run time parameter, models can be executed on any node. You can distribute the models for execution on multiple nodes. The settings are applicable for the entire OFSAA installation.

> **NOTE** The reference implementation provided by Oracle is for Open-R distribution. Any other distribution would require custom plug-in based well-published interface-spec to interchange data/parameters and output handling.

7.2.1 Prerequisite

1. Install the following packages along with R (R version 3.0.1):
   - rJava - version 0.9-8

- RJDBC- version 0.2-5
- DBI- version 0.4-1
- Cairo- version 1.5-9

  The packages are available to download from https://cran.r-project.org/.

- Rserve – version 1.8-x (download link - http://rforge.net/Rserve/files/)

2. To execute R scripted models, ensure that the Rserve related jar files such as `REngine.jar` and `RserveEngine.jar` are copied into the `$FICDB_HOME/lib` folder.
3. Install the OFSAAIRunnerOpenR R Package in the remote box where Rserve is running. For more information, see Installing OFSAAIRunnerOpenR R Package.

7.2.1.1 Installing OFSAAIRunnerOpenR R Package

OFSAAIRunnerOpenR is a mandatory R package required to execute models in the Open-R Framework. This package (`OFSAAIRunnerOpenR_1.0.0.tar.gz`) is available in the `$FIC_DB_HOME/lib` directory. Install this package on a machine which runs **Rserve** or **client R Engine**.

Perform the following instructions to install OFSAAIRunnerOpenR R Package:

1. Login to the OFSAA Server.
2. Navigate to the `$FIC_DB_HOME/lib` directory.
3. Copy the file `OFSAAIRunnerOpenR_1.0.0.tar.gz` in default mode to Rserve box (node where Rserve is installed/running).

> **NOTE** The preceding action requires UNIX root login.

4. Navigate to the directory where the file `OFSAAIRunnerOpenR_1.0.0.tar.gz` is copied.
5. Install the package by executing the command as a root user:

```
R CMD INSTALL OFSAAIRunnerOpenR_1.0.0.tar.gz
```

> **NOTE** The OFSAAIRunnerOpenR package is installed in the `/usr/lib64/R/library` directory.

6. Navigate to the directory `$R_HOME/library` and check whether the OFSAAIRunneOpenR package is listed in the directory by executing the command as root user:

```
ls -l
```

7.2.2 Configurations

Following configurations are required for Rserve in remote nodes where Open-R engine is installed:

1. Create **Rserv.conf** file in `/etc` and make following entries:

   ```
   workdir /tmp/Rserv
   pwdfile /etc/Rserveusers
   remote enable
   auth enable
   plaintext enable
   port 6311
   maxsendbuf 0
   interactive no
   ```

   For more details, refer the link: http://rforge.net/Rserve/doc.html.

   > **NOTE** The user who starts the R Server should have the read-write permissions for the working directory.

2. Set the Environment variables for R:

   ```
   JAVA_HOME={java home path}
   JAVA_BIN={java bin path}
   LD_LIBRARY_PATH={LD library path}
   ```

   Note the following:

   - If RJDBC connection is required, copy the `ojdbc<version>.jar` file to the lib directory in the remote file path configured. The version of `ojdbc<version>.jar` file is based on the Java version.
     Limitation: For OFSAA release 8.0.6.0.0, copy the `ojdbc6.jar` file to the lib directory.
   - The `lib` and `conf` folders have to be created under the path mentioned in `<REMOTE_FILE_PATH>` tag.
   - For the Kerberos authentication the required `jaas-conf, krb-conf` and `keytab` files have to be placed under `conf` folder. The `jaas-conf` file name should be same as that of the `keytab` file name. It should be placed under the `conf` folder in the read-write path in remote machine or in the `$FIC_DB_HOME/conf` folder in case of local executions. The `krb5 conf` file name should be same as the name configured in the table.
   - Hive and Hadoop related jars should be copied to the `lib` folder mentioned in the `<REMOTE_FILE_PATH>` tag.

7.2.3 Structure of the gss-jass.conf File

- If sun JDK for Linux is used:

  ```
  com.sun.security.jgss.initiate {
    com.sun.security.auth.module.Krb5LoginModule required
    useKeyTab=true
  ```

```
   useTicketCache=false
   doNotPrompt=true
   keyTab="<KeyTab File Path>"
   debug=true;
};
```

- If IBM JDK for Linux is used:

```
com.ibm.security.jgss.initiate {
   com.ibm.security.auth.module.Krb5LoginModule required
credsType=both
useKeytab="<KeyTab File Path>"
   debug=true;
};
```

7.3 Configurations for Open-R with HDFS

Oracle R Advanced Analytics for Hadoop (ORAAH)/Oracle R Connector for Hadoop (ORCH) is the default approach for running Open-R on HDFS.

7.3.1 Prerequisites

The installation requirements for external dependencies are in the following list:

- Apache Big Data
- ORAAH – Versions supported: 2.6.0 and 2.7.0.
  Download it from http://www.oracle.com/technetwork/database/database-technologies/bdc/r-advanalytics-for-hadoop/downloads/index.html

  For more information on installation and configuration of ORAAH, see ORAAH Installation Guide.
- Cairo- The package is available to download from https://cran.r-project.org/. Download and transfer it to Rserve box. Install the package using the following command:

  ```
  R CMD INSTALL Cairo_Package_Name
  ```

  Or

  ```
  install.packages( “Cairo”, dependencies = T)  #using R session
  ```

The installation requirements for internal dependencies are in the following list:

- OFSAAIRunnerHDFS_1.0.0.tar.gz
- OFSAAIRunnerOpenR_1.0.0.tar.gz

> **NOTE** The packages in the preceding list are mandatory for executions to work. For more information, see section Installing OFSAAIRunnerOpenR R Package.

7.3.2 Installing OFSAAIRunnerHDFS Package

OFSAAIRunnerHDFS is an R package required for executing models in Open-R Framework with HDFS Option. This package (`OFSAAIRunnerHDFS_1.0.0.tar.gz`) is available under `$FIC_DB_HOME/lib`. This package needs to be installed on a machine which is running Rserve or client R Engine.

Refer to the following instructions to install OFSAAIRunner package:

1. Login to the OFSAA Server. Navigate to the folder `$FIC_DB_HOME/lib`.
2. Copy the file `OFSAAIRunnerHDFS_1.0.0.tar.gz` in in default mode to Rserve box (node where Rserve is installed/running).

   NOTE UNIX root login is required.

3. Navigate to the directory where the file `OFSAAIRunnerHDFS_1.0.0.tar.gz` is copied.
4. Install the package by executing the command as root user:

   ```
   R CMD INSTALL OFSAAIRunnerHDFS_1.0.0.tar.gz
   ```

   NOTE The OFSAAIRunnerHDFS package is installed in /usr/lib64/R/library.

5. Navigate to the directory `$R_HOME/library` and check whether OFSAAIRunnerHDFS package is listed there by executing the command as root user:

   ```
   ls -l
   ```

7.3.3 Additional Configurations for ORAAH Executions

The following configurations are mandatory for model executions using ORAAH.

Set the following environment variables in `$R_HOME/etc/Renviron.site` file:

- `HIVE_HOME, SPARK_HOME, HADOOP_HOME` with the respective paths
- `HIVE_CONF_DIR, HADOOP_CONF_DIR, YARN_CONF_DIR, SPARK_CONF_DIR` with their respective configuration directory paths
- `CLASSPATH` and `HADOOP_CLASSPATH` with all the hadoop/hdfs/yarn/hive jars, Hadoop configuration directory (HADOOP_CONF_DIR) and spark configuration directory (SPARK_CONF_DIR)
  For example,

  ```
  CLASSPATH=$HADOOP_CONF_DIR:$SPARK_CONF_DIR:All_hadoop_jars
  ```

- `SPARK_JAVA_OPTS` variable with `$R_HOME/lib`

  For example, `SPARK_JAVA_OPTS="-Djava.library.path=/usr/lib64/R/lib"`

- For **Kerberos** enabled cluster, initializing the ticket should be done in `Renviron/Renviron.site` file.

7.4 Support for Scripts which work on HDFS Files Directly

The framework supports scripts which work directly on the HDFS files. In the technique registration UI and model definition UI there will be a provision to specify what is the input data type – data-frame or HDFS file.

The default pre-script and post-script which comes with the patch set will work only with data frame approach. For the script to work on HDFS files, custom pre and post scripts have to be written and configured in the `ModelingFramework.xml`. Also, the HDFS location has to be configured in the XML.

The HDFS location should have complete access and the necessary packages should have been installed in the server.

7.5 User Configurable Execution Implementation

If you want your own implementation to execute the scripts, you can configure the `<CLASS_NAME>` tag in the `ModelingFramework.xml` with the java class name to be instantiated. Also, the jar file containing this class file should be placed in `$FIC_DB_HOME/lib` folder.

7.6 Configuration for Parallel Execution of Models

If Rserve version is 1.8.x and above, the control feature should not be enabled for parallel execution of models. You should remove the tag `control enable/disable` entry from the `Rserv.conf` file in the `/etc` folder.

7.7 Configurations for ORE Execution

This is an optional step and required only if you have installed and configured Oracle R distribution and Oracle R Enterprise:

1. Login to the Oracle Database Server.
2. Add an entry in `tnsnames.ora` file with same name as that of the value set for `ORACLE_SID`.

> **NOTE** For a RAC database, follow the aforementioned configuration in all nodes of the RAC cluster.

7.8 Variable Migration Utility

The Variable Migration utility is provided to migrate the variables defined in OFSAAI 8.0.5.0.0 and previous versions to the Variables Definition compatible with OFSAAI 8.0.6.0.0. The utility `variableresaveutil.sh` is available in the `$FIC_HOME/utility/variable/bin/` folder.

The following are the steps to run the migration utility:

1. Navigate to `$FIC_HOME/utility/variable/bin` directory.
2. Execute `variableresaveutil.sh` (UNIX).

```
./variableresaveutil.sh
```

This command will migrate all available variables from all Infodoms, which are in the `ftpshare/<infodom>/erwin/variable/` directory.

3. Provide the following parameter if you want to migrate variables that are present in a particular information domain:

   - INFODOM- Specify the information domain name if you want to migrate variables present only in a particular information domain.

     ```
     ./variableresaveutil.sh <INFODOM >
     ```

4. Check the status, and errors if any, in the `migration.log` file available in the `$FIC_HOME/utility/variable/logs/` folder.

> **NOTE** After you have triggered this utility and migrated all variables successfully, any subsequent run of the utility will throw SQL constraint violation errors for Variables that have been migrated. You can ignore this error if you do not want to change any details in migrated variables. If you want to update or correct an existing variable, then delete the migrated variable from UI and retrigger the utility.

7.9 Model Execution Venue Migration Utility

The Model Execution Venue Migration utility helps to migrate the `ModelingFramework.xml` entries configured in previous versions to the table definition compatible with OFSAAI 8.0.6.0.0. This utility `ExecutionConfig.sh` is available in the `$FIC_HOME/utility/ modelutil/bin/` folder. This utility gets executed as part of OFS AAAI Application Pack 8.0.6.0.0 patch installation. If you encounter any errors, you should run the utility again.

Following are the steps to run the utility:

1. Navigate to `$FIC_HOME/utility/modelutil/bin` directory.
2. Execute `ExecutionConfig.sh` (UNIX).

   ```
   ./ExecutionConfig.sh
   ```

   This command migrates all available ModelingFramework.xml target entries to table.

   Check the status, and errors if any, in the `MF_xml_migration.log` file available in the `$FIC_HOME/utility/modelutil/log folder`.

7.10 Data Redaction Grants to Sandbox Schema

The configuration discussed in this section is required if you have selected Data Redaction while installing OFSAA. Data Redaction is an Advanced Security option (see Data Redaction for more details). You have to give grants related to Data Redaction to the Sandbox schema for model execution to execute.

Perform the following procedure to give grants for Data Redaction to the Sandbox schema:

1. Login with System Database Administrator (SYSDBA) rights to the database where the Sandbox schema is created.
2. Give the following Grants:

```
grant execute on DBMS_REDACT to &atomicUser
/
Create role OFS_SEC_DATA
/
grant OFS_SEC_DATA to &atomicUser
/
create role OFS_NOSEC_DATA
/
grant EXEMPT REDACTION POLICY to OFS_NOSEC_DATA
/
grant OFS_NOSEC_DATA to &atomicUser
/
alter user &atomicUser default role none
/
```

8 Process Modeling Framework Configurations

In 8.0.2.0.0, it was called Workflow and Process Orchestration.

This chapter details about the configurations required for Process Modeling Framework module. It includes the following sections:

- SMTP Server Configurations
- Work Manager Configurations

8.1 SMTP Server Configurations

Task notifications can be sent as Email to the assigned users. To receive notifications as email, perform the following configurations:

1. Add the following entries in `AAI_EMAIL_CONFIG` table:

   `V_PROTOCOL` - SMTP

   `V_HOST` –SMTP/ Mail Server ID

   `V_PORT` - SMTP Server Port

   `V_AUTHENTICATION` - Either False or True

   `V_USER_NAME` - Login name to SMTP/ Mail Server ID from which mail will be triggered. This is required if `V_AUTHENTICATION` is set as True.

   `V_PASSWORD` - Password to login into SMTP/ Mail Server. This is required if `V_AUTHENTICATION` is set as True.

   `V_SECURITY` -

2. Add the following entries in the `AAI_USER_PREFERENCE` table:

   In this table, you can set the user preference of how to receive the notification mails.

V_USER_ID	N_EMAIL_NOTIF_REQ
USER1	1
USER2	2

   - 0 – To receive no notification mails
   - 1 – To get mails instantly
   - 2 – To get bulk mail (Additionally, you need to set `V_BULK_MAIL_TRIGGER` value to Y in the `AAI_WF_BULK_MAIL_TRIGGER` table). A single mail will be sent with all the pending notifications from last trigger, as a PDF attachment. Once the bulk mail is sent, `V_BULK_MAIL_TRIGGER` value is automatically set to N.
   - 3 – To get mail with attachment

3. Add the email id of the user, to which the notification mails need to be sent, in the `CSSMS_USR_PROFILE` table.

V_USR_ID	V_EMAIL
USER1	user1@oracle.com
USER2	user2@oracle.com

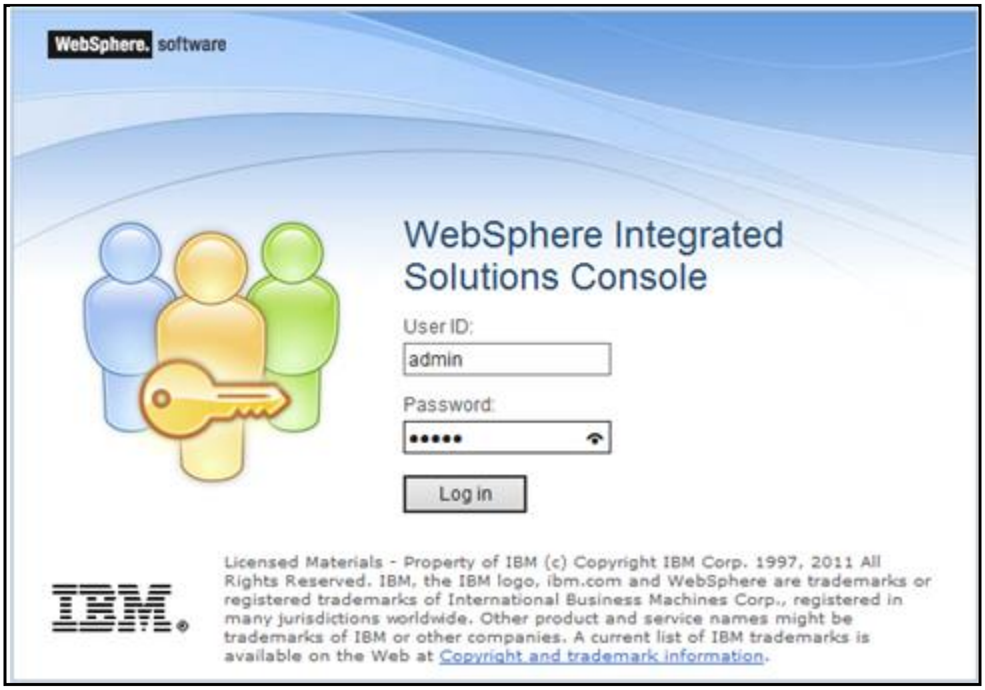
4. Add the following entries in the `AAI_WF_EMAIL_TEMPLATE` table:
   - V_MAIL_FROM- Email id from which the mail is sent
   - V_MAIL_MESSAGE- Email message template
   - V_MAIL_SUBJECT- Subject of the mail
   - V_APP_PACKAGE_ID- Application package ID
   - V_MAIL_TYPE- Email type such as task or bulk task.
   - N_TEMPLATE_ID- A unique Email Template ID
   - V_TEMPLATE_NAME- Email Template name
5. Set the `V_EMAIL_REQUIRED` value to Y in `AAI_WF_APP_PACKAGE_B` (for app level setting), `AAI_WF_APP_REGISTRATION` (for entity type level setting) and `AAI_WF_ACTIVITY_TASK_B` (for task level setting) tables.

8.2 Work Manager Configurations

Process Modelling framework requires creation of Work Manager and mapping it to OFSAA instance. This configuration is required for Web Application Server type as WebSphere and WebLogic.

8.2.1 Creating Work Manager in WebSphere Application Server

1. Open the WebSphere admin console in the browser window: http://<ipaddress>:<administrative console port>/ibm/console. (https if SSL is enabled). The *Login* window is displayed.



WebSphere Integrated Solutions Console

User ID: admin

Password: •••••

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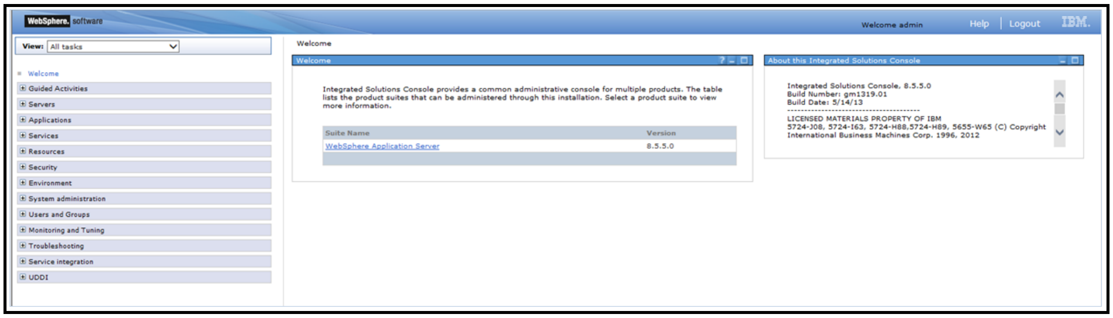
2. Login with the user id that has admin rights.



Welcome

Integrated Solutions Console provides a common administrative console for multiple products. The table lists the product suites that can be administered through this installation. Select a product suite to view more information.

Suite Name	Version
WebSphere Application Server	8.5.5.0

Integrated Solutions Console, 8.5.5.0
Build Number: gm1319.01
Build Date: 5/14/13

LICENSED MATERIALS PROPERTY OF IBM
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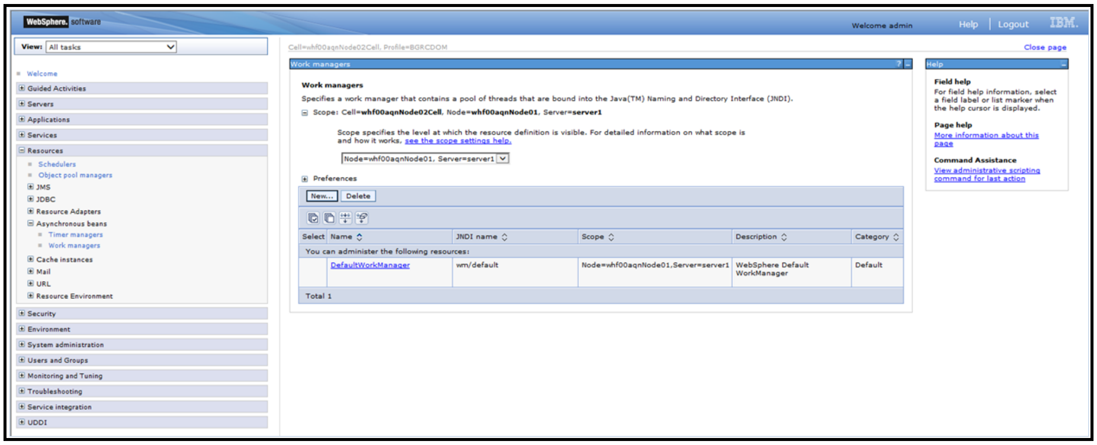
3. From the LHS menu, expand **Resources** > **Asynchronous beans** and select **Work Managers**.



Cell=whf00aqnNode02Cell, Profile=BGRCDOM

Work managers

Specifies a work manager that contains a pool of threads that are bound into the Java(TM) Naming and Directory Interface (JNDI).

Scope: Cell=**whf00aqnNode02Cell**, Node=**whf00aqnNode01**, Server=**server1**

Scope specifies the level at which the resource definition is visible. For detailed information on what scope is and how it works, see the scope settings help.

Node=whf00aqnNode01, Server=server1

Preferences

Select	Name	JNDI name	Scope	Description	Category
You can administer the following resources:					
	DefaultWorkManager	wm/default	Node=whf00aqnNode01,Server=server1	WebSphere Default WorkManager	Default
Total 1					

Field help
For field help information, select a field label or list marker when the help cursor is displayed.

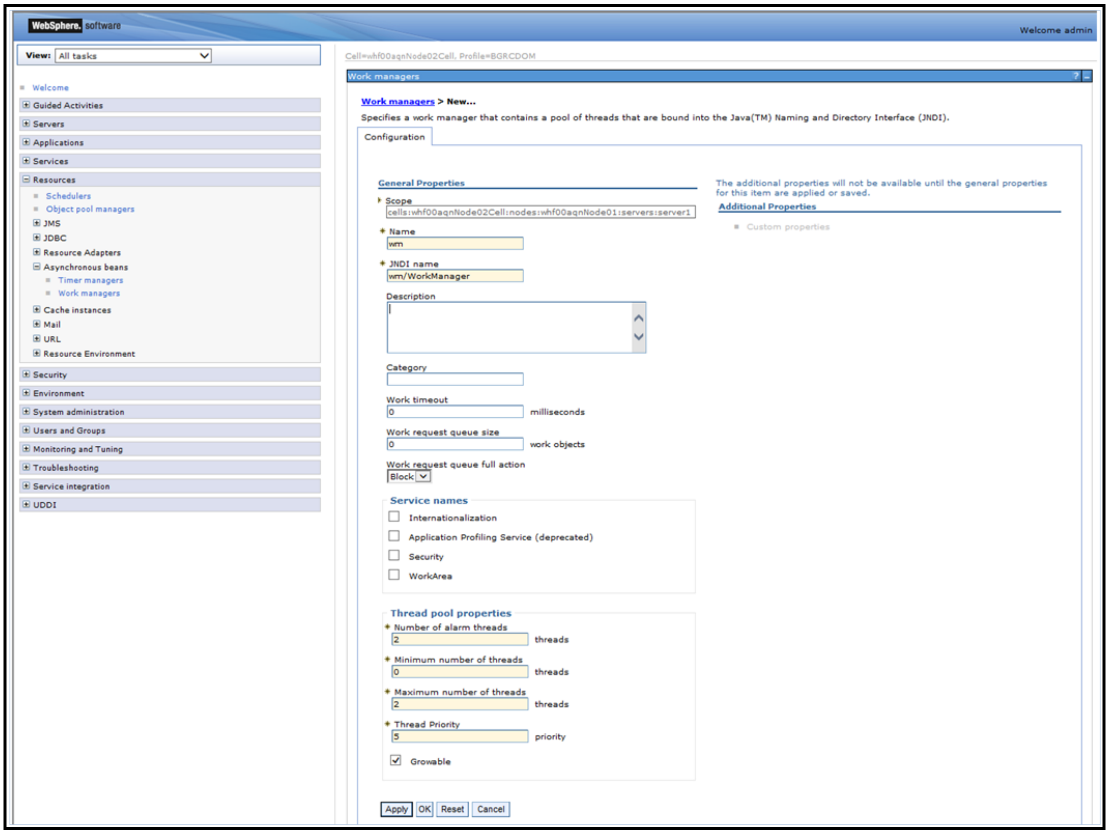
Page help
More information about this page

Command Assistance
View administrative scripting command for last action

4. Select the required **Scope** from the drop-down list.

   For example, Node=whf00aqnNode01, Server=server1.

5. Click **New** in the *Preferences* section.



Cell=whf00aqnNode02Cell, Profile=BGRCDOM

Work managers > New...

Specifies a work manager that contains a pool of threads that are bound into the Java(TM) Naming and Directory Interface (JNDI).

General Properties

The additional properties will not be available until the general properties for this item are applied or saved.

Scope: cells:whf00aqnNode02Cell:nodes:whf00aqnNode01:servers:server1

* Name: wm

* JNDI name: wm/WorkManager

Description:

Category:

Work timeout: 0 milliseconds

Work request queue size: 0 work objects

Work request queue full action: Block

Service names

- □ Internationalization
- □ Application Profiling Service (deprecated)
- □ Security
- □ WorkArea

Thread pool properties

* Number of alarm threads: 2 threads

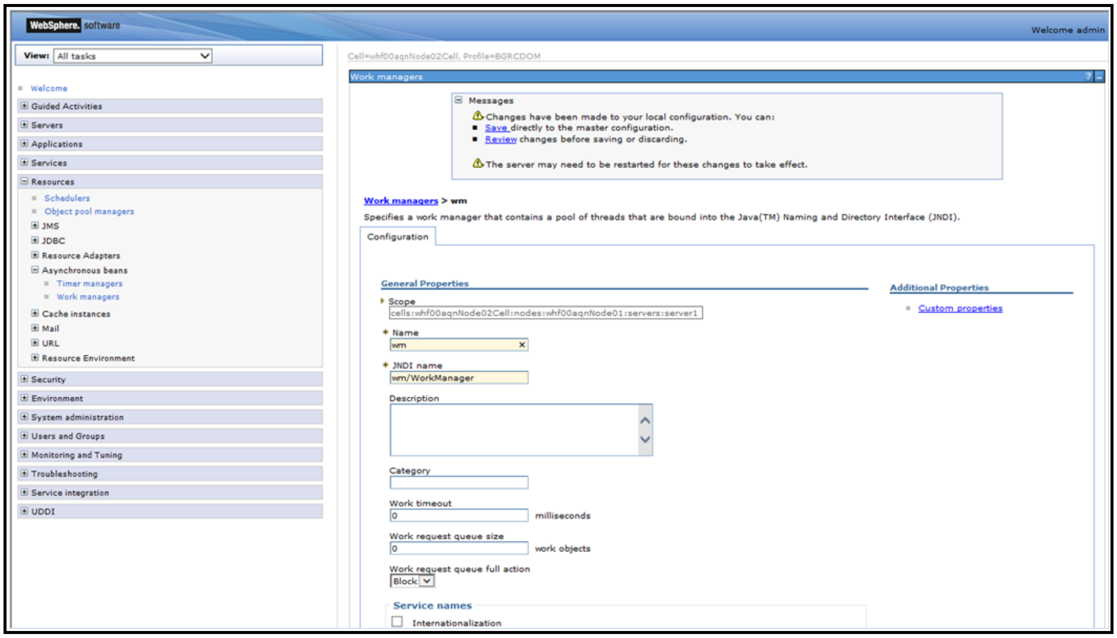
* Minimum number of threads: 0 threads

* Maximum number of threads: 2 threads

* Thread Priority: 5 priority

☑ Growable

6. Enter the **Name** as ‘wm’ and **JNDI name** as ‘wm/WorkManager ‘ in the respective fields.
7. Enter the **Thread pool properties**.
8. Click **Apply**.



Cell=whf00aqnNode02Cell, Profile=BGRCDOM

Messages

⚠ Changes have been made to your local configuration. You can:

- Save directly to the master configuration.
- Review changes before saving or discarding.

⚠ The server may need to be restarted for these changes to take effect.

Work managers > wm

Specifies a work manager that contains a pool of threads that are bound into the Java(TM) Naming and Directory Interface (JNDI).

General Properties

Scope: cells:whf00aqnNode02Cell:nodes:whf00aqnNode01:servers:server1

* Name: wm

* JNDI name: wm/WorkManager

Description:

Category:

Work timeout: 0 milliseconds

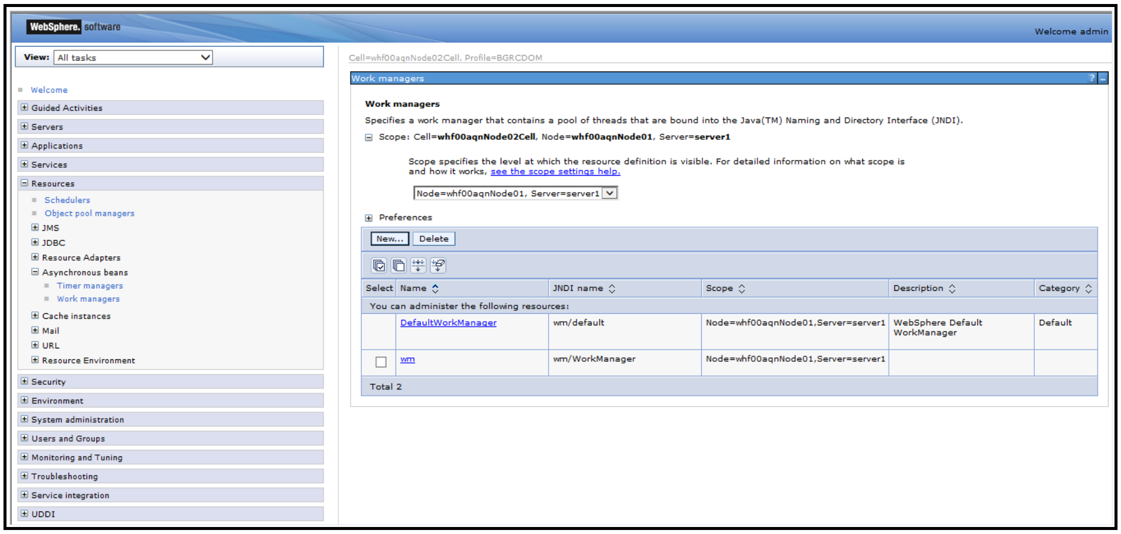
Work request queue size: 0 work objects

Work request queue full action: Block

Service names

- □ Internationalization

9. Click **Save**.



Cell=whf00aqnNode02Cell, Profile=BGRCDOM

Work managers

Work managers

Specifies a work manager that contains a pool of threads that are bound into the Java(TM) Naming and Directory Interface (JNDI).

Scope: Cell=**whf00aqnNode02Cell**, Node=**whf00aqnNode01**, Server=**server1**

Scope specifies the level at which the resource definition is visible. For detailed information on what scope is and how it works, see the scope settings help.

Node=whf00aqnNode01, Server=server1

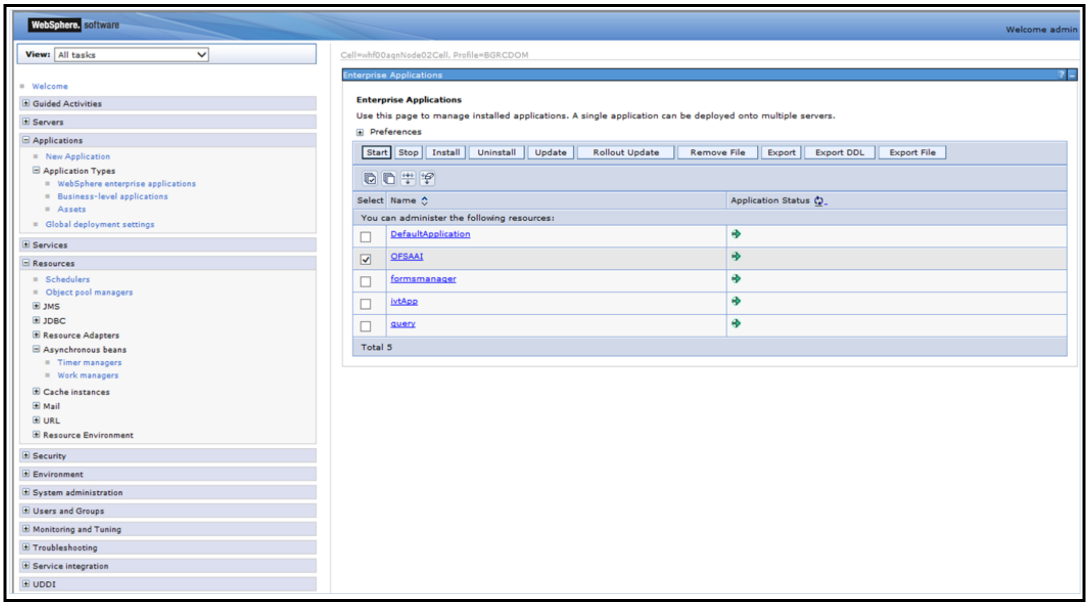
Preferences

Select	Name	JNDI name	Scope	Description	Category
You can administer the following resources:					
	DefaultWorkManager	wm/default	Node=whf00aqnNode01,Server=server1	WebSphere Default WorkManager	Default
□	wm	wm/WorkManager	Node=whf00aqnNode01,Server=server1		
Total 2					

After creating work manager successfully, you have to map it to OFSAA instance.

8.2.2 Mapping Work Manager to OFSAA WebSphere Instance

1. From the LHS menu, expand **Applications** > **Application Types** and select **WebSphere enterprise applications**.



Cell=whf00aqnNode02Cell, Profile=BGRCDOM

Enterprise Applications

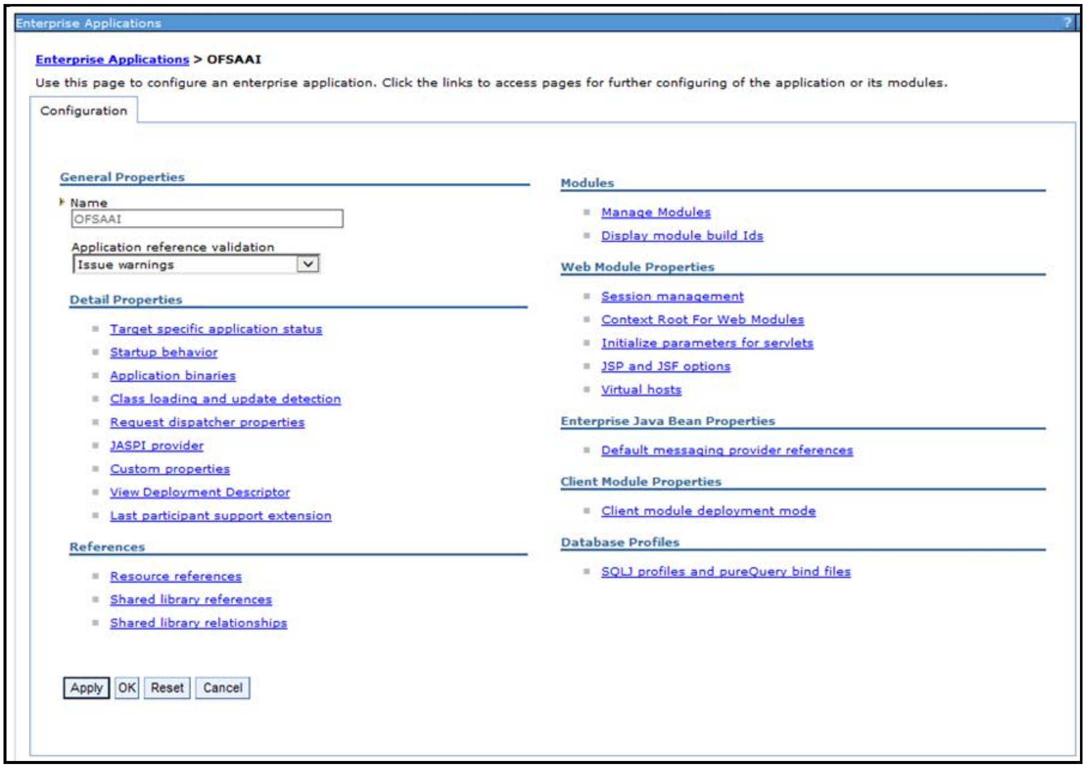
Enterprise Applications

Use this page to manage installed applications. A single application can be deployed onto multiple servers.

Preferences

Select	Name	Application Status
You can administer the following resources:		
□	DefaultApplication	➔
☑	OFSAAI	➔
□	formsmanager	➔
□	ivtApp	➔
□	query	➔
Total 5		

2. Click **OFSAAI instance** hyperlink.



Enterprise Applications > OFSAAI

Use this page to configure an enterprise application. Click the links to access pages for further configuring of the application or its modules.

General Properties

Name: OFSAAI

Application reference validation: Issue warnings

Detail Properties

- Target specific application status
- Startup behavior
- Application binaries
- Class loading and update detection
- Request dispatcher properties
- JASPI provider
- Custom properties
- View Deployment Descriptor
- Last participant support extension

References

- Resource references
- Shared library references
- Shared library relationships

Modules

- Manage Modules
- Display module build Ids

Web Module Properties

- Session management
- Context Root For Web Modules
- Initialize parameters for servlets
- JSP and JSF options
- Virtual hosts

Enterprise Java Bean Properties

- Default messaging provider references

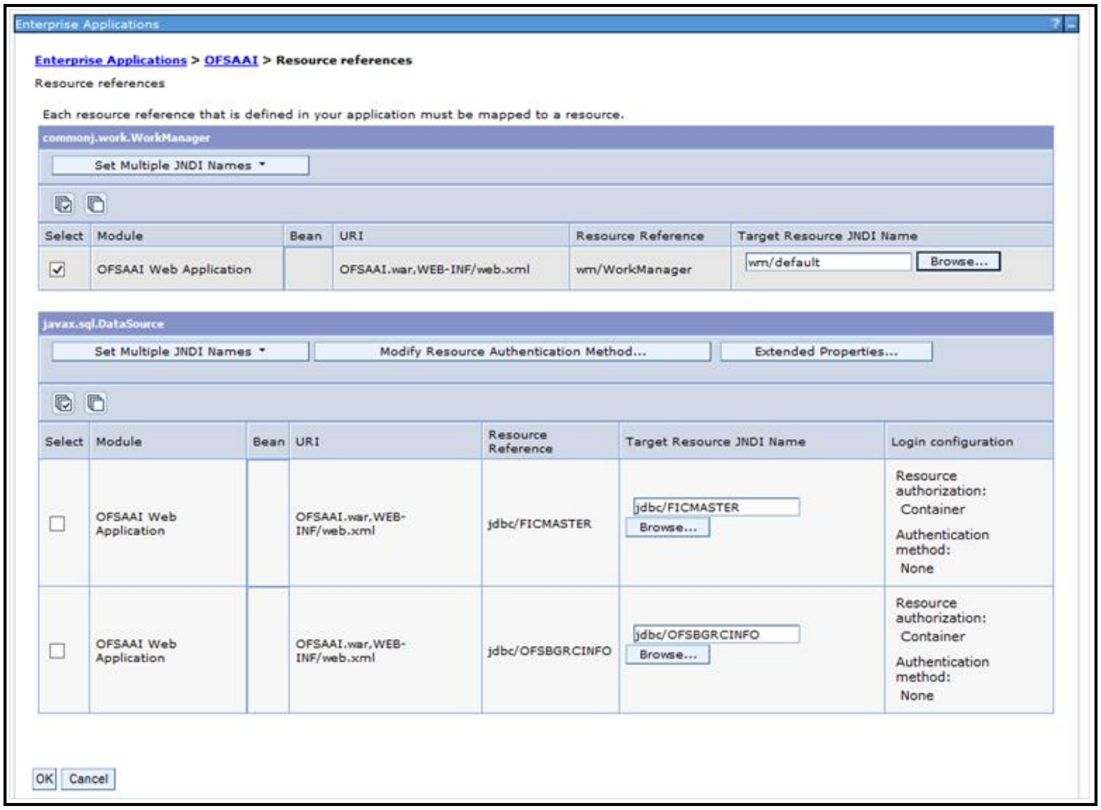
Client Module Properties

- Client module deployment mode

Database Profiles

- SQLJ profiles and pureQuery bind files

3. Click **Resource references** link under *References* section.



Enterprise Applications > OFSAAI > Resource references

Resource references

Each resource reference that is defined in your application must be mapped to a resource.

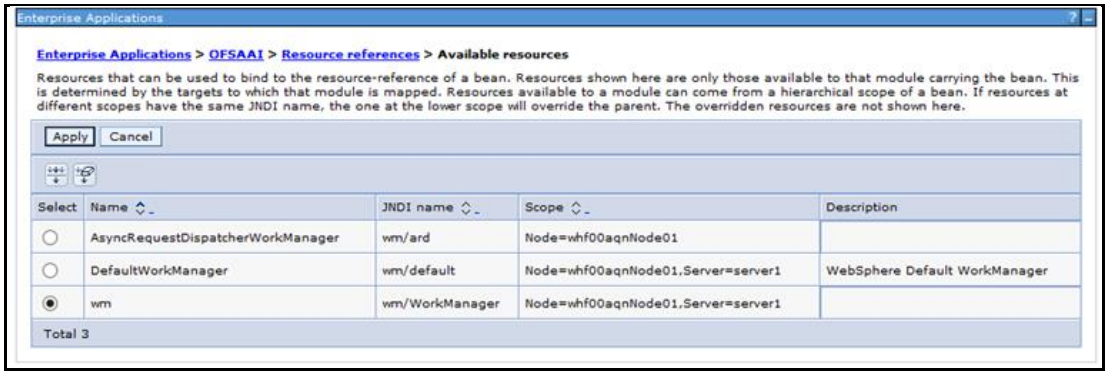
commonj.work.WorkManager

Select	Module	Bean	URI	Resource Reference	Target Resource JNDI Name
☑	OFSAAI Web Application		OFSAAI.war,WEB-INF/web.xml	wm/WorkManager	wm/default Browse...

javax.sql.DataSource

Select	Module	Bean	URI	Resource Reference	Target Resource JNDI Name	Login configuration
☐	OFSAAI Web Application		OFSAAI.war,WEB-INF/web.xml	jdbc/FICMASTER	jdbc/FICMASTER Browse...	Resource authorization: Container Authentication method: None
☐	OFSAAI Web Application		OFSAAI.war,WEB-INF/web.xml	jdbc/OFSBGRCINFO	jdbc/OFSBGRCINFO Browse...	Resource authorization: Container Authentication method: None

4. Click **Browse** corresponding to the Work Manager Resource Reference. The available resources are displayed.



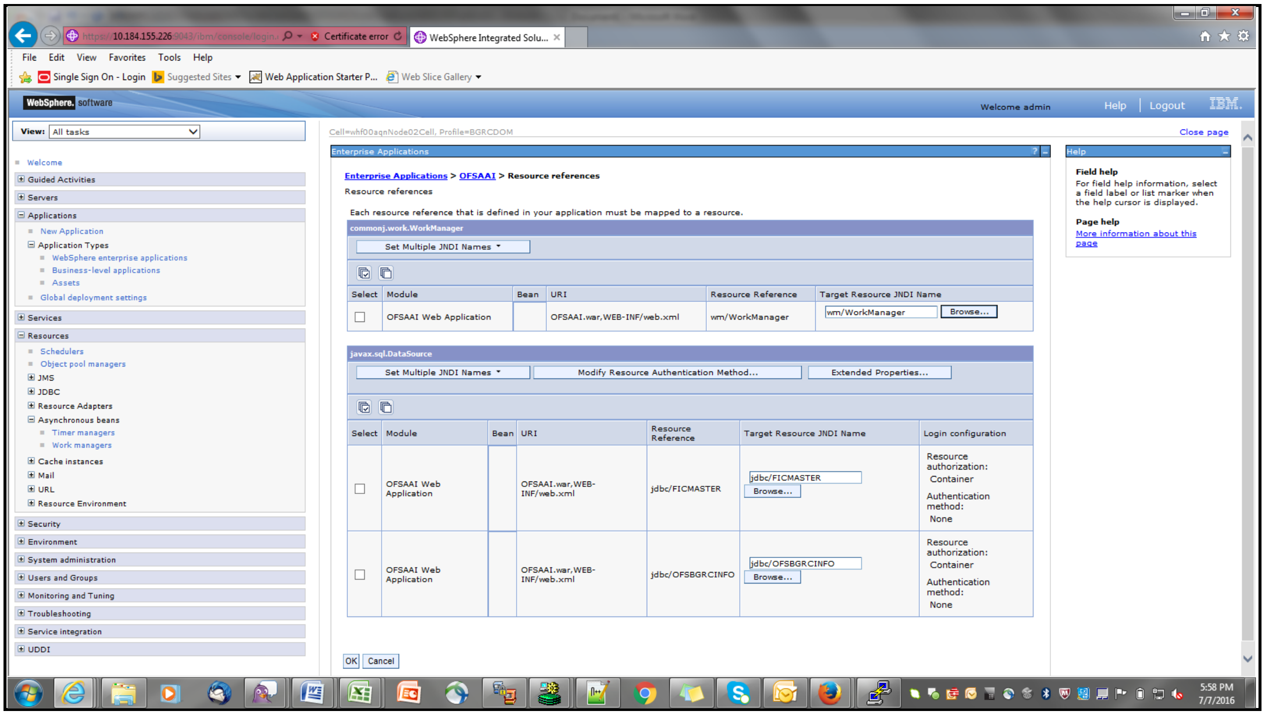
Enterprise Applications > **OFSAAI** > **Resource references** > **Available resources**

Resources that can be used to bind to the resource-reference of a bean. Resources shown here are only those available to that module carrying the bean. This is determined by the targets to which that module is mapped. Resources available to a module can come from a hierarchical scope of a bean. If resources at different scopes have the same JNDI name, the one at the lower scope will override the parent. The overridden resources are not shown here.

Select	Name	JNDI name	Scope	Description
○	AsyncRequestDispatcherWorkManager	wm/ard	Node=whf00aqnNode01	
○	DefaultWorkManager	wm/default	Node=whf00aqnNode01,Server=server1	WebSphere Default WorkManager
●	wm	wm/WorkManager	Node=whf00aqnNode01,Server=server1	

Total 3

5. Select the newly created Work Manager (‘wm’) and click **Apply**.



Cell=whf00aqnNode02Cell, Profile=BGRCDOM

Enterprise Applications > **OFSAAI** > **Resource references**

Resource references

Each resource reference that is defined in your application must be mapped to a resource.

commonj.work.WorkManager

Select	Module	Bean	URI	Resource Reference	Target Resource JNDI Name
□	OFSAAI Web Application		OFSAAI.war,WEB-INF/web.xml	wm/WorkManager	wm/WorkManager Browse...

javax.sql.DataSource

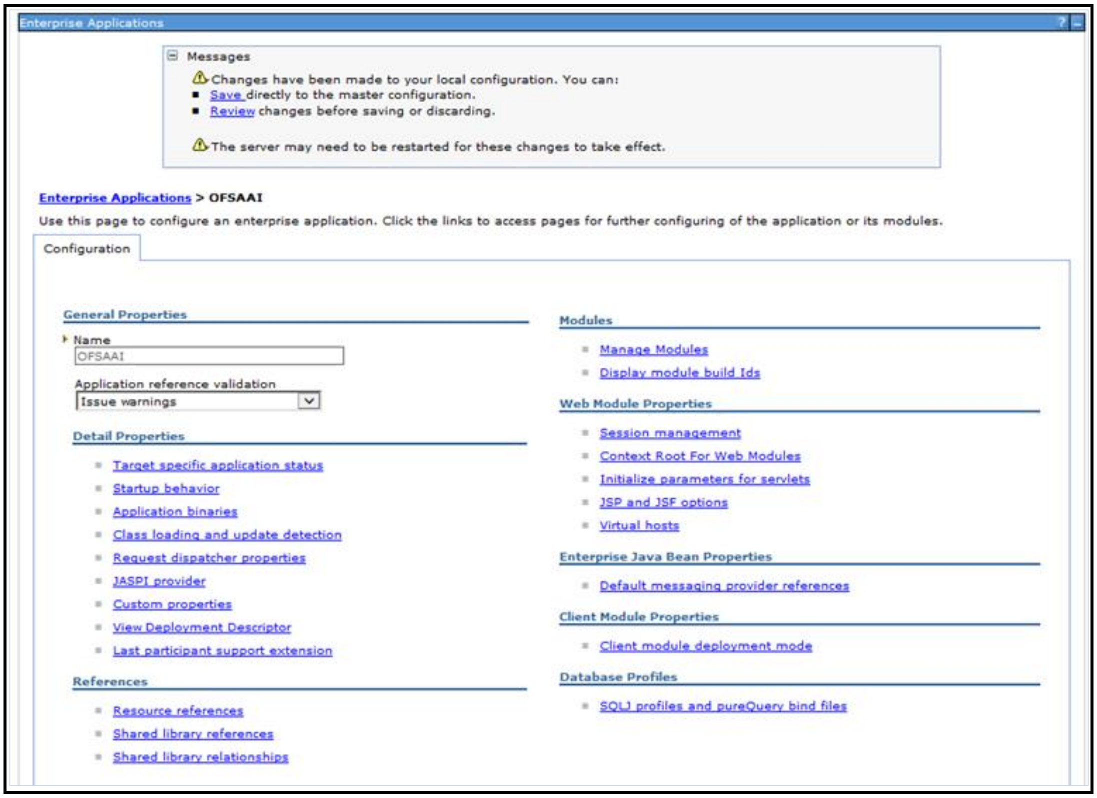
Select	Module	Bean	URI	Resource Reference	Target Resource JNDI Name	Login configuration
□	OFSAAI Web Application		OFSAAI.war,WEB-INF/web.xml	jdbc/FICMASTER	jdbc/FICMASTER Browse...	Resource authorization: Container Authentication method: None
□	OFSAAI Web Application		OFSAAI.war,WEB-INF/web.xml	jdbc/OFSBGRCINFO	jdbc/OFSBGRCINFO Browse...	Resource authorization: Container Authentication method: None

Help

Field help
For field help information, select a field label or list marker when the help cursor is displayed.

Page help
More information about this page

6. Select the Work Manager (‘wm/WorkManager’) and click **OK.**



Enterprise Applications

Messages

⚠ Changes have been made to your local configuration. You can:

- Save directly to the master configuration.
- Review changes before saving or discarding.

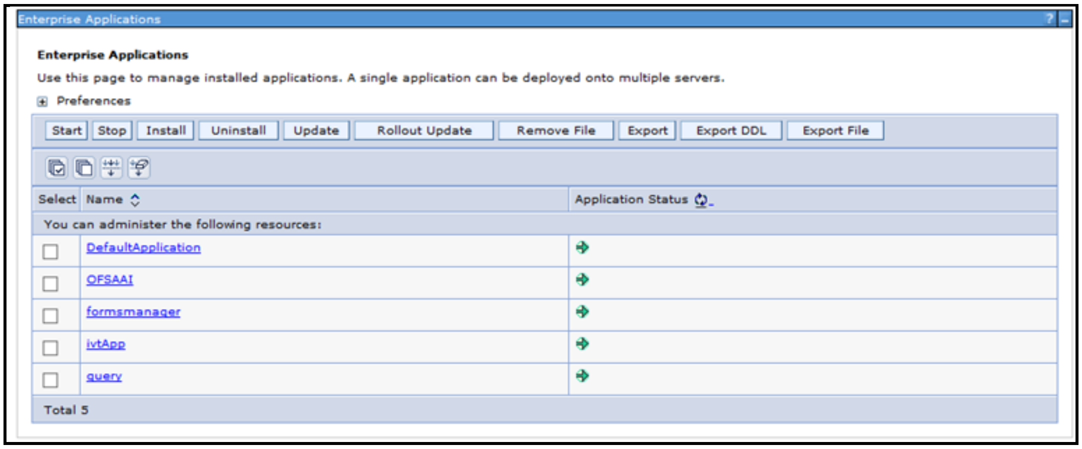
⚠ The server may need to be restarted for these changes to take effect.

Enterprise Applications > OFSAAI

Use this page to configure an enterprise application. Click the links to access pages for further configuring of the application or its modules.

Configuration
General Properties
Name
OFSAAI
Application reference validation
Issue warnings
Detail Properties
Target specific application status
Startup behavior
Application binaries
Class loading and update detection
Request dispatcher properties
JASPI provider
Custom properties
View Deployment Descriptor
Last participant support extension
References
Resource references
Shared library references
Shared library relationships
Modules
Manage Modules
Display module build Ids
Web Module Properties
Session management
Context Root For Web Modules
Initialize parameters for servlets
JSP and JSF options
Virtual hosts
Enterprise Java Bean Properties
Default messaging provider references
Client Module Properties
Client module deployment mode
Database Profiles
SQLJ profiles and pureQuery bind files

7. Click **Save**.



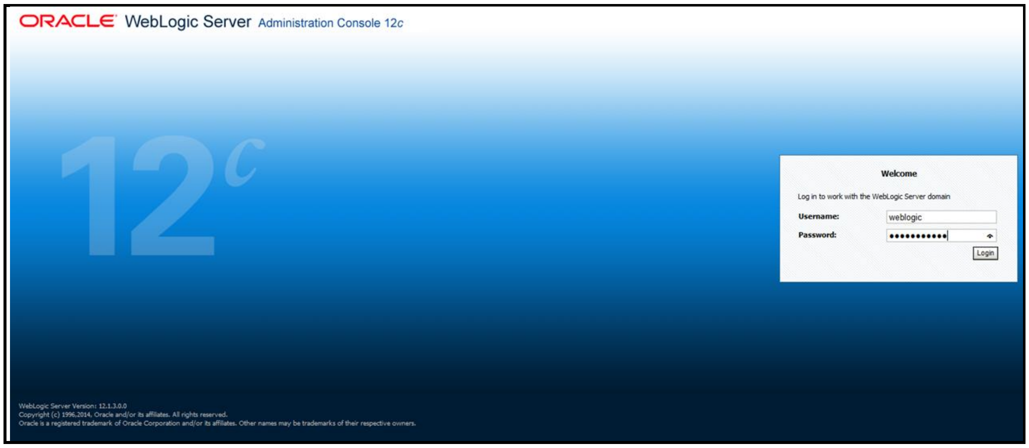
Enterprise Applications

Use this page to manage installed applications. A single application can be deployed onto multiple servers.

Select	Name	Application Status
You can administer the following resources:		
□	DefaultApplication	➜
□	OFSAAI	➜
□	formsmanager	➜
□	ivtApp	➜
□	query	➜
Total 5		

8.2.3 Creating Work Manager in WebLogic Application Server

1. Open the WebLogic admin console in the browser window: `http://<ipaddress>:<administrative console port>/console`. (https if SSL is enabled). The *Welcome* window is displayed.



Log in to work with the WebLogic Server domain

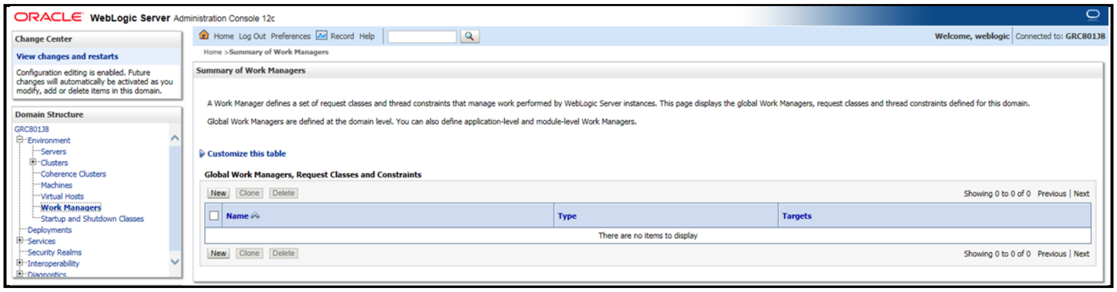
Username: weblogic

Password: ●●●●●●●●●●●

WebLogic Server Version: 12.1.3.0.0
Copyright (c) 1996,2014, Oracle and/or its affiliates. All rights reserved.
Oracle is a registered trademark of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owners.

2. Login with the user id that has admin rights.

3. From the *Domain Structure* menu in the LHS, expand **Environment** and select **Work Managers**. The *Summary of Work Managers* window is displayed.



Configuration editing is enabled. Future changes will automatically be activated as you modify, add or delete items in this domain.

A Work Manager defines a set of request classes and thread constraints that manage work performed by WebLogic Server instances. This page displays the global Work Managers, request classes and thread constraints defined for this domain.

Global Work Managers are defined at the domain level. You can also define application-level and module-level Work Managers.

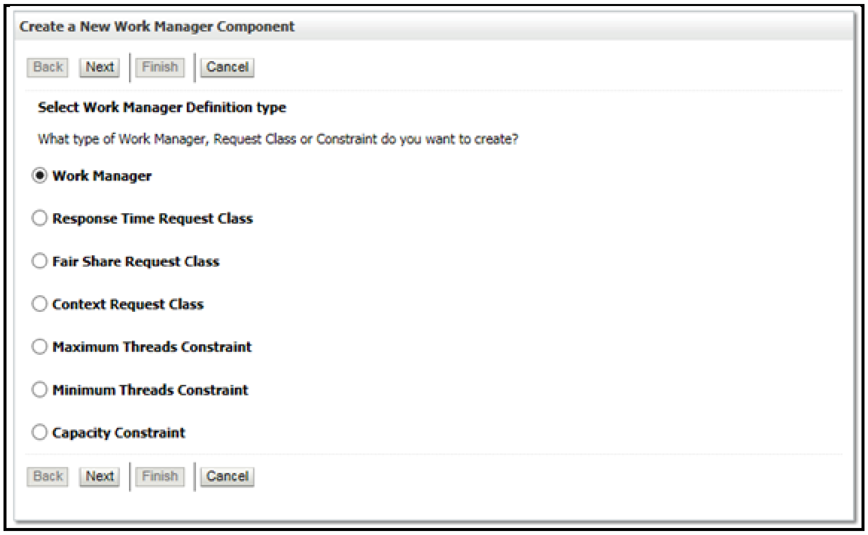
Global Work Managers, Request Classes and Constraints

Showing 0 to 0 of 0

□	Name	Type	Targets
There are no items to display			

Showing 0 to 0 of 0

4. Click **New** to create a new work manager component.



Select Work Manager Definition type

What type of Work Manager, Request Class or Constraint do you want to create?

● Work Manager

○ Response Time Request Class

○ Fair Share Request Class

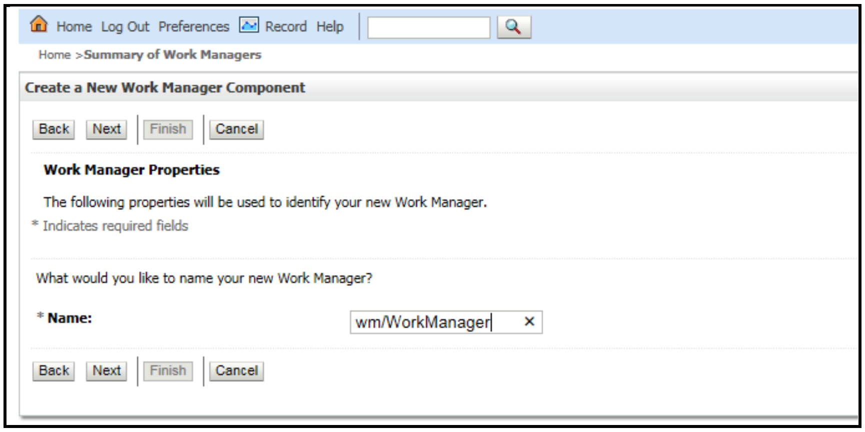
○ Context Request Class

○ Maximum Threads Constraint

○ Minimum Threads Constraint

○ Capacity Constraint

5. Select **Work Manager** and click **Next**.


Home Log Out Preferences Record Help
Home >Summary of Work Managers
Back Next Finish Cancel

Create a New Work Manager Component

Work Manager Properties

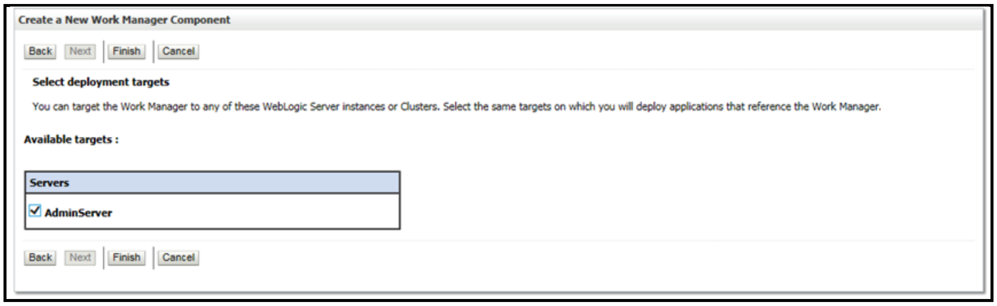
The following properties will be used to identify your new Work Manager.

* Indicates required fields

What would you like to name your new Work Manager?

* Name: wm/WorkManager

6. Enter the **Name** as ‘wm/WorkManager’.
7. Click **Next**.



Create a New Work Manager Component

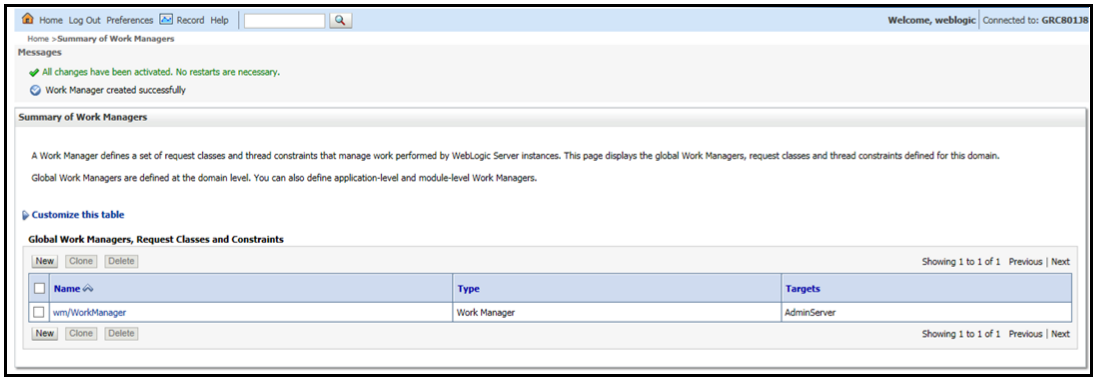
Select deployment targets

You can target the Work Manager to any of these WebLogic Server instances or Clusters. Select the same targets on which you will deploy applications that reference the Work Manager.

Available targets :

Servers
☑ AdminServer

8. Select the required deployment target and click **Finish**.


Home Log Out Preferences Record Help
Welcome, weblogic
Connected to: GRC801J8
Home >Summary of Work Managers
Customize this table
New Clone Delete
Showing 1 to 1 of 1 Previous | Next

Messages

All changes have been activated. No restarts are necessary.

Work Manager created successfully

Summary of Work Managers

A Work Manager defines a set of request classes and thread constraints that manage work performed by WebLogic Server instances. This page displays the global Work Managers, request classes and thread constraints defined for this domain.

Global Work Managers are defined at the domain level. You can also define application-level and module-level Work Managers.

Global Work Managers, Request Classes and Constraints

□	Name	Type	Targets
□	wm/WorkManager	Work Manager	AdminServer

8.3 Configuring Attributes for Attribute Expression and Advanced Attribute Expression Application Rule

This section explains how to configure attributes for creating Decision Rules on those attributes for application specific workflows. Each application and its respective components can have many attributes configured. Each attribute is identified with an ID `app_comp_attr_map_id`, based on which the values for attributes can be fetched.

Enter attribute information in the `AAI_AOM_APP_COMP_ATTR_MAPPING` table. Enter values as tabulated:

Column Name	Description
APP_COMP_ATTR_MAP_ID	ID of the attribute
V_ATTR_CODE	Name of the attribute
N_ATTR_TYPE_ID	ID of the attribute type. The values of the attributes are fetched based on attribute type. 1001- Static 1002- Query 1003- JavaAPI For more information, see Attribute Types.
V_ATTRIBUTE_VALUE1 V_ATTRIBUTE_VALUE2	Values to be fetched for the attribute. Based on the attribute type, you need to pass the values.
N_APP_ID	Application code for which the current attribute is configured.
N_COMP_ID	Component code for which the attribute is configured.
V_UDP_CODE	Special property used by applications (user defined). For example, 'GET_STATUS' –to get the status for the workflow.

8.3.1 Attribute Types

The values of attributes are fetched based on the attribute types. Following are the attribute types with their IDs:

Attribute Type ID	Attribute Type Name
1001	Static
1002	Query
1003	JavaAPI

- **1001 (Static)** - Store attribute values in the AAI_AOM_STATIC table as V_STATIC_ID and V_STATIC_VAL.
- **1002 (Query)** - Enter the SQL query in V_ATTRIBUTE_VALUE1 in the AAI_AOM_APP_COMP_ATTR_MAPPING table, which has to be fired to fetch the attribute values.
- **1003 (JavaAPI) –** Enter the method that is configured for V_ATTRIBUTE_VALUE1 for the required attribute . The configured method in the class path is invoked to get the attribute values in this case.

8.4 Enabling Proxy for REST Service Application Rule

This section explains how to configure the Proxy details if it is required for the Rest Service Application Rule.

Add the following entries in the AAI_WF_GLOBAL_SETTINGS table:

V_PARAM_NAME	V_PARAM_VALUE	Description
PROXY_SERVER_IP	For example, www.proxy.myserver.com	Provide the IP address of the Proxy server.
PROXY_SERVER_PORT	For example, 80	Provide the port number of the Proxy server.

9 Inline Processing Engine Configurations

You should create an additional resource reference as `JDBC/<INFODOMNAME>` pointing to the same infodom in which IPE is installed. For information on creating resource reference, see *Appendix B* of the OFS AAI Application Pack Installation and Configuration Guide.

10 Document Management Configurations

Documents are required to support transactions and you can upload or download them in OFSAA configuring the various document management properties.

Topics:

- Configure Document Upload Settings
- Content Management Integration

10.1 Configure Document Upload Settings

Configure the document upload settings for the location of the files, types of files, and the size of the files in the configuration table of the Config Schema.

> **NOTE** Restart OFSAA services after updating the document upload settings.

10.1.1 Configure Document Upload Location Properties

A document upload in the OFSAA is initially stored in a temporary directory in the web local path of the web layer. After the document copying process to the temporary directory is complete, it is copied to the ftpshare location of the application layer. This is a two-stage process.

To configure the temporary and permanent directories to save the uploaded documents, set the parameters DOCUMENT_UPLOAD_TEMP and DOCUMENT_UPLOAD_SAVE in the configuration table of the Config Schema as shown in the following table:

PARAMNAME	PARAMVALUE	DESCRIPTION
DOCUMENT_UPLOAD_TEMP	/TEMPFOL	Set the value of the temporary directory. The directory is created in the web local path of the web tier. To find the web local path, execute the following query in the CONFIG schema: `SELECT LOCALPATH FROM WEB_SERVER_INFO;`
DOCUMENT_UPLOAD_SAVE	/DocStorage	Set the value of the document storage directory. The directory is created in the FTPSHARE path of the application tier. To find the FTPSHARE path, execute the following query in the CONFIG schema: `SELECT FTPDRIVE FROM APP_SERVER_INFO;`

10.1.2 Configure Document Upload File Formats and Size

To configure the file types (formats) and the file size that you can upload, set the parameters DOCUMENT_ALLOWED_EXTENSION and DOCUMENT_MAX_SIZE in the configuration table of the Config Schema as shown in the following table.

PARAMNAME	PARAMVALUE	DESCRIPTION
DOCUMENT_ALLOWED_EXTENSION	• txt • pdf • doc • Doc • html • htm • xls • zip	Set the file format extension values separated by commas for the file types allowed for upload.
DOCUMENT_MAX_SIZE	10096000	Set the maximum size of the document that can be uploaded in bytes.

10.1.3 Configure Document Upload File Timeout and File Transfer

To configure the file timeout and the file transfer that you can upload, set the FTP_SOCKET_TIMEOUT and F_IS_ASYNC_FILETRANSFER parameters in the configuration table of the Config Schema as shown in the following table.

PARAMNAME	PARAMVALUE	DESCRIPTION	DEFAULT VALUE
FTP_SOCKET_TIMEOUT	10000000	Default file transfer socket timeout value.	By default, the value is 10000000 milliseconds.
F_IS_ASYNC_FILETRANSFER	FALSE	File transfer mode is Synchronous or Asynchronous.	By default, the value is FALSE, which means Synchronous file upload.

10.2 Content Management Integration

Content Management Interoperability Services (CMIS) is an OASIS standard enabling information sharing between different Content Management Systems. Document management within OFSAA can integrate with CMIS services to support document upload and download to the CMIS repository.

> **NOTE** To use the features explained in this section, additional licenses may apply. For details, contact My Oracle Support.

Perform the following configurations:

1. Set the following parameters in the configuration table in the Config Schema to enable CMIS:
   - **a.** Set the value of `IS_CMIS_ENABLED` parameter to TRUE. If this is set to FALSE, document upload will happen on ftpshare.
   - **b.** Update the value of `CMIS_ATOMPUB_URL` parameter with the repository URL. Make sure the URL is up & running.

     For example: http://192.0.2.1:7777/service/cmis
2. Modify the property file `INFODOM_cmis.properties`, which is available inside `$FIC_HOME/ficweb/webroot/conf` folder.
   - **a.** Rename the file by replacing the INFODOM with actual name of Infodom. For example if Infodom name is "OFSAAINFO", rename the file to `OFSAAINFO_cmis.properties`.
   - **b.** The property file will contain the following entries. Update them as per the CMIS URL.

     `REPOSITORY_ID=`*5*

     `USER=`*admin*

     `PASSWORD=`*password*

     `DEFAULTPATH=`*/Default*

     `DOC_OBJ_TYPE_ID=`*cmis:document*

     `FLDR_OBJ_TYPE_ID=`*cmis:folder*
3. Redeploy the application onto your configured web application server. For more information on generating and deploying the EAR/ WAR file, refer to the Post Installation Configuration section in the Oracle Financial Services Analytical Applications Infrastructure Installation & Configuration Guide 8.0.2.0.0.
4. Restart all the OFSAAI services. For more information, refer to the Start/Stop Infrastructure Services section in the Oracle Financial Services Analytical Applications Infrastructure Installation & Configuration Guide 8.0.2.0.0.

10.2.1 Configurations for Document Upload to Multiple Libraries

This is applicable to OFSAAI versions 8.0.7.1.0 and higher.

Documents can be uploaded to multiple libraries instead of single library. This way, the number of documents within each library can be controlled within the threshold.

Enter values for the following parameters in the AAI_CMIS_REPO_MASTER table in the Config Schema as given:

- V_REPO_ID: Unique value for identification of Library
- V_REPO_URL: Update the value with the repository URL
- V_DEF_PATH: Update the folder path
- D_START_DATE: Upload start date for the library/folder
- D_END_DATE: Upload end date for the library/folder
- V_INFODOM: Update Infodom name

- V_CMIS_REPO_ID: Update the value with REPOSITORY_ID (note that this value is case-sensitive)

> **NOTE** For old documents, in the DOCUMENT_MASTER table, only the V_DOC_CMIS_ID column is updated for CMIS integrated uploads. After applying 80710 ML patch, V_REPO_ID column in the DOCUMENT_MASTER table should be updated with value as updated in AAI_CMIS_REPO_MASTER.V_REPO_ID column. This needs to be updated for all rows that are having value in the V_DOC_CMIS_ID column of the DOCUMENT_MASTER table.

11 Flexible KBD Configurations

Perform the following configurations required for Flexible KBD utility:

1. Add entries to the following tables to create the tree structure according to the application requirements:
    - aai_menu_b
    - aai_menu_tl
    - aai_menu_tree
    - insert_aai_obj_type_action_func_map
    - insert_aai_obj_type_b
    - insert_aai_obj_type_tl
2. Map the required User Groups to the respective User Roles to provide access to KBD Preference module. The User Roles mapped to KBD Preference module are:
    - F_KBDACC -Flex KBD Access
    - F_KBDAUTH- Flex KBD Authorize
    - F_KBDREAD- Flex KBD Read
    - F_KBDWRITE- Flex KBD Write

    If you already have User Group Role mapping, map your user group to `FlexKBD` folder. For more information, see the *Identity Management* section in OFS Analytical Applications Infrastructure User Guide. You can also populate the following tables to seed the appropriate user function mapping to FlexKBD folder:

    — insert_cssms_function_mast

    — insert_cssms_group_role_map

    — insert_cssms_role_function_map

    — insert_cssms_role_mast

    — cssms_folder_function_map

    If data is seeded into the system, then the sequences for the following tables should be reinitialized:

    — flexkbd_ctrl_loc

    — flexkbd_dim_info

    — flexkbd_pref_master

    Following table describes the column name for the corresponding Table and Sequence that needs to be reinitialized:

Sequence name	Table name	Column name
FLEXKBD_CTRL_LOC_SEQ	flexkbd_ctrl_loc	CONTROL_ID
FLEXKBD_DIM_INFO_SEQ	flexkbd_dim_info	KBDID

FLEXKBD_PREF_MASTER_SEQ	flexkbd_pref_master	PREF_ID

12 Questionnaire Setup and Configuration Details

This section provides details to set up Questionnaire in your system environment and map groups to roles, which lets you access the feature.

You have to launch the Questionnaire menu and map it to roles. The following subsections provide details for the procedures:

- Launching Questionnaire Menu
- Mapping Roles to Access Questionnaire
- Configuring Components, Dimensions, and Static Options

12.1 Launching Questionnaire Menu

You can configure Questionnaire to appear in any relevant menu of your choice in the application. For example, you can configure Questionnaire to appear in the PMF menu or in the Common Tasks menu.

The following menus are available for Questionnaire:

1. **OFS_ABC_QTNR_CONF** – You can access the Questionnaire Configuration screen from this menu. It is used to define components and attributes, which are used to create a Questionnaire.
2. **OFS_ABC_QTNR_DEFN** – You can access the Questionnaire Library screen from this menu.
3. **OFS_ABC_QTN_DEFN** – You can access the Questions Library screen from this menu.

Add the menus mentioned in the preceding list to the **aai_menu_tree** table to enable the Questionnaire menus to appear in the OFSAAI LHS menu.

After you have launched the menu, follow the instructions described in the section Mapping Roles to Access Questionnaire.

12.2 Mapping Roles to Access Questionnaire

Access to Questionnaire requires mapping groups to roles. The step-by-step description of the procedure is in the following list:

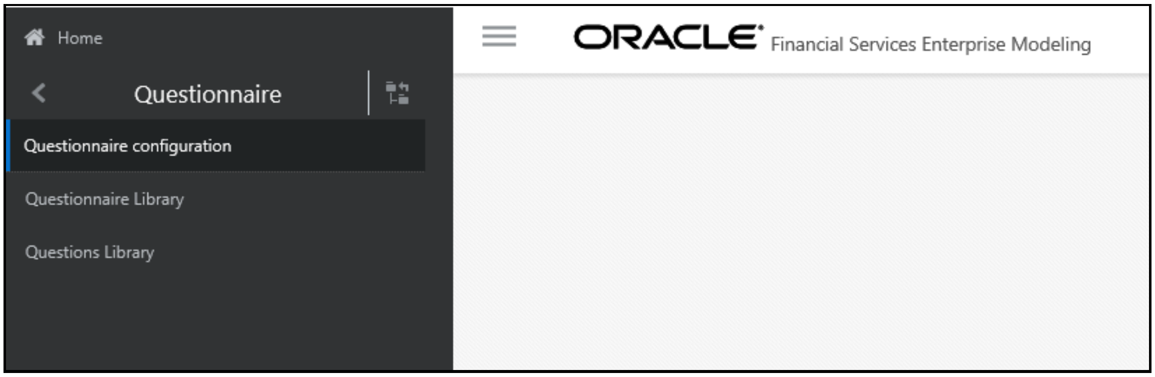
1. Login to OFSAA with your system administrator credentials.
2. Click 🔒 from the header to display the administration tools in a Tiles menu.
3. Click **Identity Management** to view the *Security Management* menu in a separate window.
4. Click **User Administrator** to expand the list further.
5. Click **User Group Role Map** to display the *User Group Role Map* window.
6. Map users to User or Approver roles.
   a. Users of applications mapped to groups can access the Questionnaire menu by mapping the groups to following roles:

Number	Role Codes	Description
1	QTNRADMNRL	ABC Questionnaire Administrator
2	QUESTMATRL	ABC Questionnaire Maintenance
3	QTNRCONFRL	Questionnaire Configuration Execute

b. Users of applications can be configured to be approvers by mapping their group to the QLOCAUTHRL role.

7. Authorize the user groups and role mapping. (You or another user with authorizer role (*sysauth*) has to login to OFSAA and authorize the mapping).

Configured users can login with the credentials created and access Questionnaire with the roles assigned. The **Questionnaire** window is displayed as shown.


Home
Questionnaire
Questionnaire configuration
Questionnaire Library
Questions Library
ORACLE Financial Services Enterprise Modeling

In the preceding illustration, the **Questionnaire** window is configured to appear in **Application Builder Component** in **Common Tasks**. Similarly, you can configure Questionnaire to appear in the menu item of your choice. For example, you can configure it to appear in the Know Your Customer (KYC) menu list.

12.3 Configuring Components, Dimensions, and Static Options

Users have to configure the data in the drop down fields such as Components, Dimensions and Static options on the Questionnaire window. The following subsections provide configuration information for the various options.

12.3.1 Configuring Components for Questionnaire

Component is a drop down list. Seed the data for Components in the tables DIM_COMPONENT_INFO and DIM_COMPONENT_INFO_MLS. For table details, see the spreadsheet AAI_Questionnaire_Data_Model_Sheet.xlsm.

12.3.2 Configuring Dimensions for Questionnaire

Dimensions is a drop down list. Seed the data for Dimensions in the tables QTNR_DIM_SRC and QTNR_DIM_SRC_MLS. For table details, see the spreadsheet AAI_Questionnaire_Data_Model_Sheet.xlsm.

12.3.3 Configuring Static Options for Questionnaire

Static Options is a drop down list. Seed the data for Static Options in the following tables and in the order specified:

1. QTNR_STATIC_GRP
2. QTNR_STATIC_GRP_MLS
3. QTNR_STATIC_SRC
4. QTNR_STATIC_SRC_MLS

For table details, see the spreadsheet AAI_Questionnaire_Data_Model_Sheet.xlsm.

12.4 Registering and Invoking your Application's Customized Workflow

You can define customized workflows in your application and apply in Questionnaire by registering it. Questionnaire has a workflow definition seeded by AAI, where object type is defined as QTNR. If you choose not to define your workflow, Questionnaire defaults to the workflow defined by AAI.

Perform the following steps in your application to register the customized workflow:

1. Create a new package in the table **aai_wf_app_package_b**.
   Note: Name **OBJECT_TYPE** for workflow definition in the convention **$APP_CODE_QTNR**. For example, if your APP_CODE is OFS_KYC, name the Object Type as OFS_KYC_QTNR.
2. Register a new object **V_OBJECT_TYPE** in the table **aai_wf_app_registration**.
3. Create a new process or copy it to the PMF application.
4. Add the entry with the object **V_OBJECT_TYP**E in the table **aai_wf_app_definition_map**.

Questionnaire validates the Object Type before invoking the workflow. If the naming convention of the workflow definition matches with the naming convention defined in the preceding steps, it invokes the registered workflow from your application. However, if the naming convention does not match the registered workflow, Questionnaire invokes the default reference workflow with object type **QTNR**.

To check for the creation of the new process, perform the following steps:

1. Create a new questionnaire in Draft status.
2. Check in the Process Monitor that the Questionnaire is running in the new process.

13 Data Security and Data Privacy

Data Security refers to the protection of data against unauthorized access and data theft. OFSAA ensures Data Security with the following features:

- Multi-Factor Authentication
- Transparent Data Encryption (TDE)
- Data Redaction
- File Encryption
- Key Management
- HTTPS
- Logging

13.1 Multi-Factor Authentication

This section is applicable only if you are using SSO enabled with multi factor authentication in OAM/OIM.

Multi-Factor Authentication (MFA) is a method of confirming a user's identity for login, by verifying 2 or more pieces of evidence (or factors) to an authentication mechanism. Two-Factor Authentication in OFSAA requires users to provide two levels of authentication. The subsections in this topic provide information to configure Two-Factor Authentication in OFSAA using OAM/OIM.

13.1.1 Prerequisites

The following list mentions the prerequisites required for this configuration:

1. All Oracle IDM Suite 11.1.2.3 related services should be running and OFSAA setup should be SSO enabled.
2. WebLogic or Tomcat as Web Application Server identified for the deployment of OFSAA.

13.1.2 Configuring OTP through Email using OAM Adaptive Authentication Service

The OAM Oracle Adaptive service uses SOA User Messaging Service (UMS) to send notifications. This requires that you must configure the SOA server to UMS to enable this feature.

13.1.2.1 Enabling Adaptive Authentication Service

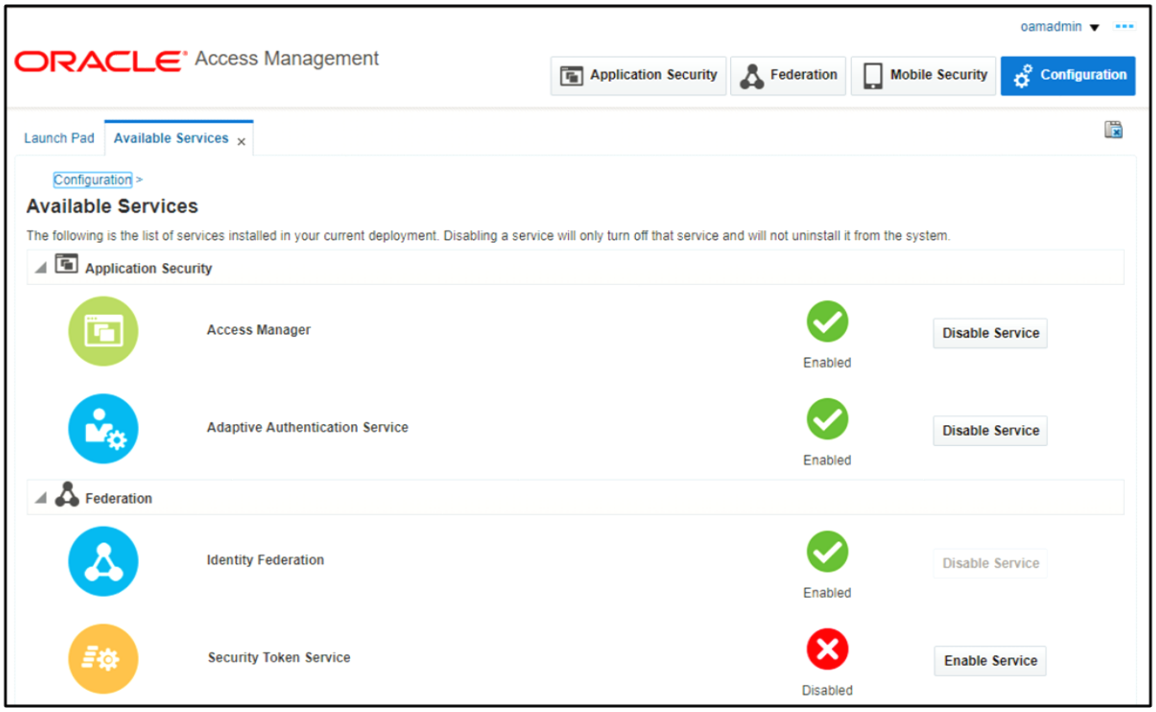
The Adaptive Authentication Service is enabled using the Oracle Access Management Console.

The Adaptive Authentication Service has to be licensed separately to use the two-factor authentication feature.

To enable the Adaptive Authentication Service, perform the following steps:

1. Login in to *OAM Admin Console* and click **Configuration** tab.
2. Navigate to **Configuration > Available Services**.

3. Click **Enable Service** against **Adaptive Authentication Service**.



Available Services

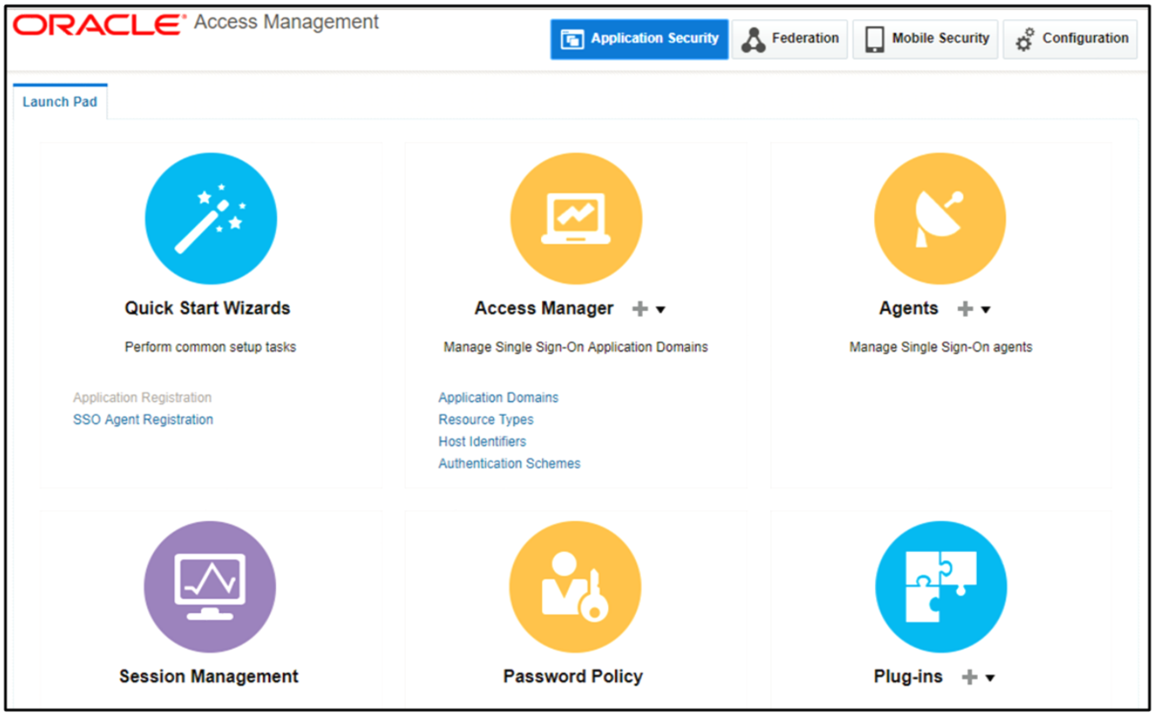
The following is the list of services installed in your current deployment. Disabling a service will only turn off that service and will not uninstall it from the system.

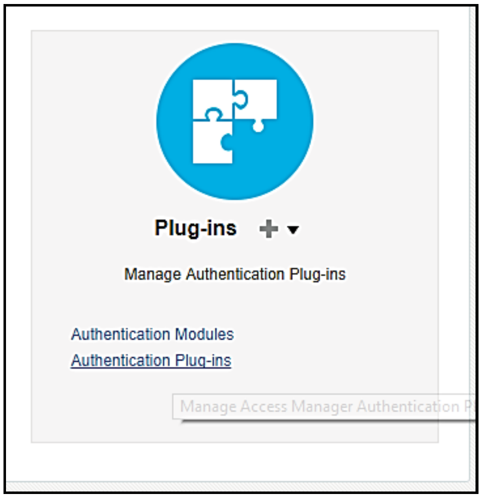
Application Security		
Access Manager	Enabled	Disable Service
Adaptive Authentication Service	Enabled	Disable Service
Federation		
Identity Federation	Enabled	Disable Service
Security Token Service	Disabled	Enable Service

13.1.2.2 Configuring Adaptive Authentication Plugin

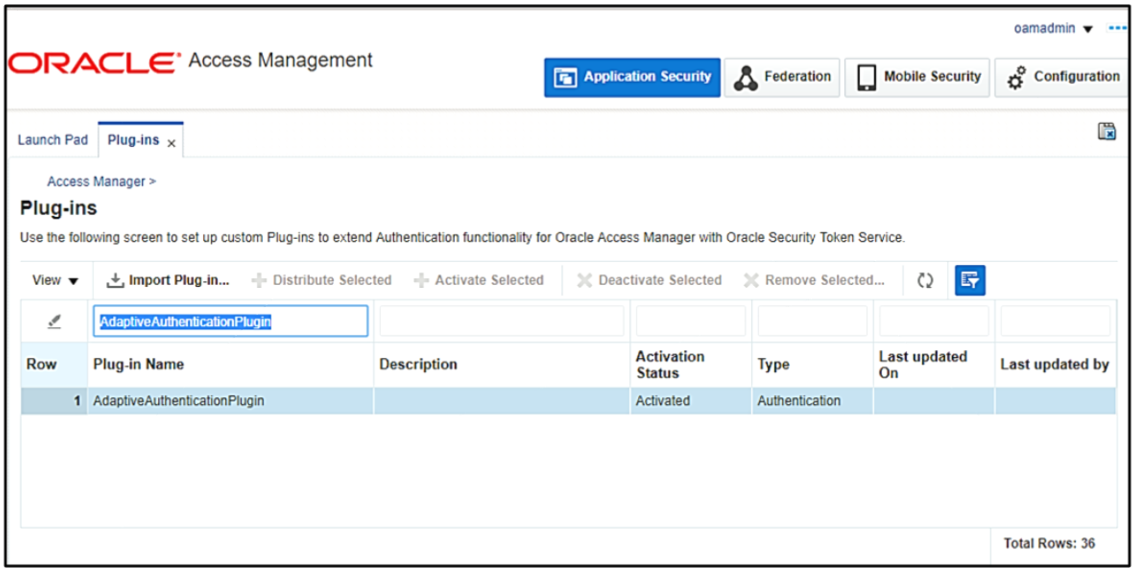
To configure email related settings in the Adaptive Authentication plugin, perform the following steps:

1. Login to *OAM Admin Console* and click **Application Security** tab.




Plug-ins
Manage Authentication Plug-ins
Authentication Modules
Authentication Plug-ins
Manage Access Manager Authentication P

2. Click **Authentication Plug-ins** under *Plug-ins* tile. The *Plug-ins* window is displayed.



Plug-ins

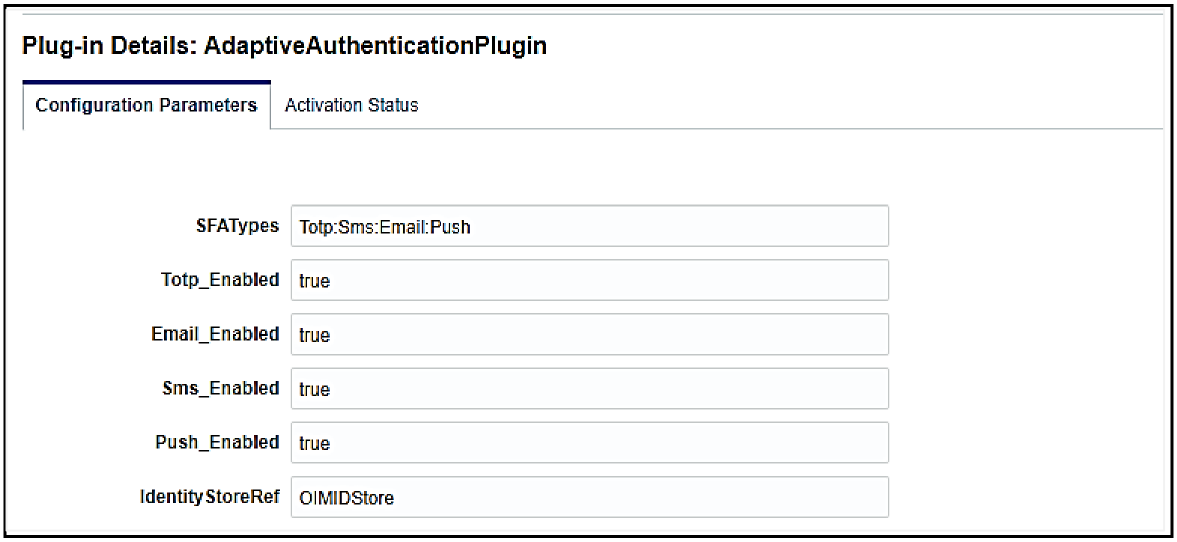
Use the following screen to set up custom Plug-ins to extend Authentication functionality for Oracle Access Manager with Oracle Security Token Service.

Row	Plug-in Name	Description	Activation Status	Type	Last updated On	Last updated by
	AdaptiveAuthenticationPlugin					
1	AdaptiveAuthenticationPlugin		Activated	Authentication		

Total Rows: 36

3. Search for **AdaptiveAuthenticationPlugin**.

4. Click the **AdaptiveAuthenticationPlugin** link. The *Plug-in Details: AdaptiveAuthenticationPlugin* window is displayed.



Plug-in Details: AdaptiveAuthenticationPlugin

SFATypes	Totp:Sms:Email:Push
Totp_Enabled	true
Email_Enabled	true
Sms_Enabled	true
Push_Enabled	true
IdentityStoreRef	OIMIDStore

5. Configure OTP through Email by updating the following *Configuration Parameters*:

   a. **SFATypes** - Types of Second Factor Authentication methods. To send OTP through Email, add Email to the list. Add Email if you are not using other SFA types.

   b. **Email_Enabled** - Set this attribute to **true** to send OTP through Email.

   c. **IdentityStoreRef** - Enter the user Identity store where your user details are stored and user is authenticated in First-level authentication.

NOTE After the first-level authentication, the adaptive authentication plug-in searches for the Email (required attributes for other types of SFA). If the **IdentityStoreRef** detail is not correct, then an error page is displayed after the First level authentication.

   d. **UMSAvailable** - Set the value to **true**

   e. **UmsClientUrl -** Enter the value for **UmsClientUrl**.
   Adaptive Authentication Service uses Oracle SOA User Messaging Services to send the Email notification.

   f. **EmailField** – Enter the value for Email Address attribute in the User Identity Store. The Adaptive Authentication plugin fetches the value for this field to send the email notification.

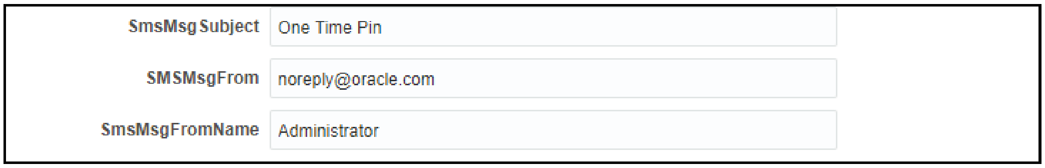
   g. **PinLength** – Specify the length of the OTP pin sent through Email.

   h. **PinChars** – Specify the characters to generate the OTP. If you want only digits in the OTP, enter only “0123456789”.

   i. **EmailMsgSubject** – Email Subject for the OTP notification.

   j. **EmailMsgFrom** – From email address in the email notification.

   k. **EmailMsgFromName** – From name in the email notification



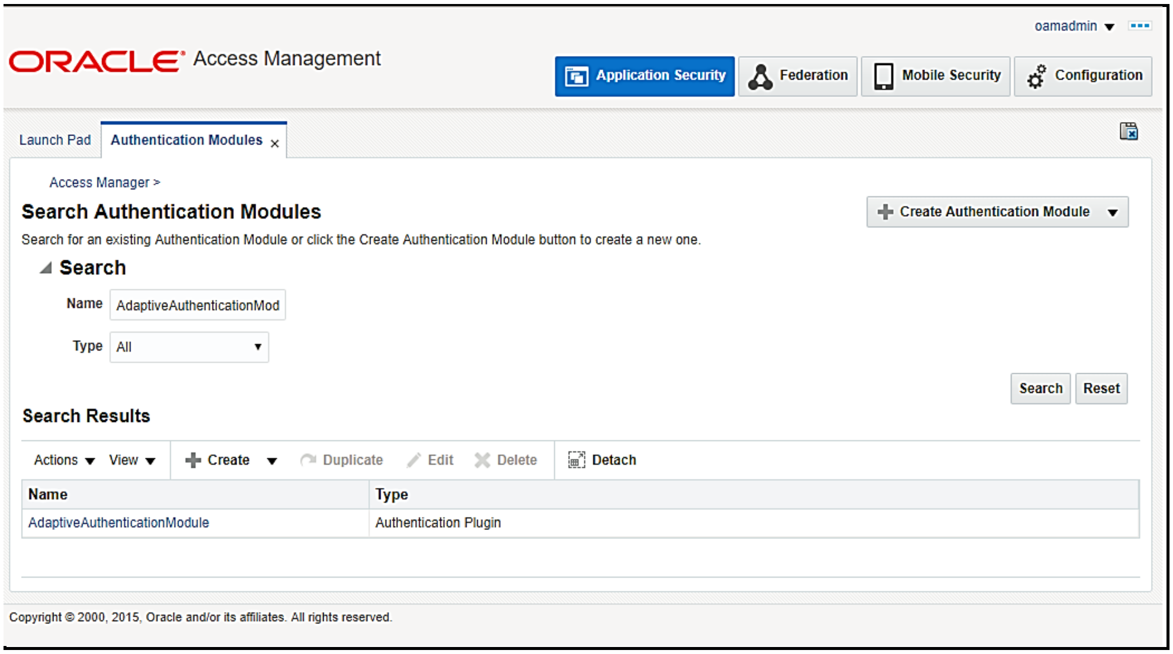
SmsMsg Subject	One Time Pin
SMSMsgFrom	noreply@oracle.com
SmsMsgFromName	Administrator

6. Click **Save**.

13.1.2.3 Configuring AdaptiveAuthenticationModule

To configure the Adaptive Authentication Module, perform the following steps:

1. Navigate to **Application Security > Plug-ins > Authentication Modules**.
2. Search for **AdaptiveAuthenticationModule**.



Search Authentication Modules

Search for an existing Authentication Module or click the Create Authentication Module button to create a new one.

Name: AdaptiveAuthenticationMod

Type: All

Search Results

Name	Type
AdaptiveAuthenticationModule	Authentication Plugin

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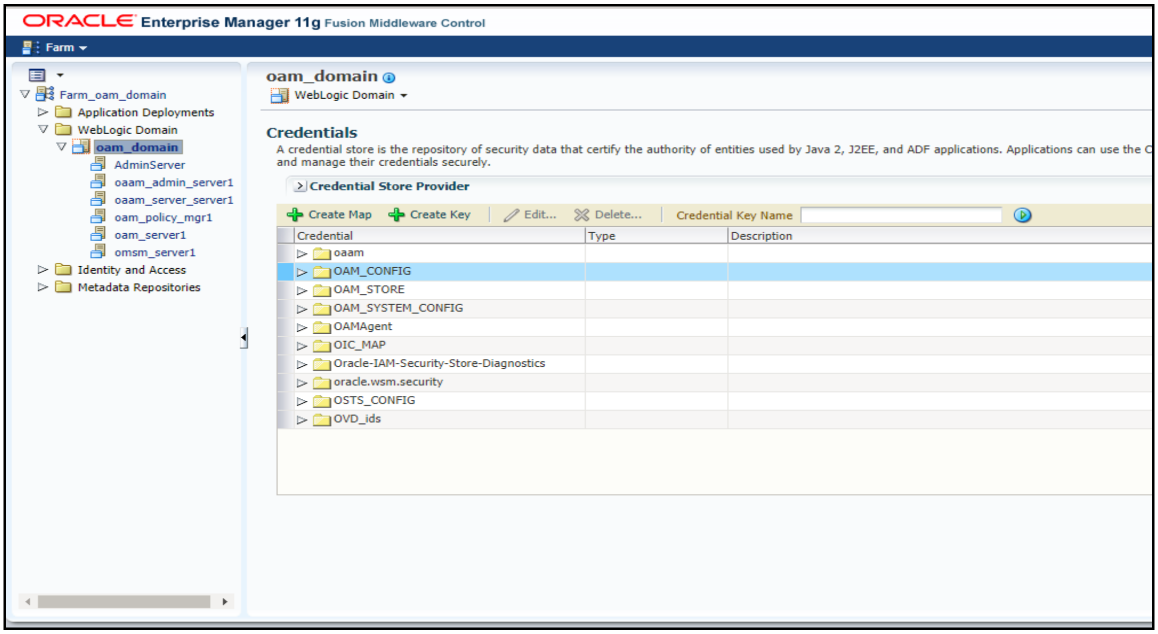
3. Click **AdaptiveAuthenticationModule**.
4. Click *Steps* tab and validate the configuration details entered. Update any Email related parameter if it is missing.
5. Validate **IdentityStoreRef**, **UmsAvailable**, **UmsClientUrl**, **EmailField**, **Email_Enabled** and so on. Update the values if required.

13.1.2.4 Configuring Credentials for UMS

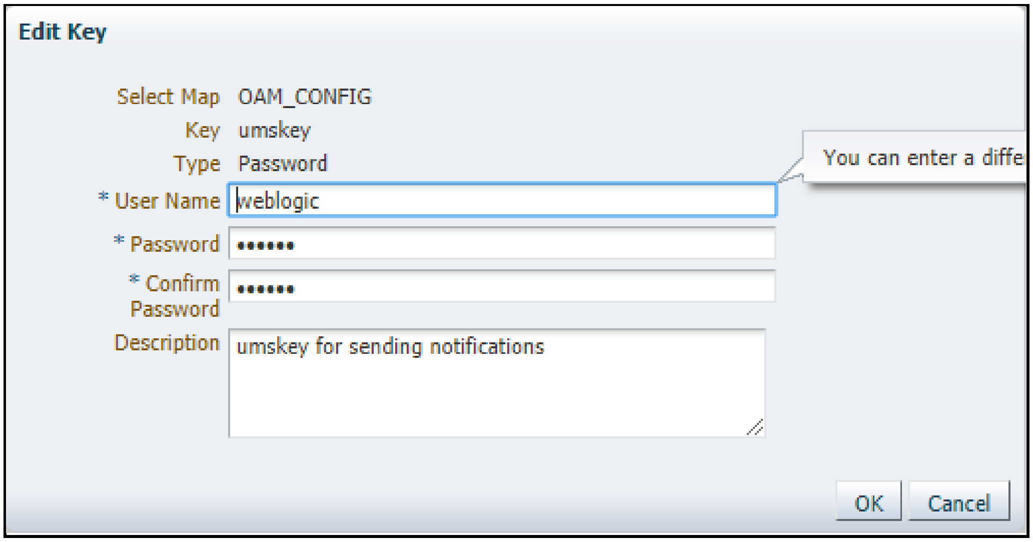
Adaptive Authentication Service uses Oracle SOA **User Messaging Service (UMS)** to send Email notifications. The OAM server needs the UMS credentials to send the notifications.

To update the UMS credentials for OAM server, perform the following steps:

1. Login to OAM EM console.
2. Expand **Weblogic Domain** and then right click on **<Domain_Name>** and navigate to **Security > Credentials**.



3. From the *Credentials* window, click **OAM_CONFIG** and then click **Create Key**. The *Edit Key* window is displayed.



Edit Key

Select Map OAM_CONFIG

Key umskey

Type Password

* User Name weblogic

* Password ••••••

* Confirm Password ••••••

Description umskey for sending notifications

4. Enter the UMS key credentials such as **User Name, Password, Confirm Password** and **Description**. Make sure that **OAM_CONFIG** is selected in **Select Map** and **Type** is selected as Password.

5. Click **OK** to save.

For creating **umsKey** using the *wlst scripts*, perform the following steps:

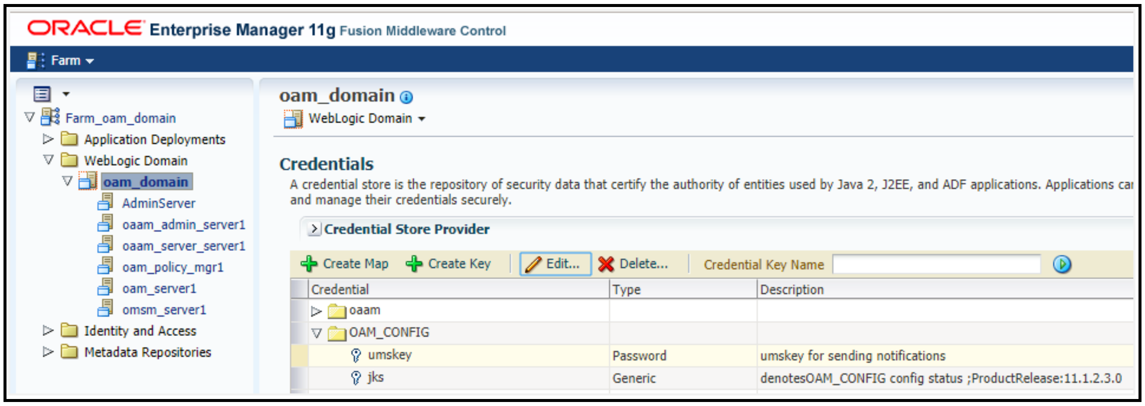
1. Navigate to `<MiddleWare_HOME>/common/bin`.

2. Execute the following command:

```
./wlst.sh
```

3. Connect to WebLogic server using `connect()` and enter the following WebLogic Admin server details:

```
createCred(map=”OAM_CONFIG”,key=”umsKey”,user=”weblogic”,password=”welcome1” )
```



Credentials

A credential store is the repository of security data that certify the authority of entities used by Java 2, J2EE, and ADF applications. Applications ca and manage their credentials securely.

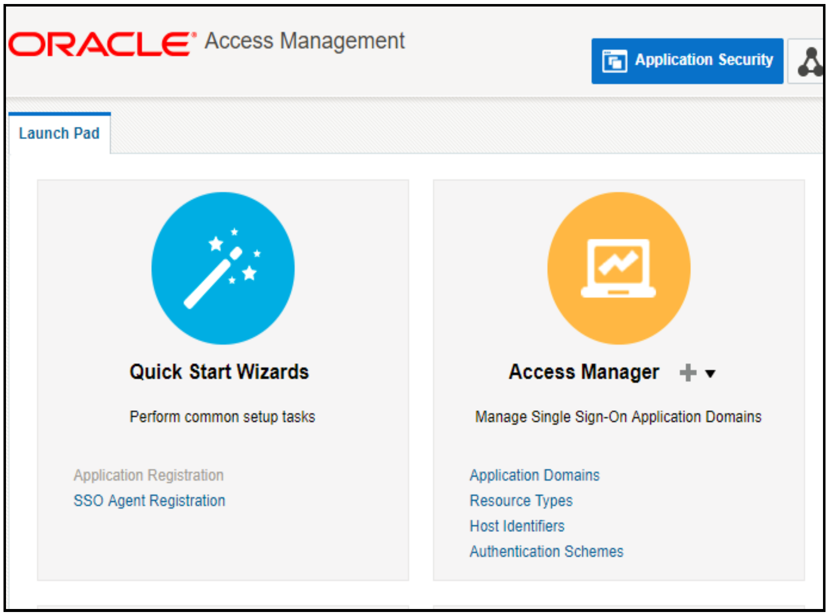
Credential	Type	Description
oaam		
OAM_CONFIG		
umskey	Password	umskey for sending notifications
jks	Generic	denotesOAM_CONFIG config status ;ProductRelease:11.1.2.3.0

13.1.2.5 Protecting the Resource with AdaptiveAuthenticationScheme

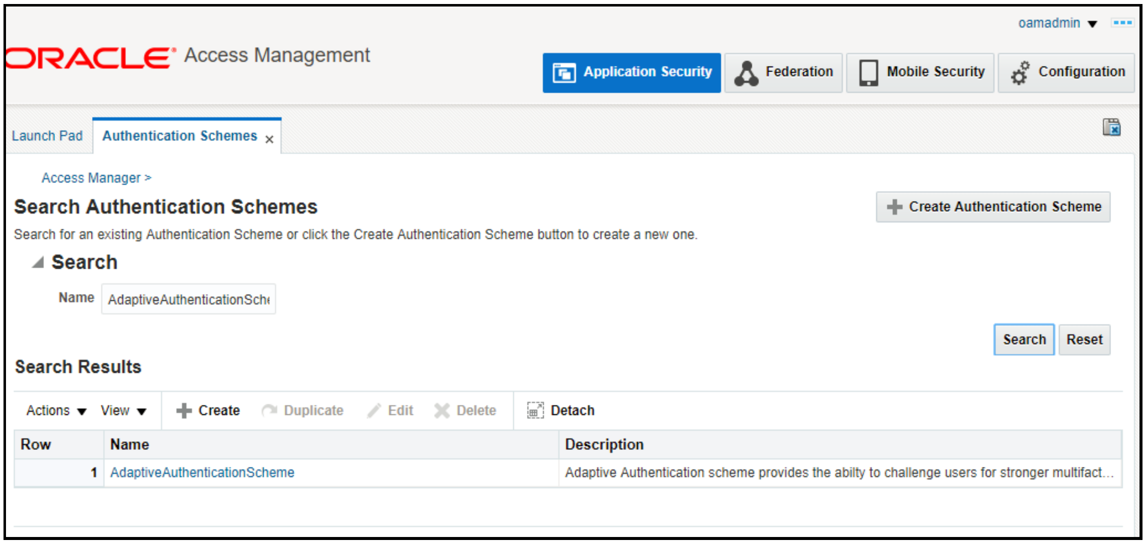
The adaptiveAuthentication Scheme is used for two-factor authentication.

To configure, perform the following steps:

1. Login to *OAM Admin Console* and click **Application Security**.



2. From the **Application Security** tab and click **Access Manager > Authentication Schemes**.
3. Search for **AdaptiveAuthenticationScheme**.



Search Authentication Schemes

Search for an existing Authentication Scheme or click the Create Authentication Scheme button to create a new one.

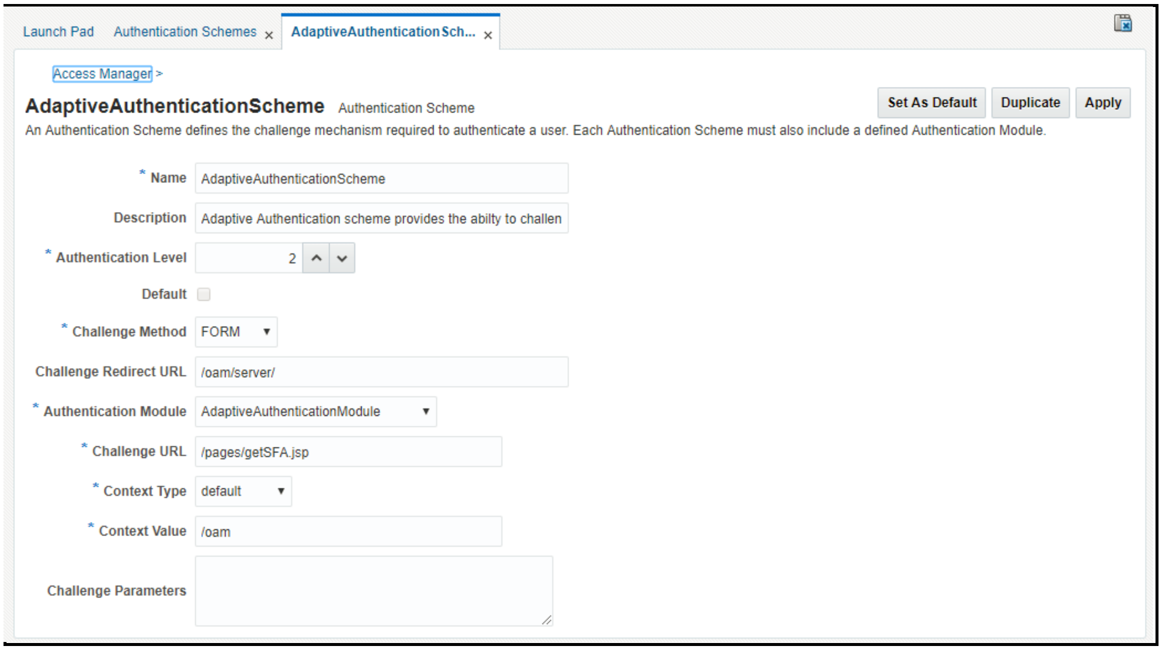
Search

Name: AdaptiveAuthenticationSche

Search Results

Row	Name	Description
1	AdaptiveAuthenticationScheme	Adaptive Authentication scheme provides the abilty to challenge users for stronger multifact...

4. Click **AdaptiveAuthenticationScheme** to view the details.



AdaptiveAuthenticationScheme Authentication Scheme

An Authentication Scheme defines the challenge mechanism required to authenticate a user. Each Authentication Scheme must also include a defined Authentication Module.

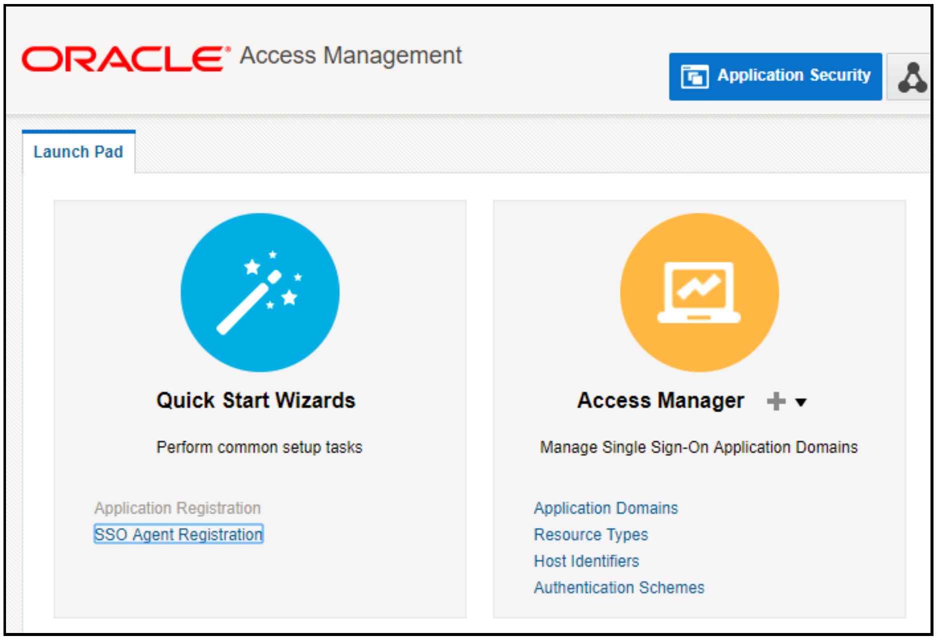
* Name	AdaptiveAuthenticationScheme
Description	Adaptive Authentication scheme provides the abilty to challen
* Authentication Level	2
Default	□
* Challenge Method	FORM
Challenge Redirect URL	/oam/server/
* Authentication Module	AdaptiveAuthenticationModule
* Challenge URL	/pages/getSFA.jsp
* Context Type	default
* Context Value	/oam
Challenge Parameters	

5. Verify the details and click **Apply**.

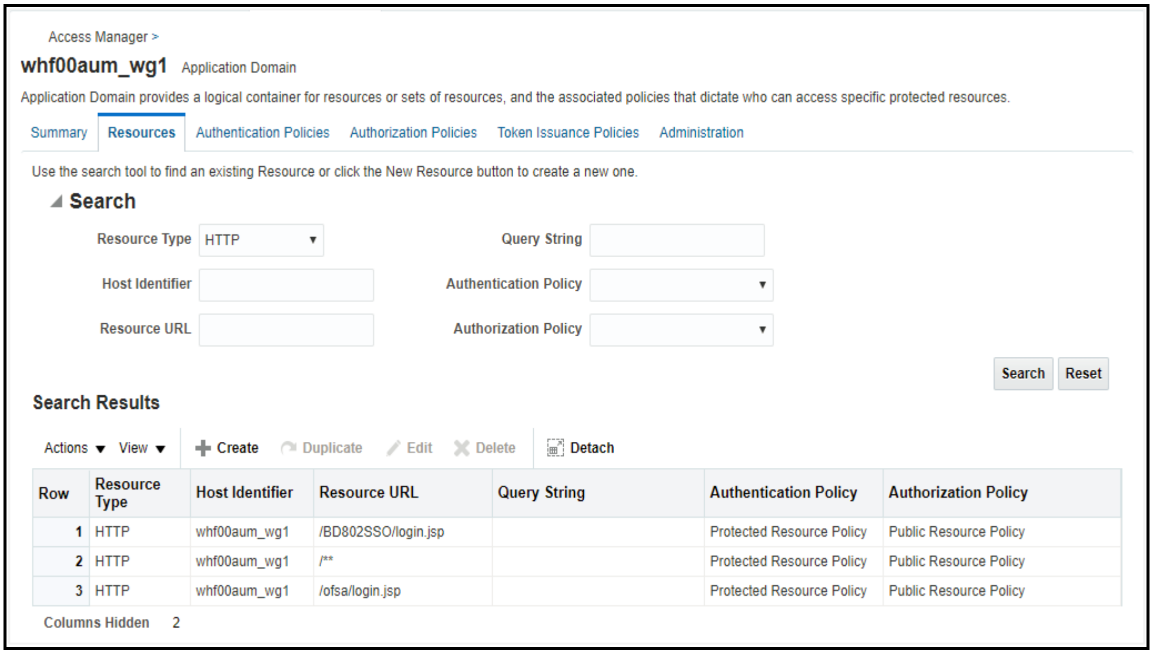
13.1.2.6 Enabling Two-Factor Authentication to a Protected Resource

To enable two-factor authentication to a protected resource, perform the following steps:

1. Login to *OAM Admin Console* and click **Application Security** tab.



2. Click **Access Manager > Application Domains**.



Application Domain provides a logical container for resources or sets of resources, and the associated policies that dictate who can access specific protected resources.

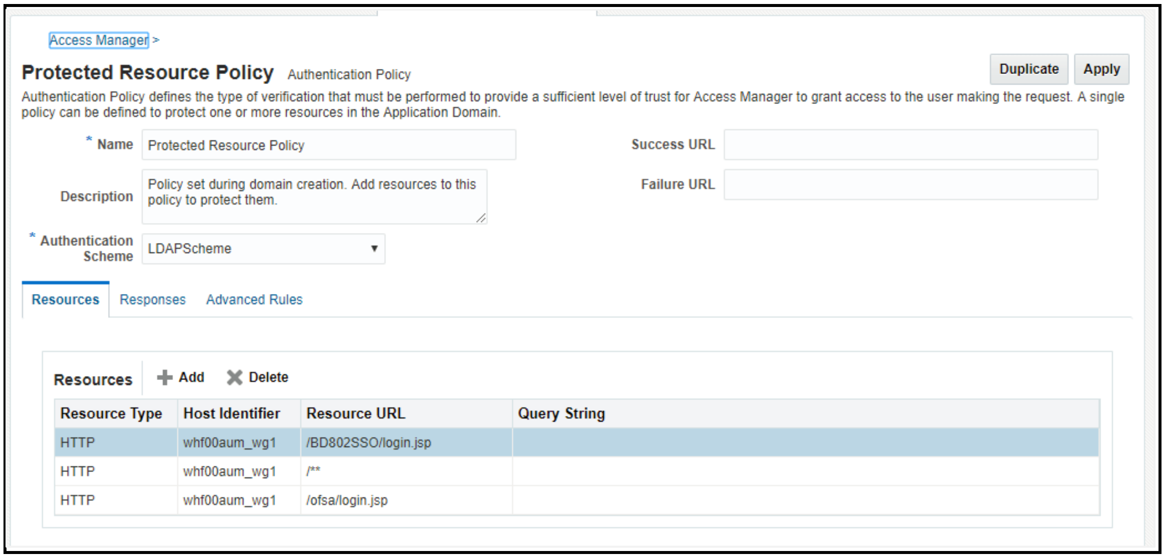
Use the search tool to find an existing Resource or click the New Resource button to create a new one.

Resource Type	HTTP	Query String	
Host Identifier		Authentication Policy	
Resource URL		Authorization Policy	

Row	Resource Type	Host Identifier	Resource URL	Query String	Authentication Policy	Authorization Policy
1	HTTP	whf00aum_wg1	/BD802SSO/login.jsp		Protected Resource Policy	Public Resource Policy
2	HTTP	whf00aum_wg1	/**		Protected Resource Policy	Public Resource Policy
3	HTTP	whf00aum_wg1	/ofsa/login.jsp		Protected Resource Policy	Public Resource Policy

3. From the *Resources* tab, search for your SSO added Resource Type.

4. Select *Authentication Policies* tab and then click **Protected Resource Policy**.



Access Manager >

Protected Resource Policy Authentication Policy

Authentication Policy defines the type of verification that must be performed to provide a sufficient level of trust for Access Manager to grant access to the user making the request. A single policy can be defined to protect one or more resources in the Application Domain.

* Name: Protected Resource Policy

Success URL:

Description: Policy set during domain creation. Add resources to this policy to protect them.

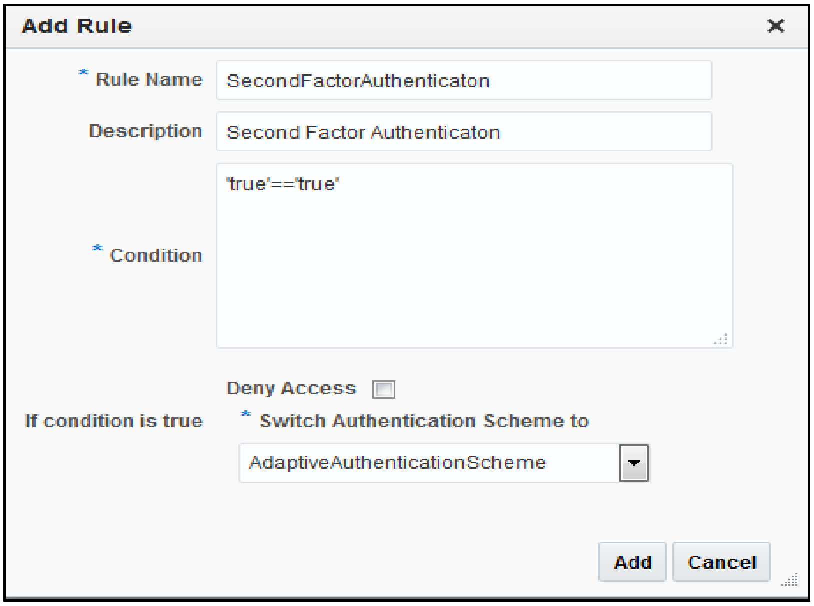
Failure URL:

* Authentication Scheme: LDAPScheme

Resource Type	Host Identifier	Resource URL	Query String
HTTP	whf00aum_wg1	/BD802SSO/login.jsp	
HTTP	whf00aum_wg1	/**	
HTTP	whf00aum_wg1	/ofsa/login.jsp	

5. Click **Advanced Rules tab.**

6. **From the** *Post-Authentication* tab in the created Authentication Policy, click **Add**.



Add Rule

* Rule Name: SecondFactorAuthenticaton

Description: Second Factor Authenticaton

* Condition: 'true'=='true'

If condition is true: Deny Access □

* Switch Authentication Scheme to: AdaptiveAuthenticationScheme

7. Enter the required details as shown and click **Add** to save.

13.1.2.7 Accessing the UI

To access the UI, perform the following steps:

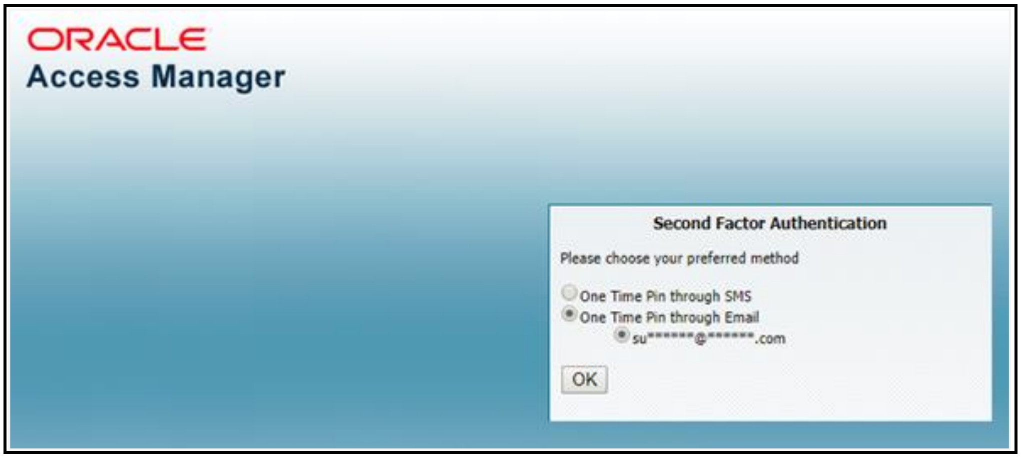
1. Access the UI by using the IP Address/ Host Name, Port, and Context Name of SSO enabled Setup.

```
http://<IPADDRESS/HOSTNAME hosting IDM OHS>:<OHSPORT>/<OFSAACONTEXT
NAME>/login.jsp
```

For example:

```
http://<SERVER_HOME>:7777/<CONTEXT>/login.jsp
```

2. Login with User Name and Password. After successful OIM login, the application prompts for Second Factor Authentication through OTP.

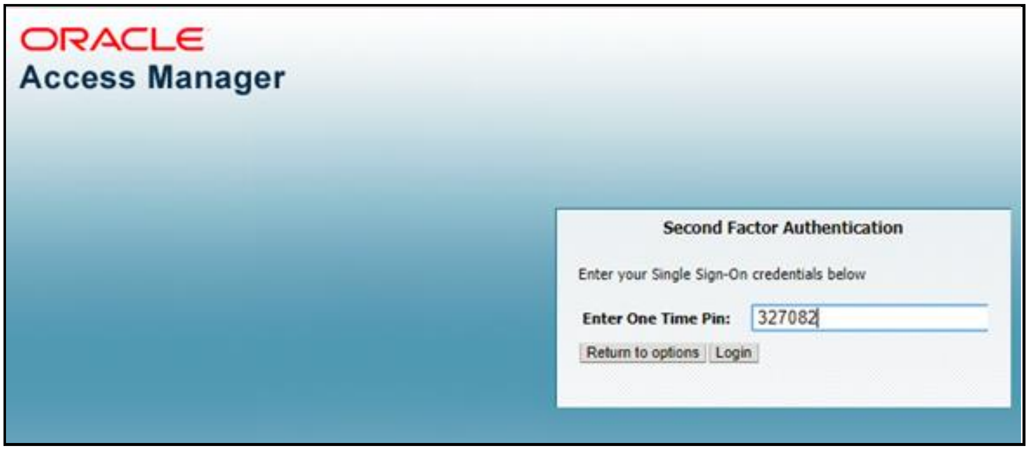


Second Factor Authentication

Please choose your preferred method

○ One Time Pin through SMS
● One Time Pin through Email
● su******@******.com

3. Select the method to receive the OTP from the options: SMS or Email.



Second Factor Authentication

Enter your Single Sign-On credentials below

Enter One Time Pin: 327082

4. Enter the OTP which you received through SMS or Email.
5. Click **Login**. The *OFSAA Landing Screen* is displayed.

13.2 Transparent Data Encryption (TDE)

OFSAAI is enhanced to support Transparent Data Encryption (TDE) feature of Oracle Advanced Security option. Transparent Data Encryption (TDE) enables you to encrypt sensitive data, such as Personally Identifiable Information (PII), that you store in tables and tablespaces. After the data is encrypted, this data is transparently decrypted for authorized users or applications when they access this data. To prevent unauthorized decryption, TDE stores the encryption keys in a security module external to the database, called a Keystore.

In case you did not enable TDE or Data Redaction during OFSAA 8.0.6.0.0 installation and want to enable at a later point of time, see *Enabling Transparent Data Encryption (TDE) and Data Redaction* section in OFS AAAI Application Pack Installation and Configuration Guide 8.0.6.0.0.

13.3 Data Redaction

OFSAAI is enhanced to enable masking of sensitive data and Personal Identification Information (PII) to adhere to Regulations and Privacy Policies. Oracle Data Redaction provides selective, on-the-fly redaction of sensitive data in database query results prior to display by applications so that unauthorized users cannot view the sensitive data. The stored data remains unaltered, while displayed data is transformed to a pattern that does not contain any identifiable information.

13.3.1 Prerequisites

1. Ensure the required Oracle Database Server versions are installed :
   - Oracle Database Server Enterprise Edition 11g Release 2 (11.2.0.4.0 +) - 64 bit RAC/Non-RAC with/ without partitioning option, Advanced Security Option
   - Oracle Database Server Enterprise Edition 12c Release 1 (12.1.0.1.0 +) - 64 bit RAC/ Non-RAC with/ without partitioning option, Advanced Security Option
2. Ensure the required patches are applied for your respective Oracle DB versions:
   - For Oracle DB Serve 11.2.0.4, the patch 22205607 should have been applied.
   - For Oracle DB Server 12.1.0.1 and 12.1.0.2, the patches 27010930 and 22205607 should have been applied.
3. You should have done all configurations mentioned in "Enabling Data Redaction" section in OFS AAAI Application Pack Installation and Configuration Guide 8.0.6.0.0. In case of applications installed using Full Installers, see the respective sections for enabling Data Redaction in your application Installation Guides.
4. User should have DATASECURITYADMIN User Role mapped to his user group.
5. From the *Configuration* window in the *System Configuration* module, select the **Allow Data Redaction** checkbox. For more information, see *Configuration* section in the OFS Analytical Applications Infrastructure User Guide.

13.3.2 Input for Data Redaction

Following are the tables that are seeded as part of Data Redaction:

Table Name	Description
AAI_DRF_FUNCTION_MASTER	This table holds the Redaction function definitions. Generic Functions can be email, card number, phone number etc.
AAI_DRF_FUNCTION_COLUMN_MAP	This table holds the Redaction Function- Column mappings. The columns will be redacted according to the Function mapping.
AAI_DRF_TABLE_ACCESS_CD_MAP	This table holds the mapping of tables having columns marked for redaction to the Access codes. These access codes are SMS function codes and are expected to be mapped to the role DATASECURITY. The policy expression would be created based on this role and would be evaluated in order to access unredacted data.

13.3.3 Data Redaction utility

This utility can be executed by running the seeded Batch with Batch Name as “##INFODOM##_DATA_REDACTION” if it is available as part of application common metadata. If it is not available, you have to create a new Batch as mentioned in the Creating Batch for Executing Data Redaction Utility section.

The task in the Batch has three parameters: `dataredaction.sh`, `true/false` and OFSAA User ID.

- **true/false flag**
  - False- By default, `false` is seeded. False indicates policy scripts will be generated and executed.
  - True- Specify `true` to generate policy scripts, but will not be executed. You can use this option if the logged-in user does not have script execution rights on Atomic Schema. See Executing Data Redaction utility with TRUE flag section to execute the scripts later.
- **User ID**- OFSAA user who is the batch owner

Note the following:

If any application specific database roles are granted to atomic schema, they should be granted as default roles after enabling data redaction.

```
Alter user << atomic schema user >> default role <<role1>>, <<role2>>.
```

For example, RQADMIN database role is granted to atomic schema user for ORE executions. In this case, post enabling data redaction, RQADMIN should be granted as a default role to atomic schema.

```
Alter user <<atomic schema user>> default role RQADMIN
```

13.3.3.1 Executing Data Redaction Utility with False Flag

Following are the steps if you want to execute Data Redaction utility with False flag:

1. From the *Batch Execution* window, search for Batch Name as “##INFODOM##_DATA_REDACTION”.
2. Select the Batch and click **Execute Batch**.

   All policy scripts will be generated and executed in the Atomic Schema and the identified table data will be redacted.

13.3.3.2 Executing Data Redaction utility with TRUE flag

Following are the steps involved if dataredaction utility is executed with TRUE flag

1. From the *Configuration* window of System Configuration module, enter the absolute path where the encryption key is stored in the **Encryption Key Path** field. If this is not provided, default key will be used which is available in `$fic_home/conf` folder.
2. From the *Batch Maintenance* window, search for Batch ID as “##INFODOM##_DATA_REDACTION”.
3. Select the Batch.
4. Select the task from the *Task Details* pane and click **Edit**.

5. In the Executable field in the Dynamic Parameters List, specify as `dataredaction.sh,true,<<ofsaa user id>>`.

6. Click **Save**.

7. From the *Batch Execution* window, search for Batch ID as <>>.

8. Select the Batch and click **Execute Batch**.

9. Navigate to `FTPshare/DataRedaction` folder. You can find 2 folders called Scripts and Postscripts inside DataRedaction folder.

10. Decrypt "create scripts" in the `FTPshare/DataRedaction/scripts` folder using `dmtfileencryption.sh` with the following arguments:

    ```
    ./dmtfileencryption.sh decrypt_file <INPUTFILE> <OUTPUTFILE> <KEYFILE>
    ```

    - <INPUTFILE>- Provide the absolute path of the input file. Since all "create scripts" in the scripts folder need to be decrypted, you can provide the folder path, that is, `FTPshare/DataRedaction/scripts`.

    - <OUTPUTFILE>- Provide the absolute path of the input file.

    - <KEYFILE>- Provide the absolute path of key file with key file name. This should be same as that is provided in the Configuration window. If nothing was provided in the Configuration window, specify the default key path as `$fic_home/conf/ofsaa8xkey.ext`.

      For more details, see *Command Line Utility for DMT File Encryption* section in OFS Analytical Applications Infrastructure User Guide.

11. Execute the decrypted "create scripts" in the Atomic Schema.

12. Execute scripts in the `FTPshare/DataRedaction/postscripts` folder for populating required OFSAA metadata.

    The identified table data will be redacted.

13.3.4 Creating Batch for Executing Data Redaction Utility

If the seeded Batch is not available, create a Batch to execute Data Redaction utility.

Following are the steps required to create a Batch

1. From the *Batch Maintenance* window, click + **Add** button in the *Batch Name* tool bar. The *Add Batch Definition* window is displayed.

2. Enter **Batch Name** and **Batch Description**.

3. Click **Save.** The newly added Batch will be listed in the *Batch Maintenance* window.

4. Select the Batch and click + **Add** from the *Task Details* tool bar. The *Add Task Definition* window is displayed.

5. Enter **Task Description** and select **Component** as RUN EXECUTABLE from the drop-down list.

6. In the **Executable** field in the *Dynamic Parameters List*, specify as `dataredaction.sh,false/true,<<ofsaa user id>>`.

7. See *Adding Task Details* section in the *Operations* Chapter in the OFS Analytical Applications Infrastructure User Guide for details on other fields.

13.3.5 Logs

You can find the logs in `/ftpshare/logs/<ExecutionDate>/<Infodom Name>/RUN EXECUTABLE` folder.

13.3.6 Disabling Data Redaction

For disabling data redaction, perform the following steps:

1. From the *Configuration* window in the *System Configuration* module, de-select the **Allow Data Redaction** checkbox.
2. Run the Data Redaction utility. For details on running the Data Redaction utility, see Data Redaction utility section.

13.4 Data File Encryption

OFSAAI supports encryption of Data files. A stand-alone File Encryption utility is provided to encrypt and decrypt the Data files.

To configure File encryption:

1. From the *DMT Configurations* window under *File Encryption* grid, enter the following details:
   a. Select **Yes** from the **Encryption at Rest** drop-down list.
   b. Enter the **Key File Name** and **Key File Path** of the key that is used to encrypt or decrypt the Data File. You can use File Encryption utility to generate key in AES 256 bit format. For details, see *Command Line Utility for File Encryption* section in OFS Analytical Applications Infrastructure User Guide 8.0.6.0.0.
2. For F2T or F2H, encrypt your Data File using File Encryption utility and place the Key used for encryption in the **Key File Path** given in the DMT Configurations window. Then place the encrypted Data File in `/ftpshare/<INFODOM>/dmt/source/<SOURCE_NAME>/data/<MIS_DATE>/`.
3. For T2F or H2F, the output Data file will be encrypted. Use the File Encryption utility to decrypt the data file.

   For details on how to execute File Encryption Utility, see *Command Line Utility for File Encryption* section in OFS Analytical Applications Infrastructure User Guide 8.0.6.0.0.

13.5 Key Management

The OFSAA Configuration Schema (CONFIG) is the repository to store passwords for users and application database schemas centrally. These values are AES 128 bit encrypted using an encryption key uniquely generated for each OFSAA instance during the installation process.

The OFSAA platform provides a utility (EncryptC.sh) to rotate/ generate a new encryption key if needed.

> **NOTE** Integration with any other Key management solution is out of scope of this release.

This section details about the EncryptC Utility, which is used to:

- Generate keystore from `AESCryptkey.ext` key.
- Retrieve `AESCryptkey.ext` if it is deleted using the keystore.
- Generate new `AESCryptKey.ext` and update the keystore.

13.5.1 Executing EncryptC Utility

The procedure to execute the EncryptC utility is described in the following subsections.

13.5.1.1 Knowing the Prerequisites

- Ensure that the `Keystore.properties` file is present in the `$FIC_HOME/conf` directory.
- Enter the keystore path where you want to generate AESkeystore.ks.

  For example,

  ```
  keystorepath=/scratch/ofsaaweb/OFSAAI_806
  ```
- Ensure that **EncryptC** utility is present in the `$FIC_HOME/utility/EncryptC` directory.

13.5.1.2 Generating Keystore

Generate keystore using the following procedure:

1. Navigate to the `$FIC_HOME/utility/EncryptC/bin` directory.
2. Execute the command:

   ```
   ./EncryptC.sh -genkeystore
   ```
3. Expected output and actions required are listed:

   a. A prompt appears to enter the keystore path if the path is not mentioned in `keystore.properties`.

   b. A prompt appears to enter keystore password and keypassword. If the keypassword is not given, then the system picks the keystorepassword as the keypassword.

   c. Keystore path is read from `KeyStore.properties` file and name of keystore is **AESKeyStore.ks**. So this generates keystore at specified location.

13.5.1.3 Retrieving AESCryptKey.ext

Retrieve `AESCryptKey.ext` using the following procedure:

1. Navigate to the `$FIC_HOME/utility/EncryptC/bin` directory.
2. Execute the command:

   ```
   ./EncryptC.sh -retrieve
   ```

3. Expected output and actions required are listed:
   - **a.** A prompt appears to confirm whether you want to retrieve the `AESCryptKey.ext` file or not.
   - **b.** If you select **Yes**, then a prompt appears to enter keystore password and key password.
   - **c.** After you enter the passwords, `AESCryptKey.ext` is retrieved to all locations where it was originally present.

13.5.1.4 Generating new AESCryptKey.ext and updating the keystore

Generate new `AESCryptKey.ext` and update the keystore using the following procedure:

1. Navigate to `$FIC_HOME/utility/EncryptC/bin` directory.
2. Execute the command:

   ```
   ./EncryptC.sh -genkey
   ```
3. Expected output and actions required are listed:
   - **a.** The system checks whether keystore exists or not. If it does not, then it prompts for generating keystore using the `–genkeystore` option.
   - **b.** The system rotates the existing `AESCryptKey.ext` and generates a new `AESCryptKey.ext` key.
   - **c.** Then it updates the keystore with the new key.

> **NOTE** If you provide an option other than the ones discussed in the preceding sections, the system prompts to enter the correct option.

13.6 HTTPS Protocol

HTTP Secure (HTTPS) is an extension of the Hypertext Transfer Protocol (HTTP) for secure communication over a network.

To change protocol from HTTP to HTTPS, follow these steps:

1. Create SSL related certificates and import to respective servers.
2. Enable SSL on a desired Port (example 9443) on your existing and already deployed web application servers.
3. Execute PortC Utility to change the Servlet port to hold new SSL port and Servlet Protocol from http to https. For details, see Changing IP/ Hostname, Ports, Deployed paths, Protocol of the OFSAA Instance.
4. When SSL/TLS is configured on Java 7, navigate to `$FIC_HOME/utility/Migration/bin` path and modify the `ObjectMigration.sh` file as given:

   ```
   $JAVA_BIN/java $X_ARGS_OBJMIG -Dhttps.protocols=TLSv1.2 -classpath
   $_CLASSPATH $MAIN_JAVA_CLASS $MIGRATION_HOME> $LOG_FILE
   ```

> **NOTE** For more information, see the link: https://bugs.openjdk.java.net/browse/JDK-8151387.

13.7 Logging

Logging in OFSAA is done using Log4J. The log files are available in the following locations:

- **UI/Web Logs**: `<DEPLOYED LOCATION>/<Context>.ear/<Context>.war/logs`
- **Application Logs**: `$FIC_HOME/logs`
- **Execution Logs**: `/ftpshare/logs/<MISDATE>/<INFODOM>/<COMPONENT NAME>/<LOG FILE NAME>.log`

13.7.1 Purging of Logs

Configure the logger related attributes in the `RevLog4jConfig.xml` file available in the `$FIC_HOME/conf/` folder. Each of log file will have appenders in this file and attributes pertaining to this particular appender can be changed.

The default size of the log files is set to 5000 KB and number of maximum backup log files retained is set to 5, both of which are configurable. Increasing these parameters to a higher value should depend on the server hardware configurations and may reduce the performance.

> **NOTE** Similar settings are also available in `OFSAALogger.xml` file available in the `$FIC_HOME/conf/` folder which contains configuration for additional loggers used in OFS AAI. You can configure the Log file size as explained in the following section.

To configure the Logs file size, follow these steps:

1. Navigate to `$FIC_HOME/conf` folder or `<DeployedLocation>/<context.war>/<context>/` and locate `RevLog4jConfig.xml` file.
2. Configure the logger related attributes in the `RevLog4jConfig.xml` file. This file will have Appenders for each log files.

   Sample Appender for UMM log file is shown:

   ```
   <RollingFile name="UMMAPPENDER"
   fileName="/scratch/ofsaaweb/weblogic/user_projects/domains/cdb/applications/cdb.ear/cdb.war/logs/UMMService.log"

   filePattern="/scratch/ofsaaweb/weblogic/user_projects/domains/cdb/applications/cdb.ear/cdb.war/logs/UMMService-%i.log" >

   <PatternLayout>

     <Pattern> [%d{dd-MM-yy HH:mm:ss,SSS zzz aa}{GMT}] [%-5level] [WEB]
   %m%n </Pattern>

     </PatternLayout>
   ```

```
<Policies>
    <SizeBasedTriggeringPolicy size="5000 KB" />
</Policies>
 <DefaultRolloverStrategy max="5"> <!-- number of backup files -->
    </DefaultRolloverStrategy>
</RollingFile>
```

3. To change the log file size, modify the value set for `SizeBasedTriggeringPolicy size.`
4. To change the number of backup files to be retained, modify the value set for `DefaultRolloverStrategy max.`

13.7.2 Log File Format

In OFSAA, log format is standardized and can be read by any standard log analysis tool. The standard log format is as follows:

```
[GMT TIMESTAMP] [LOGGER LEVEL] [LOGGER LOCATION]  [MODULE/COMPONENT]
[LOGGED IN USER] [JAVA CLASS] <LOG MESSAGE>
```

Sample:

```
[25-04-18 10:08:41,066 GMT AM] [INFO    ] [WEB]  [UMM]  [UMMUSER]
[BUSINESSMETADATA] Inside createImplicitObjectsForAllInfodom

[25-04-18 10:08:41,069 GMT AM] [INFO    ] [WEB]  [UMM]  [UMMUSER]
[BUSINESSMETADATA] Call createImplicitObjectsForMapper for infodom =
TESTCHEF

[25-04-18 10:08:42,142 GMT AM] [DEBUG] [WEB]  [UMM]  [UMMUSER]
[BUSINESSMETADATA] Source created successfully for infodom TESTCHEF

[25-04-18 10:08:42,142 GMT AM] [INFO    ] [WEB]  [UMM]  [UMMUSER]
[BUSINESSMETADATA] Start - code added to create user group hierarchy for
this infodom

[25-04-18 10:08:42,142 GMT AM] [INFO    ] [WEB]  [UMM]  [UMMUSER]
[BUSINESSMETADATA] Inside createUserGroupHierarchyForInfodom
```

14 Generic Configurations

This chapter describes about generic configurations required for OFS AAAI Application pack. It consists of the following sections:

14.1 OFSAA Global Performance Optimization

OFSAA execution performance can be enhanced by providing optimization parameters specifically at information domain level, database level, object level or object sub type level. This is done by updating the AAI_GLOBAL_EXEC_OPTIMIZATION table with appropriate values.

The columns and the values to be given in the AAI_GLOBAL_EXEC_OPTIMIZATION table are indicated as follows:

Column Name	Description	Value
V_INFODOM_CODE	Information Domain code	ALL or specific information domain code.
V_DB_TYPE	Database type of the Information Domain	ORACLE or HIVE

Column Name	Description	Value
V_OBJ_TYPE_CODE	Object type for which you want to apply execution optimization.	For example, Rule (RL). This is referred from AAI_OBJ_TYPE_SUBTYPE_MAP. V_ OBJ_TYPE_CODE.
V_OBJ_SUBTYPE_CODE	Object sub type for which you want to apply execution optimization.	For example, for Rule (RL) Object type, TYPE2 and TYPE3 are subtype codes. This is referred from AAI_OBJ_TYPE_SUBTYPE_MAP. V_ OBJ_SUBTYPE_CODE.
V_EXEC_OPTIM_PARAM_NAME	Name of the parameter using which optimization is done.	This is referred from AAI_EXEC_OPTIM_PARAM_B. V_EXEC_OPTIM_PARAM_NAME. Currently supported parameters are POSTSCRIPT, PRESCRIPT, MERGE, HINT and SELECT.
V_EXEC_OPTIM_PARAM_VALUE	Value for the optimization parameter mentioned in V_EXEC_OPTIM_PARAM_NAME column.	

14.2 Query Performance Optimization

A configuration file, **OracleDB.conf** has been introduced to accommodate any configurable parameter related to operations for Oracle database. If you do not want to set a parameter to a specific value, then the respective parameter entry can be removed/commented from the **OracleDB.conf** file which resides in the path `$FIC_DB_HOME/conf`.

The following table details the configurable OFSAA parameters in **OracleDB.conf** file with its purpose and the way it maps to Oracle Database Parallelism settings.

Parameters	Description
CNF_PARALLEL_DEGREE_POLICY	Sets the parallel degree policy. Possible values – **MANUAL**, **LIMITED**, or **AUTO**. Query fired on the database - ALTER SESSION SET PARALLEL_DEGREE_POLICY=<<CNF_PARALLEL_DEGREE_POLICY>>
CNF_PARALLEL_QUERY	Sets parallelism for queries. Possible values – **DISABLE**, **ENABLE**, or **FORCE**. Query fired on the database - ALTER SESSION <<CNF_PARALLEL_QUERY>> PARALLEL QUERY

Parameters	Description
CNF_PARALLEL_DML	Sets parallelism for DML operations. Possible values – **DISABLE**, **ENABLE**, or **FORCE**. Query fired on the database - ALTER SESSION <<CNF_PARALLEL_QUERY>> PARALLEL DML
CNF_DEGREE_OF_PARALLELISM	Sets the degree of parallelism. Possible values – Value can be any positive integer. The default mode of a session is *DISABLE PARALLEL DML*. If *CNF_DEGREE_OF_PARALLELISM* is not set, then the default degree, as decided by Oracle will be used. Queries fired on the database - ALTER SESSION <<CNF_PARALLEL_QUERY>> PARALLEL QUERY PARALLEL <<CNF_DEGREE_OF_PARALLELISM>> ALTER SESSION <<CNF_PARALLEL_QUERY>> PARALLEL DML PARALLEL <<CNF_DEGREE_OF_PARALLELISM>>

For more information, see the **Using Parallel Execution** section in Oracle Database VLDB and Partitioning Guide.

14.3 Multiple Language Support (MLS) Utility

Multiple Language Support (MLS) refers to the ability to run multiple languages in the same Application instance. MLS provides multiple language architecture, while specific language packs provide the individual language translations.

Multiple Language Support (MLS) is supported for the following objects:

- Unified Metadata Manager- All Objects.
- Run Rule Framework- Run, Process and Rule definitions.
- Financial Services Applications- Dimension Management - Attributes, Members, Hierarchies; Filters, Expressions and Object Migration.

The MLS Utility can be invoked through the execution of the following steps with an appropriate parameter. The purpose and the parameters are listed below.

To execute the MLS utility, perform the following steps:

1. Navigate to `$FIC_HOME/MLS_ofsaai` directory of OFSAAI APP tier.
2. Execute the MLS utility <Command> <parameter>.

14.3.1 Available Parameters

MES

You need to invoke the utility with this parameter for population of seeded text such as menu labels and popup messages.

You need to execute this utility with this parameter only after you install an OFSAA language pack, where the language pack has a version lower than the installed OFSAAI software version. For example, you are installing the OFSAA 8.0.0.0.0 LP on an OFSAA setup where the OFSAA version is 8.0.1.0.0.

There are additional labels and messages that have been added or modified as part of previous release. In order to update/ populate the `messages_<locale>` table with delta records, you need to run the utility with this parameter. Running this utility will copy the incremental set of text to the language-specific `messages_<locale>` tables as a placeholder, so you will see an American English message (default for base install) until the translation is available in language packs.

For example, if you are on OFSAA 8.0.1.0.0 and have installed OFSAA 8.0.0.0.0 language packs for French and Spanish (since the latest 8.0.x language pack may not yet be available), running the utility with the MES parameter will duplicate the incremental labels and messages from the `messages_en_US` table to the language specific tables for French and SpanishCommand:

```
./MLS_ofsaai.sh MES
```

MLS

You need to execute the MLS utility with this parameter in order to pseudo-translate the translatable attributes of user-defined metadata objects. For example, this will copy Names and Descriptions as placeholders in rows for other installed languages.

See the above list of MLS-enabled OFSAAI object types. After installation of 8.0.0.0.0 release for any application, the base metadata and translatable data for these object types will have rows for US (American English) only. Executing the utility with the MLS parameter will duplicate the translatable attributes of the metadata objects for other installed locales.

Command:

```
./MLS_ofsaai.sh MLS
```

Multilingual Support (MLS) architecture has been enabled by segregation of the metadata definitions into non-translatable content (such as Codes), and translatable content (such as Names and Descriptions) for the en_US and other installed languages. The object information has been organized with a single row of base information (containing non-translatable attributes) and multiple associated language rows for holding translatable content (one for each language including a row for en_US.).

For example, you have a Hierarchy which has been defined in en_US (US English) language and then you install 8.0.0.0.0 language packs for 2 more languages, say fr-FR (French), and es-ES (Spanish). Post execution of the utility with the MLS parameter, the same Hierarchy rule will be available in the two additional languages that you have installed. You can then login to each locale (language) and edit the Hierarchy definition to enter translated text for the Hierarchy Name and Description.

Before you run the utility, you will have only one row for English, for example:

> LANGUAGE=US, Description="Organization Hierarchy – Level 1", SOURCE_LANG=US

After you run the utility, you will have two more rows: One for French, and one for Spanish:

> LANGUAGE=FR, Description="Organization Hierarchy – Level 1", SOURCE_LANG=US
>
> LANGUAGE=ES, Description="Organization Hierarchy – Level 1", SOURCE_LANG=US

That is, the utility has created a copy of the source row for each target language. The source language in each row is American English (US), the Description data is American English, and the LANGUAGE column contains the target language code. The Hierarchy rule will be available when you login with any of the above languages. For example, if you login with French, you can select and edit the object definition, then update the Name and Description to a French translation of the text.

> **NOTE** As in the above example, running with MLS is necessary for objects (such as a Hierarchy rule) that exist in OFSAAI 8.0.0.0.0 (or later release) prior to applying a language pack for a new locale. If you create a Hierarchy after you apply the language pack, OFSAAI will automatically replicate text (such as Name and Description) into the new locale.

14.3.2 AAIPI.sh Utility

AAIPI.sh utility can be executed instead of executing MLS utility with different parameters. This utility will internally call the MLS utility in the following order:

```
./MLS_ofsaai.sh MIG
./MLS_ofsaai.sh MLS
./MLS_ofsaai.sh MES
```

To execute this utility:

1. Navigate to `$FIC_HOME/Post_AAI_Migration` directory of OFSAAI APP tier.
2. Execute command:

   ```
   ./aaipi.sh
   ```

You can find the log file `Post_AAI_Migration.log` in the following location `$FIC_HOME/Post_AAI_Migration/logs/`.

14.4 Transferring Batch Ownership

A procedure called TRANSFER_BATCH_OWNERSHIP is available in Configuration Schema to transfer the batch ownership of specific batches in an information domain or across information domains.

To execute the procedure:

1. Login to Configuration Schema.
2. Execute the procedure TRANSFER_BATCH_OWNERSHIP by entering following command:

   ```
   begin
   AAI_TRANSFER_BATCH_OWNER.TRANSFER_BATCH_OWNERSHIP
   ('<fromuser>','<touser>','<batchid>','<infodom>');
   end;
   ```

   — `<fromuser>` - Specify the ID of the user whose batch ownership you want to transfer.

   — `<touser>` - Specify the ID of the user to whom the ownership has to be transferred.

   — `<batchid>` - This is an optional parameter. Specify the ID of the batch whose ownership you want to transfer. If `<batchid>` is not specified, all batches owned by the `<fromuser>` will be transferred to the `<touser>`.

- `<infodom>` - This is an optional parameter. Specify the information domain name if ownership of all batches in that information domain needs to be transferred to the `<touser>`. If `<infodom>` is not specified, ownership of batches across all information domains will be transferred.

For example,

To transfer a single batch ownership, execute the following command:

```
begin

AAI_TRANSFER_BATCH_OWNER.TRANSFER_BATCH_OWNERSHIP
('<fromuser>','<touser>','<batchid>');

end;
```

To transfer all batch ownerships across infodoms, execute the following command:

```
begin

AAI_TRANSFER_BATCH_OWNER.TRANSFER_BATCH_OWNERSHIP
('<fromuser>','<touser>');

end;
```

To transfer all batches in a specific infodom, execute the following command:

```
begin

AAI_TRANSFER_BATCH_OWNER.TRANSFER_BATCH_OWNERSHIP
('<fromuser>','<touser>','','<infodom>');

end;
```

14.5 Database Password Reset/ Change

The database password for config schema and atomic schema should be changed periodically for security. The following configurations are required on changing the database passwords:

For changing CONFIG schema password:

1. Login to the database and change the config schema password.
2. Login to the OFSAA server.
3. Stop all OFSAA services.
4. Delete `Reveleus.sec` from `FIC_HOME/conf`.
5. Restart OFSAA service in foreground (without the nohup option).
6. Enter the latest config schema password when you are prompted at the console.

For changing the ATOMIC schema password:

1. Ensure the OFSAA services are running and application can be accessed.
2. Login to the database and change the ATOMIC schema password.
3. Login to the OFSAA application as any user with System Administrator privilege.
4. Navigate to *System Configuration and Identity Management* > *Administration and Configuration* > *Database Details*.

5. Modify the **Password** field with the new password and click **Save**. For more information, see OFSAAI User Guide.
6. Navigate to *Data Management Framework* > *Data Sources*.
7. Select the appropriate Data Source pointing to the ATOMIC Schema for which the password was reset from the *Data Sources* tree.
8. Click **Edit**.
9. Modify the **Password** field with the new password and click **Save**. For more information, see OFSAAI User Guide.

Resource Reference/ JNDI connection details

On change of the CONFIG/ ATOMIC schema passwords, the corresponding Resource Reference/ JNDI connection entries made in the Web Application Servers need to be updated.

- For Tomcat Web Server.
  - Stop the Tomcat Server.
  - Update the `Server.xml` file present in `$CATALINA_HOME/conf` with the latest config schema and atomic schema passwords.
- For WebSphere / WebLogic
  - Access the server specific "Admin" console.
  - Login to the server with Administrative privileges.
  - Update DataSources with the latest config schema and atomic schema passwords. For more information, see the *Configuring Resource Reference* sections in Appendix B in *OFS AAAI Application Pack Installation and Configuration Guide* available in OHC Documentation Library.

14.6 Changing IP/ Hostname, Ports, and Deployed paths of the OFSAA Instance

The Port Changer utility can be used to change IP/ Hostname, Ports, and Deployed paths of the OFSAA instance.

Prerequisites

- Ensure that the `RevLog4jConfig.xml` of the `$FIC_HOME/conf` and the **AAI_SETUP_PROPS** Table of the Config Schema for the param name `LOGHOME` is configured with the default log paths before executing the utility.

  The default log path for `RevLog4jConfig.xml` is `$FIC_HOME/logs` and the default log path to be set for the **AAI_SETUP_PROPS** Table of the Config Schema for the param name LOGHOME is `<deployed area of web server>/logs`.
- For more information, see *How to Find and Maintain OFSAA and OFSAAI Log and Configuration Files (Doc ID 1095315.1)* available in My Oracle Support.

14.6.1 Running Port Changer Utility

1. Navigate to `$FIC_HOME/utility/PortC/bin` folder on *Target.*
2. Run the **PortC.sh** utility using command:

   ```
   ./PortC.sh DMP
   ```

   A file with the name `DefaultPorts.properties` will be created under `$FIC_HOME` directory which will contain the ports, IPs and paths currently being used.

> **NOTE** It is mandatory to run the Port Changer utility using the DMP parameter every time before executing the utility using UPD command.

3. Make the necessary changes to those ports, IPs, and paths in the `DefaultPorts.properties` file as per the Target environment. Save the changes.

> **NOTE** In the properties file, make sure that the JDBC_URL parameter does not contain space(s). If you enter JDBC_URL with space(s), then you might experience errors in accessing the System Configuration window.

4. Run the **PortC.sh** utility using the command:

   ```
   ./PortC.sh UPD
   ```

   This will change the ports, IPs and paths in `.profile` (under home directory), all files under `$FIC_HOME` directory, and tables in the database according to the values mentioned in `DefaultPorts.properties` file.
5. Execute the `.profile` file and create the EAR/WAR file. Then restart the OFSAA services and redeploy to the configured web application server.

> **NOTE**
> - The table `batch_parameter` is not updated with the new IP after you run the file `portc.jar`. The table holds the batch execution details of the batches that were executed earlier. The table `batch_parameter_master` holds the new IP after you run `portc.jar`.
> - Check the logs for more information, and contact My Oracle Support if you encounter any errors.

14.7 Using X-Frame-Options to Embed OFSAA Content on your Site

By default, the OFSAA configuration does not allow you to embed OFSAA content on your site. However, you can modify the web.xml file to enable this option. For more information about X-Frame-Options, see https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers/X-Frame-Options.

14.7.1 Knowing the Prerequisites

The following is the prerequisite to configure X-Frame-Options to embed OFSAA content on your site:

You can embed the OFSAA content only on the following browsers that support X-Frame-Options headers:

Number	Browser	DENY and SAMEORIGIN Support Introduced Version	ALLOW-FROM Support Introduced Version
1	Chrome	4.1.249.1042 [3]	Not supported or Bug reported [4]
2	Firefox (Gecko)	3.6.9 (1.9.2.9) [5]	18.0 [6]
4	Opera	10.50 [9]	
5	Safari	4.0 [10]	Not supported or Bug reported [11]

14.7.2 Enabling or Disabling X-Frame-Options in the web.xml File

Change the default OFSAA setting for X-Frame-Options from **SAMEORIGIN** to **ALLOW-FROM** in the *web.xml* file to embed OFSAA content on your site.

The following is the procedure to modify the *web.xml* file:

1. Open the `web.xml` file in an editor.
2. Search for the following tag:

```
<filter>
<filter-name>FilterServlet</filter-name>
<filter-class>com.iflex.fic.filters.FilterServlet</filter-class>
</filter>
```

3. Add the following tag before the tag shown in the preceding step:

```
<filter>
   <filter-name>FilterServletAllowFrom</filter-name>
   <filter-class>com.iflex.fic.filters.FilterServlet</filter-class>
   <init-param>
       <param-name>mode</param-name>
       <param-value>ALLOW-FROM https://example.com/</param-value>
   </init-param>
</filter>
<filter-mapping>
   <filter-name>FilterServletAllowFrom</filter-name>
   <url-pattern>/url1/</url-pattern>
</filter-mapping>
```

4. Replace **https://example.com/** with the URL of your site and replace **/url1/** with the OFSAA relative URL. This embeds OFSAA content on your site.

14.8 Setting Access-Control-Allow-Origin Header

Setting the Access-Control-Allow-Origin header value allows browsers to get responses from the origin and access it for the request codes sent.

> **NOTE** The configuration described in this section is applicable to release 8.0.6.1.0 and later.

The following is the procedure to set Access-Control-Allow-Origin header:

1. Open the `web.xml` file in an editor.
2. Search for the following tag:

```
<filter>
<filter-name>FilterServlet</filter-name>
<filter-class>com.iflex.fic.filters.FilterServlet</filter-class>
</filter>
```

3. Add the <init-param> tag values within the filterservlet tag as shown in the following:

```
<filter>
<filter-name>FilterServletAllowFrom</filter-name>
<filter-class>com.iflex.fic.filters.FilterServlet</filter-class>
<init-param>
<param-name>AllowOrigin</param-name>
<param-value><origin></param-value>
</init-param>
</filter>
```

4. Replace <origin> in the preceding tag with the URL of your website. This allows the request of code from the origin.

14.8.1 Knowing Additional Cross-Origin Resource Sharing (CORS) Configuration

Setting the Access-Control-Allow-Origin header value described previously allows for responses of all requests. Configuring CORS renders more security to the application and reduces vulnerability to CSRF and XSS attacks. It also allows only specific sharing of resources such as script_font and CSS.

> **NOTE**
>
> 1. The configuration described in this section is applicable to release 8.0.7.0.0 and later.
> 1. The CORS configuration is preset in OFSAA and does not require any action. The information presented here is for your understanding.

The following headers have been added to make the shared resource and response restricted to specific http method types and also to be accessible through authentication:

1. Access-Control-Allow-Credentials
2. Access-Control-Allow-Methods

14.9 Configuration for Tomcat

To stop generating static content with one print statement per input line, you need to configure the `web.xml` file.

To configure `web.xml` file, perform the following steps:

1. Navigate to `tomcat/conf` folder.
2. Edit `web.xml` file as explained below:

   Set the mapped file parameter to **False** in the servlet tag mentioned with

   ```
   <servlet-name>jsp</servlet-name>.
   <init-param>
   <param-name>mappedfile</param-name>
   <param-value>false</param-value>
   </init-param>
   ```

14.10 Configuring WebLogic

This section provides information for generic configurations required for OFSAA deployed on WebLogic server.

14.10.1 Configuring WebLogic for REST Services Authorization

To enable REST API authorization by OFSAA in WebLogic server, perform the following steps:

1. Open the `config.xml` file located in the domain where OFSAA is deployed, that is, `<domain_home>/config/config.xml.`
2. Add the following in the security-configuration tag:

   ```
   <enforce-valid-basic-auth-credentials>false</enforce-valid-basic-auth-credentials>
   ```

14.11 Configuring WebSphere

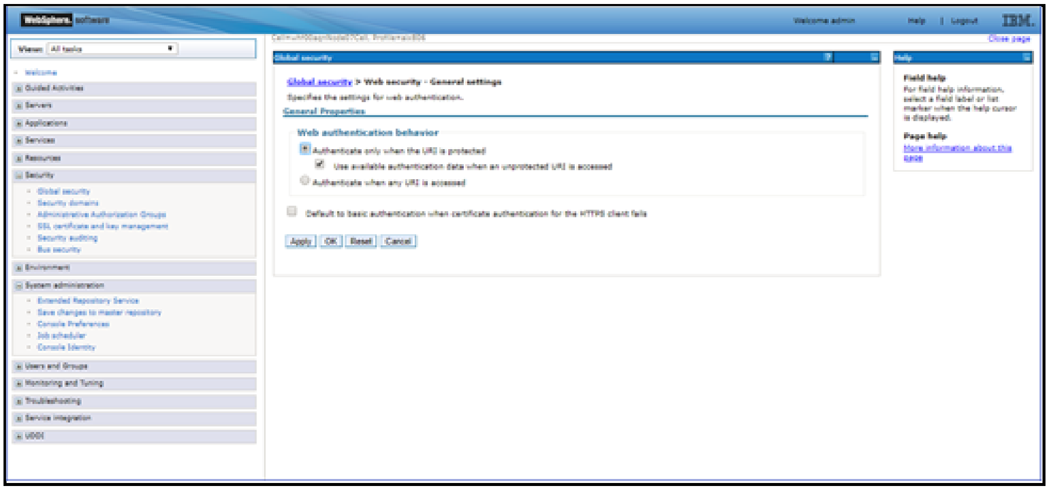
This section provides information for generic configurations required for OFSAA deployed on WebLogic server.

14.11.1 Configuring WebSphere for REST Services Authorization

Configure the following in WebSphere to enable REST API authorization by OFSAA:

1. Log on to WebSphere console with the **User ID** provided with the admin rights.

2. Expand Security menu in the LHS and click **Global security** > **Web and SIP security** > **General settings**.



Global security > Web security - General settings

Specifies the settings for web authentication.

General Properties

Web authentication behavior

● Authenticate only when the URI is protected

☑ Use available authentication data when an unprotected URI is accessed

○ Authenticate when any URI is accessed

□ Default to basic authentication when certificate authentication for the HTTPS client fails

Field help

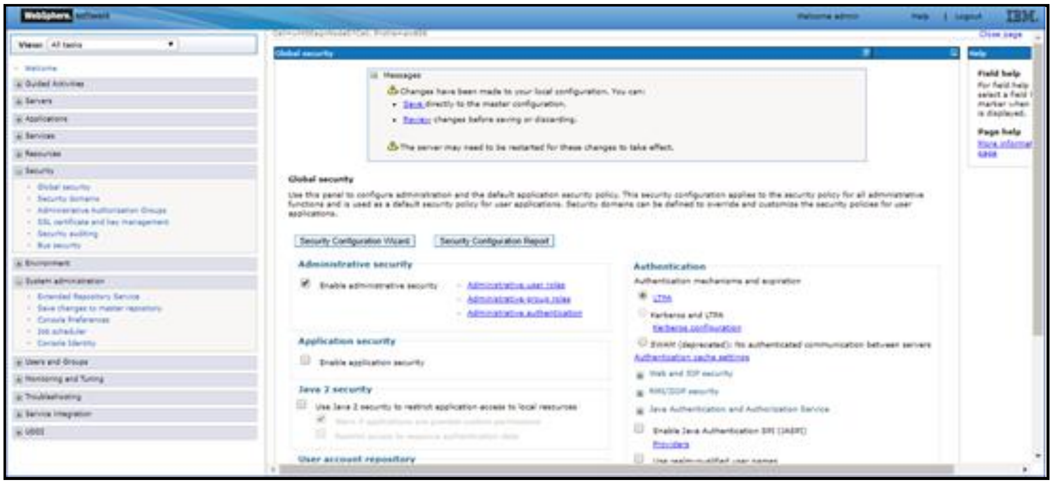
For field help information, select a field label or list marker when the help cursor is displayed.

Page help

More information about this page

3. De-select the **Use available authentication data when an unprotected URI is accessed** checkbox.

4. Click **OK.**



Messages

⚠ Changes have been made to your local configuration. You can:

- Save directly to the master configuration.
- Review changes before saving or discarding.

⚠ The server may need to be restarted for these changes to take effect.

Global security

Use this panel to configure administration and the default application security policy. This security configuration applies to the security policy for all administrative functions and is used as a default security policy for user applications. Security domains can be defined to override and customize the security policies for user applications.

Administrative security

☑ Enable administrative security

- Administrative user roles
- Administrative group roles
- Administrative authentication

Application security

□ Enable application security

Java 2 security

□ Use Java 2 security to restrict application access to local resources

☑ Warn if applications are granted custom permissions

□ Restrict access to resource authentication data

User account repository

Authentication

Authentication mechanisms and expiration

● LTPA

○ Kerberos and LTPA

Kerberos configuration

○ SWAM (deprecated): No authenticated communication between servers

Authentication cache settings

Web and SIP security

RMI/IIOP security

Java Authentication and Authorization Service

□ Enable Java Authentication SPI (JASPI)

Providers

□ Use realm-qualified user names

Field help

For field help select a field marker when is displayed.

Page help

More informat page

5. Click **Save** to save the changes to master configuration.

14.12 SSO Authentication (SAML) Configuration

OFSAA can be configured as “Service Provider” using the SAML 2.0 protocol. To register OFSAA as the Service Provider, update the `sp_metadata.xml` file, which is located in the `$FIC_HOME/conf/` directory. The following options are available:

1. SAML Service Provider Metadata Configuration with Certificate
2. SAML Service Provider Metadata Configuration without Certificate

14.12.1 SAML Service Provider Metadata Configuration with Certificate

If your OFSAA version is 8.0.7.1.0, 8.0.7.2.0, 8.0.7.3.0, 8.0.8.1.0, or 8.0.9.1.0 update the `sp_metadata.xml` file with the X509 Certificate, which is available on the *OFSAA Configuration* window. For more information, see the section *Update General Details* in the OFS Analytical Applications Infrastructure User Guide.

The following code snippet shows the format of the tags in the XML file:

```
<md:EntityDescriptor xmlns:md="urn:oasis:names:tc:SAML:2.0:metadata"
entityID="$ENTITYID$">

  <md:SPSSODescriptor
protocolSupportEnumeration="urn:oasis:names:tc:SAML:2.0:protocol">

  <md:KeyDescriptor use="signing">

          <ds:KeyInfo xmlns:ds="http://www.w3.org/2000/09/xmldsig#">

               <ds:X509Data>

                    <ds:X509Certificate></ds:X509Certificate>

               </ds:X509Data>

          </ds:KeyInfo>

        </md:KeyDescriptor>

        <md:KeyDescriptor use="encryption">

          <ds:KeyInfo xmlns:ds="http://www.w3.org/2000/09/xmldsig#">

               <ds:X509Data>

                    <ds:X509Certificate></ds:X509Certificate>

               </ds:X509Data>

          </ds:KeyInfo>

        </md:KeyDescriptor>

        <md:NameIDFormat>urn:oasis:names:tc:SAML:1.1:nameid-
format:unspecified</md:NameIDFormat>

        <md:AssertionConsumerService
Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST"
Location="$CONSUMERSERVICEURL$" index="0"/>

        <md:SingleLogoutService
Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST"
Location="$LOGOUTSERVICEURL$"/>

  </md:SPSSODescriptor>

</md:EntityDescriptor>
```

> **NOTE** Do not copy `----Begin Certificate----` and `----End Certificate----`. It may lead to issues during authentication.

The following code snippet is an example of the XML file with X509 Certificate values embedded in the tags:

```
<md:EntityDescriptor xmlns:md="urn:oasis:names:tc:SAML:2.0:metadata"
entityID="http://example.com:3333/ofsa8081">

<md:SPSSODescriptor
protocolSupportEnumeration="urn:oasis:names:tc:SAML:2.0:protocol">

  <md:KeyDescriptor use="signing">

    <ds:KeyInfo xmlns:ds="http://www.w3.org/2000/09/xmldsig#">

         <ds:X509Data>
  <ds:X509Certificate>MITFpTCCA42gAwIBAgIJAKhGKZaNnbRxMA0GCSqGSIb3DQEBCwUAMG
kxCzAJBgNVBAYTAklOMRIwEAYDVQQIDAlLYXJuYXRha2ExEjAQBgNVBAcMCUJhbmdhbG9yZTEPMA
0GA1UECgwGT3JhY2xlMQ4wDAYDVQQLDAVGU0dCVTERMA8GA1UEAwwId2hmMDBvZnMwHhcNMTkxMT
A4MDc1NzE5WhcNMjExMTA3MDc1NzE5WjBpMQswCQYDVQQGEwJJTjESMBAGA1UECAwJS2FybmF0YW
thMRIwEAYDVQQHDAlCYW5nYWxvcmUxDzANBgNVBAoMBk9yYWNsZTEOMAwGA1UECwwFRlNHQlUxET
APBgNVBAMMCHdoZjAwb2ZzMIICIjANBgkqhkiG9w0BAQEFAAOCAg8AMIICCgKCAgEAuctabBwiZp
v0wk4fBdqXmHTNAb/3Rj+SvgVAxmL5ix09Z6bS+x26oHmxBHSY2zXlz5ArXeHzKpGgm0D/zSeSxv
s9v1SqrFxjjFakYNmzP361VptOpu53njZ+3f+WMXocHSTvOFsRRfzRfNTpvmXSiVzvKUtqgT8QgP
MHTR5MuLWDYiz3RLzTnN/rJ/oO4+2fQmOeo9GRkeO41SAI+SPDnOSMjycGq7rlmqnJCAfV4OVJ2w
SfuQLieNkfJUWINEiF7UT+/5IlSHjlpo6YJRVMXT51KD6Rx3i31FEzJaTaWJoDA2C7YA6xs7DYfr
bTenPKxwtue99stJDoeMKS8cGG8UK8N12BvlaLraaasmr/cDdBV89VRoP+6eDQEwhXHT834ruZ6o
M0p+TzyHztYNur9BJKtMqGlzyX+wGMGu9FFjLu5pxwtJw1qxMv9ti35yLMVUVOYAjMSHtqj+I9d1
zBLNOQMs4sPxzIZgmGMuZ0TM4kgsSNl4LuAPbFw4wDG4Q/oJYBiBMifzPC3OytYjcDTqNtl5i40i
MLMbw0bLWqFW39z0GhrNoCko6DcLTRLLtB1ERw/AmGKBdP8T66kz7hEy9C/SkyP+75qJxhjEDMN2
Ha+wwrrat3Yg+H+n7OM+xJJScerK3ZiiqkEGCA69gjvaCBKp/v/pEL/wepHZV6aGECAwEAAaNQME
4wHQYDVR0OBBYEFEi7rT1QIjudl3jn6UTRP4sw9CzeMB8GA1UdIwQYMBaAFEi7rT1QIjudl3jn6U
TRP4sw9CzeMAwGA1UdEwQFMAMBAf8wDQYJKoZIhvcNAQELBQADggIBADeHLz7k3/iOessnp8dRei
GGpf+fIzib+whbUcaVMrNzGk86WQb8zNXGExcZV3RX9l35zW2hDwQUDpdl25lHpvDTo4xIvBOMi4
P49rz0SMVYiXVAPY7sy+cidjmcATI4UXxeGD3g+gvzv3z9l6Mg19ivits5BFUksIHMY+rgMewj2+
ovSeo8RJd8rjeG7z7JDKlOj1PUPfjpEB9nY+V6tTuqYopcJU6ln3zyN4ngcrJEahY15jeRBzkdzA
QRoIRnEjFEob6lCxdkciupl2IdOz6c2kkYQnMcDjyT8jfMQffFMAV/rcE6RS+w4+Ear0/q3svukG
YpZnpGpEdxhIV4uo0TwSZo6cE1cj1LGRPNYP/2Cfd6Gp1qJBUxrFKjYx1v9c0KJEnGVUuhNRKxcP
facHloJmNHS5Z2xVQrY+eBSuR+TtKTaio9FWigU3Nx6v1LkbvC7265N38Is3Gkhk5KbN+G4Xet6T
X3LcRx0MDqfRfZT3Q+7elFFEunxeBaXg6OaTKbxhHtskgAi1+4z/acrYKC/yjNn8F7qJNkhsFovV
HwqPItx517XZzsNjVcp3V+oFfPZdw6MQtp7zSqB+GnM52OrT77X3hGe7+B+PpTARueth2trsiNag
qrumAKV8DdtS0Q4XCQ++mmKmm8n/5Epq10Sagbf1D46q+iawIgZf1E</ds:X509Certificate>

         </ds:X509Data>

    </ds:KeyInfo>

  </md:KeyDescriptor>

  <md:KeyDescriptor use="encryption">

    <ds:KeyInfo xmlns:ds="http://www.w3.org/2000/09/xmldsig#">

         <ds:X509Data>
<ds:X509Certificate>MITFpTCCA42gAwIBAgIJAKhGKZaNnbRxMA0GCSqGSIb3DQEBCwUAMGkx
CzAJBgNVBAYTAklOMRIwEAYDVQQIDAlLYXJuYXRha2ExEjAQBgNVBAcMCUJhbmdhbG9yZTEPMA0G
A1UECgwGT3JhY2xlMQ4wDAYDVQQLDAVGU0dCVTERMA8GA1UEAwwId2hmMDBvZnMwHhcNMTkxMTA4
MDc1NzE5WhcNMjExMTA3MDc1NzE5WjBpMQswCQYDVQQGEwJJTjESMBAGA1UECAwJS2FybmF0YWth
MRIwEAYDVQQHDAlCYW5nYWxvcmUxDzANBgNVBAoMBk9yYWNsZTEOMAwGA1UECwwFRlNHQlUxETAP
BgNVBAMMCHdoZjAwb2ZzMIICIjANBgkqhkiG9w0BAQEFAAOCAg8AMIICCgKCAgEAuctabBwiZpv0
wk4fBdqXmHTNAb/3Rj+SvgVAxmL5ix09Z6bS+x26oHmxBHSY2zXlz5ArXeHzKpGgm0D/zSeSxvs9
v1SqrFxjjFakYNmzP361VptOpu53njZ+3f+WMXocHSTvOFsRRfzRfNTpvmXSiVzvKUtqgT8QgPMH
```

```
TR5MuLWDYiz3RLzTnN/rJ/oO4+2fQmOeo9GRkeO41SAI+SPDnOSMjycGq7rlmqnJCAfV4OVJ2wSf
uQLieNkfJUWINEiF7UT+/5IlSHjlpo6YJRVMXT51KD6Rx3i31FEzJaTaWJoDA2C7YA6xs7DYfrbT
enPKxwtue99stJDoeMKS8cGG8UK8N12BvlaLraaasmr/cDdBV89VRoP+6eDQEwhXHT834ruZ6oM0
p+TzyHztYNur9BJKtMqGlzyX+wGMGu9FFjLu5pxwtJw1qxMv9ti35yLMVUVOYAjMSHtqj+I9d1zB
LNOQMs4sPxzIZgmGMuZ0TM4kgsSNl4LuAPbFw4wDG4Q/oJYBiBMifzPC3OytYjcDTqNtl5i40iML
Mbw0bLWqFW39z0GhrNoCko6DcLTRLLtB1ERw/AmGKBdP8T66kz7hEy9C/SkyP+75qJxhjEDMN2Ha
+wwrrat3Yg+H+n7OM+xJJScerK3ZiiqkEGCA69gjvaCBKp/v/pEL/wepHZV6aGECAwEAAaNQME4w
HQYDVR0OBBYEFEi7rT1QIjudl3jn6UTRP4sw9CzeMB8GA1UdIwQYMBaAFEi7rT1QIjudl3jn6UTR
P4sw9CzeMAwGA1UdEwQFMAMBAf8wDQYJKoZIhvcNAQELBQADggIBADeHLz7k3/iOessnp8dReiGG
pf+fIzib+whbUcaVMrNzGk86WQb8zNXGExcZV3RX9l35zW2hDwQUDpdl25lHpvDTo4xIvBOMi4P4
9rz0SMVYiXVAPY7sy+cidjmcATI4UXxeGD3g+gvzv3z9l6Mg19ivits5BFUksIHMY+rgMewj2+ov
Seo8RJd8rjeG7z7JDKlOj1PUPfjpEB9nY+V6tTuqYopcJU6ln3zyN4ngcrJEahY15jeRBzkdzAQR
oIRnEjFEob6lCxdkciupl2IdOz6c2kkYQnMcDjyT8jfMQffFMAV/rcE6RS+w4+Ear0/q3svukGYp
ZnpGpEdxhIV4uo0TwSZo6cE1cj1LGRPNYP/2Cfd6Gp1qJBUxrFKjYx1v9c0KJEnGVUuhNRKxcPfa
cHloJmNHS5Z2xVQrY+eBSuR+TtKTaio9FWigU3Nx6v1LkbvC7265N38Is3Gkhk5KbN+G4Xet6TX3
LcRx0MDqfRfZT3Q+7elFFEunxeBaXg6OaTKbxhHtskgAi1+4z/acrYKC/yjNn8F7qJNkhsFovVHw
qPItx517XZzsNjVcp3V+oFfPZdw6MQtp7zSqB+GnM52OrT77X3hGe7+B+PpTARueth2trsiNagqr
umAKV8DdtS0Q4XCQ++mmKmm8n/5Epq10Sagbf1D46q+iawIgZf1E</ds:X509Certificate>

        </ds:X509Data>

    </ds:KeyInfo>

  </md:KeyDescriptor>

        <md:NameIDFormat>urn:oasis:names:tc:SAML:1.1:nameid-
format:unspecified</md:NameIDFormat>

        <md:AssertionConsumerService
Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST"
Location="http://example.com:3333/ofsa8081/login.jsp" index="0"/>

        <md:SingleLogoutService
Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST"
Location="http://example.com:3333/ofsa8081/signoff.jsp"/>

  </md:SPSSODescriptor>

</md:EntityDescriptor>
```

After updating the file, upload it to the **Trusted Providers** table under **Identity Federation** in the Identity Manager application.

14.12.2 SAML Service Provider Metadata Configuration without Certificate

For all versions of OFSAA other than 8.0.7.1.0, 8.0.7.2.0, 8.0.7.3.0, 8.0.8.1.0, or 8.0.9.1.0, update the following information in the `sp_metadata.xml` file:

```
<md:EntityDescriptor xmlns:md="urn:oasis:names:tc:SAML:2.0:metadata"
entityID="$ENTITYID$">

   <md:SPSSODescriptor
   protocolSupportEnumeration="urn:oasis:names:tc:SAML:2.0:protocol">

        <md:NameIDFormat>urn:oasis:names:tc:SAML:1.1:nameid-
        format:unspecified</md:NameIDFormat>
```

```
            <md:AssertionConsumerService
            Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST"
            Location="$CONSUMERSERVICEURL$" index="0"/>

            <md:SingleLogoutService
            Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST"
            Location="$LOGOUTSERVICEURL$"/>

        </md:SPSSODescriptor>

</md:EntityDescriptor>
```

- `$ENTITYID$` - OFSAAI URL till context name.

  For example, `http(s)://hostname:port/<context>`

- `$CONSUMERSERVICEURL$` - OFSAAI login URL

  For example, `http(s)://hostname:port/<context>/login.jsp`

- `$LOGOUTSERVICEURL$` - OFSAAI logout URL

  For example, `http(s)://hostname:port/<context>/logout.jsp`

OFSAA generated SAMLRequest is unsigned and sent to “Identity Provider (IdP)” using “HTTP Redirect” method. “Identity Provider (IdP)” sends back SAMLResponse using “HTTP POST” method. Authenticated user can be sent as one of the attribute (e.g. "uid”) in SAMLResponse or in “Subject”.

If user is sent in attribute, same user attribute has to be specified in “SAML User Attribute” in OFSAA Configuration screen.

If user is sent in subject, then NameID format in SAML response should be “`urn:oasis:names:tc:SAML:1.1:nameid-format:unspecified`”.

14.13 Public Key Authentication

This section is meant for users who want to configure Public Key Authentication for OFSAAI on UNIX machine.

14.13.1 Prerequisite

You have a working SSH server and client installed.

14.13.2 Setting Up Public Key Authentication on Client Server

Setting up public key authentication to access a particular remote host is a one-time procedure comprising of three steps.

Step 1: Generate a public/private key pair on your webserver.

Use the `ssh-keygen` command to generate public/private key pair. The key-type flag -t is mandatory, accepting either "rsa" or "dsa" as an argument. In the example given, the -f option is also used to override the default name and location for the resulting private-key file.

When prompted for a passphrase, you can enter appropriate phrase or keep it empty.

```
$ ssh-keygen -t dsa -f ./<KEY_NAME>
```

The command produces two text files in current folder: The `<KEY_NAME>` folder contains the private key, and `<KEY_NAME>.pub` folder contains the public key. The private key must be kept secret. Accordingly, access to private key is restricted to the file owner and its contents are encrypted using the passphrase.

You can recreate `<KEY_NAME>.pub` from `<KEY_NAME>` by executing the following command:

```
$ ssh-keygen -y -f ./<KEY_NAME> > <KEY_NAME>.pub
```

Step 2: Install the public key on the remote host to which you want to connect.

1. Copy `mykey.pub` to your home directory on the remote host and append its contents to the `authorized_keys` file in the `.ssh` directory. If authorized_keys file is not present in `.ssh` directory, you can create it manually by executing the following command:

   ```
   $ scp <key_name>.pub <remote_user>@<remote_host>:<Remote_PATH>
   ```

   Here, <remote_host> is the IP address of the remote server.<remote_user> is the user name of the <remote_host> to which you want to connect.

2. Login to remote host by executing the following command:

   ```
   $ ssh -l <remote_user> <remote_host>
   ```

3. Append public key by executing the command on remote host (Server) to append public key.

   ```
   $ cat <KEY_NAME>.pub >> $HOME/.ssh/authorized_keys
   ```

   For example :

   ```
   $ cat ofsa.pub >> $HOME/.ssh/authorized_keys
   ```

   The private key is not installed on any remote host.

> **NOTE** Set the following permissions on App Server:
>
> ```
> $ chmod -R 755 <remote_user_home>
> $ chmod 700 .ssh
> $ chmod 755 authorized_keys
> ```

> **NOTE** Set the following permissions required on Web Server:
>
> ```
> $ chmod 600 <PRIVATE_KEY>
> ```

Step 3: Verify whether Public Key authentication works from Web Server

Public Key authentication is invoked by using the -i flag with the ssh command, specifying <PRIVATE_KEY_PATH> as the flag's argument.

Execute the following command from Web Server to check remote App Server:

```
$ ssh -x -l <REMOTE_USER> -i <PRIVATE_KEY_PATH> <REMOTE_HOST>
```

For example :

```
$ ssh -x -l ofsaaweb -i
/scratch/oracle/Oracle/Middleware/Oracle_Home/user_projects/domains/AAIAKG/M
YKey/ofsa whf00akg
```

`<PRIVATE_KEY_PATH>` is the fully qualified name of the private key file.

> **NOTE** If you see a password prompt instead of a passphrase prompt, the administrators of the remote host may have disallowed public key authentication.

14.13.3 Other SSH Software

Refer the documentation of SSH software for Configuration of Public Key Authentication.

If you want to use Public Key authentication on other SSH software such as Tectia, you have to convert private key file to OpenSSH format.

> **NOTE** You can use Tectia SSH if your application server and web server are running on the same machine. However, if they are on separate machines, you have to convert the private key file to OpenSSH format.

Use the following command to convert private key to OpenSSH format:

`ssh-keygen -i -f [filename]` (key must be unencrypted)

If key is encrypted, perform the following steps:

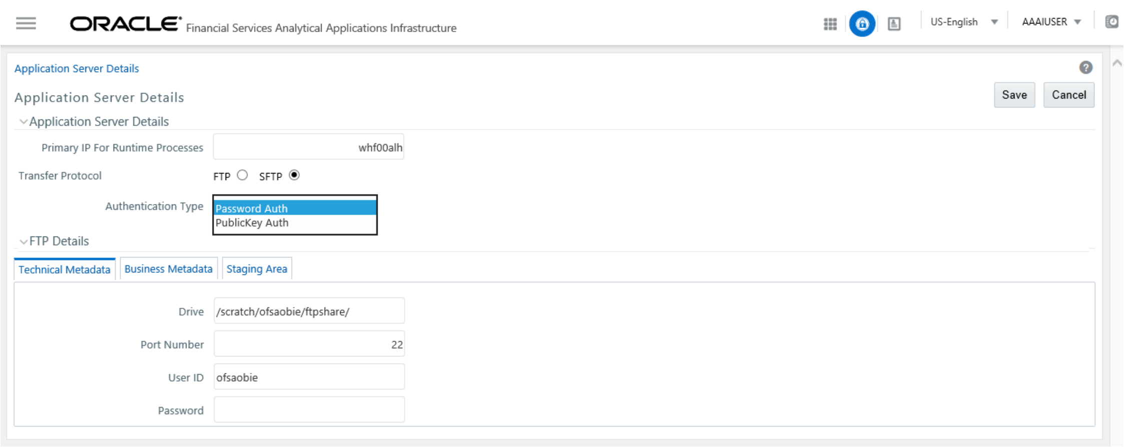
1. Convert private key to OpenSSH format.
2. Change passphrase using the following OpenSSH command:

   ```
   $ ssh-keygen -f <PRIVATE_KEY_PATH> -p
   ```

   `<private_key_path>` refers to path where private key is located including private key name.

14.13.4 Configurations Required in OFSAA Setup

1. Login to OFSAA with your system administrator credentials.
2. Click 🔒 from the header to display the administration tools in a Tiles menu.
3. Click **System Configuration** to view the menu.
4. Click **Configure Application Server** from the menu to view the *Application Server Details* window.
5. In the *Application Server Details* window, click **Modify**.



ORACLE Financial Services Analytical Applications Infrastructure
US-English
AAAIUSER
Application Server Details
Save
Cancel

Application Server Details

Application Server Details

Primary IP For Runtime Processes: whf00alh

Transfer Protocol: FTP ○ SFTP ●

Authentication Type: Password Auth / PublicKey Auth

FTP Details

Technical Metadata | Business Metadata | Staging Area

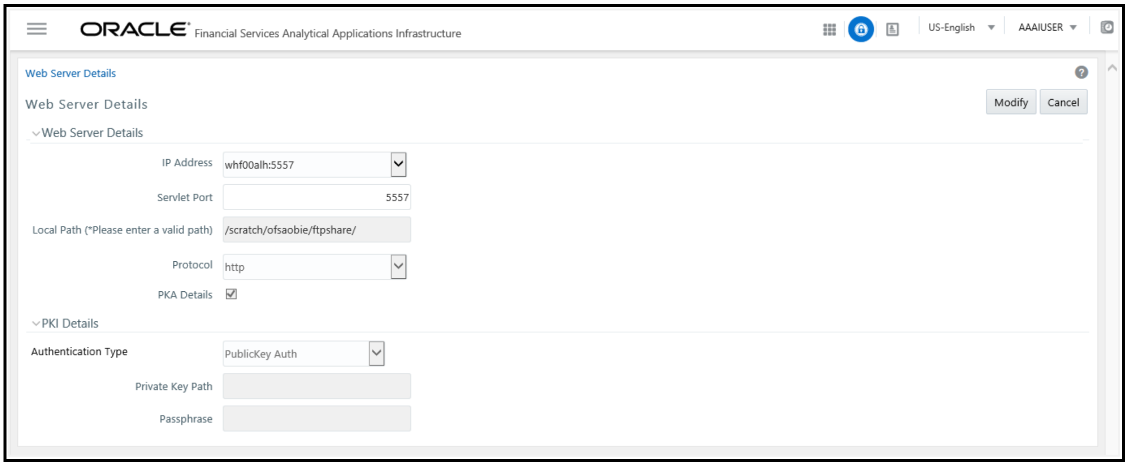
Drive: /scratch/ofsaobie/ftpshare/

Port Number: 22

User ID: ofsaobie

Password:

6. Select **Authentication Type** as **Publickey Auth.**
7. Click **Save**.
8. A confirmation message is displayed to inform that you need to provide the PKI details in the *Web Server Details* window. Click **OK**.
9. Click **Hamburger Icon** ☰ to view the Navigation list.
10. Click **Configure Web Server** from the Application Navigation Drawer. The *Web Server Details* window is displayed.



ORACLE Financial Services Analytical Applications Infrastructure
US-English
AAAIUSER
Web Server Details
Modify
Cancel

Web Server Details

Web Server Details

IP Address: whf00alh:5557

Servlet Port: 5557

Local Path (*Please enter a valid path): /scratch/ofsaobie/ftpshare/

Protocol: http

PKA Details: ☑

PKI Details

Authentication Type: PublicKey Auth

Private Key Path:

Passphrase:

If you have selected **Authentication Type** as **Public Key Auth** in the *Application Server Details* window, the **PKA Details** check box gets automatically selected and the *PKI Details* pane is displayed.

11. Click **Modify**.
12. Enter **Private Key Path** and **Passphrase** which you created during Step 1 (Generate a public/private key pair on your webserver).
13. Click **Save**.

14.14 Enable and Disable Users

The users with System Administrator (sysadmn) and System Authorizer (sysauth) functional roles can be enabled or disabled using the command line prompt. Only users with the requisite administrator role to perform this action can disable or enable users with sysadmn and sysauth roles.

14.14.1 Prerequisites

The following prerequisites must be met before you proceed with the password reset:

- Check if the Authentication Type selected is **SMS Authentication & Authorization**. Enabling and disabling users does not work for other authentication types. For more details, see the information on **Authentication Type** field in the **Configuration** subsection in **System Configuration** in the OFS Analytical Applications Infrastructure User Guide.
- Check if Security Questions are enabled and configured. For more details, see the information on **Security Questions Enable** field in the **Configuration** subsection in **System Configuration** the OFS Analytical Applications Infrastructure User Guide.

14.14.2 Enabling or Disabling Users with System Administrator and System Authorizer Roles

Perform the following procedure to enable or disable a sysadmn or sysauth user:

1. Open the Command Prompt window and go to the folder `FIC_HOME/utility/useraction/bin`.
2. Execute the following command:

   ```
   ./useraction.sh <ACTION ON USER> <OPERATION>
   ```

   For example:

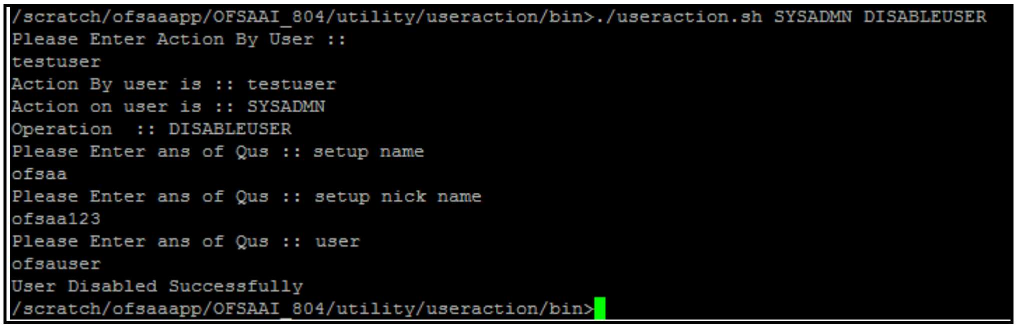
   To disable a user:

   ```
   ./useraction.sh johnsmith disableuser
   ```

   To enable a user:

   ```
   ./useraction.sh johnsmith enableuser
   ```
3. A prompt (**Please Enter Action by User**) appears, which requires that you enter your User Id. Your User ID must have the requisite role with permissions to perform the enable or disable action. Enter the User ID and the three questions for authentication appear. Enter the correct answers to complete the password reset.

   The following illustration displays a disable user action:



```
/scratch/ofsaaapp/OFSAAI_804/utility/useraction/bin>./useraction.sh SYSADMN DISABLEUSER
Please Enter Action By User ::
testuser
Action By user is :: testuser
Action on user is :: SYSADMN
Operation  :: DISABLEUSER
Please Enter ans of Qus :: setup name
ofsaa
Please Enter ans of Qus :: setup nick name
ofsaa123
Please Enter ans of Qus :: user
ofsauser
User Disabled Successfully
/scratch/ofsaaapp/OFSAAI_804/utility/useraction/bin>
```

14.15 Password Reset

The password for users can be reset from the command prompt. Only users with the requisite administrator role can perform this action.

14.15.1 Prerequisites

The following prerequisites must be met before you proceed with the password reset:

- Check if the Authentication Type selected is **SMS Authentication & Authorization**. Password reset does not work for other authentication types. For more details, see the information on **Authentication Type** field in the **Configuration** subsection in **System Configuration** in the OFS Analytical Applications Infrastructure User Guide.
- Check if Security Questions are enabled and configured. For more details, see the information on **Security Questions Enable** field in the **Configuration** subsection in **System Configuration** in the OFS Analytical Applications Infrastructure User Guide.

14.15.2 Resetting a User Password

Perform the following procedure to reset the password for a user:

1. Open the Command Prompt window and go to the folder `FIC_HOME/utility/userpasswdreset/bin`.
2. Execute the following command:

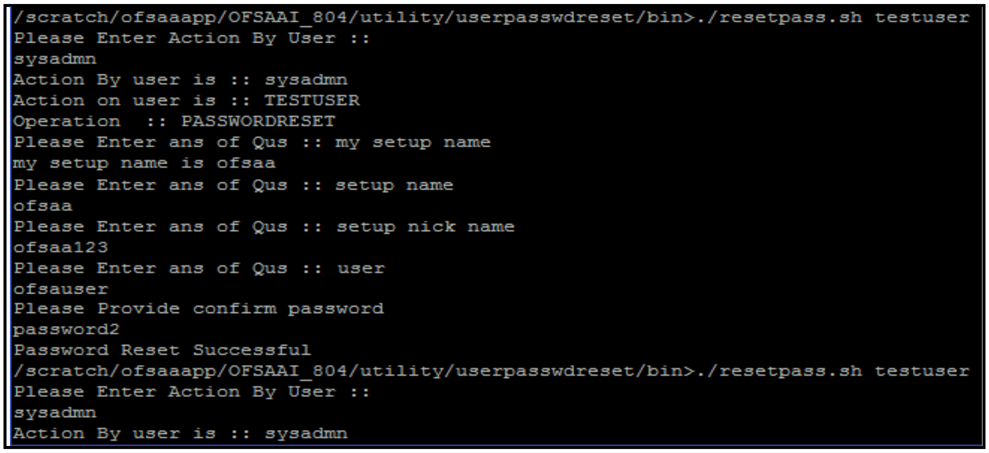
   ```
   ./resetpass.sh <ACTION ON USER>
   ```

   For example:

   ```
   ./resetpass.sh johnsmith
   ```

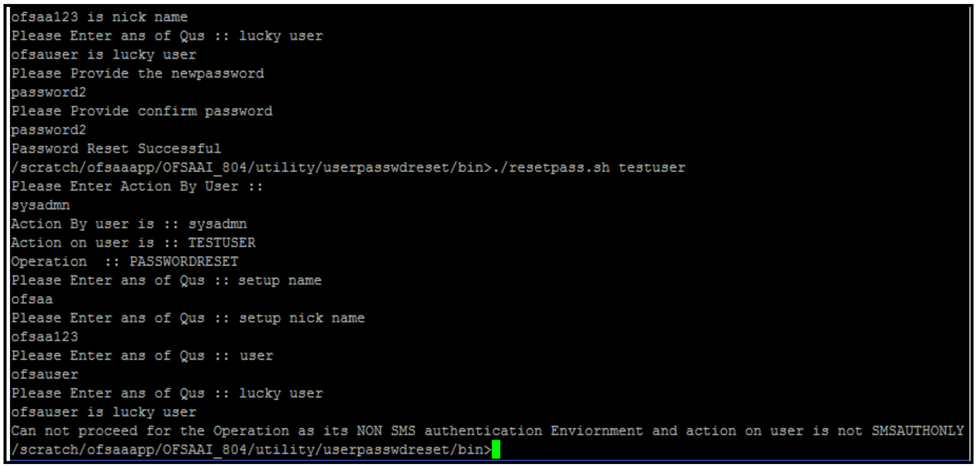
3. A prompt (**Please Enter Action by User**) appears, which requires that you enter your User Id. Your User ID must have the requisite role with permissions to perform the password reset action. Enter the User ID to display the three questions for authentication. Enter the correct answers to complete the password reset.

   The following illustration displays a password reset on the command prompt that was successful:



```
/scratch/ofsaaapp/OFSAAI_804/utility/userpasswdreset/bin>./resetpass.sh testuser
Please Enter Action By User ::
sysadmn
Action By user is :: sysadmn
Action on user is :: TESTUSER
Operation   :: PASSWORDRESET
Please Enter ans of Qus :: my setup name
my setup name is ofsaa
Please Enter ans of Qus :: setup name
ofsaa
Please Enter ans of Qus :: setup nick name
ofsaa123
Please Enter ans of Qus :: user
ofsauser
Please Provide confirm password
password2
Password Reset Successful
/scratch/ofsaaapp/OFSAAI_804/utility/userpasswdreset/bin>./resetpass.sh testuser
Please Enter Action By User ::
sysadmn
Action By user is :: sysadmn
```

The following illustration displays a password reset that was not successful since the environment did not meet the authentication type prerequisite - SMS Authentication and Authorization:



```
ofsaa123 is nick name
Please Enter ans of Qus :: lucky user
ofsauser is lucky user
Please Provide the newpassword
password2
Please Provide confirm password
password2
Password Reset Successful
/scratch/ofsaaapp/OFSAAI_804/utility/userpasswdreset/bin>./resetpass.sh testuser
Please Enter Action By User ::
sysadmn
Action By user is :: sysadmn
Action on user is :: TESTUSER
Operation  :: PASSWORDRESET
Please Enter ans of Qus :: setup name
ofsaa
Please Enter ans of Qus :: setup nick name
ofsaa123
Please Enter ans of Qus :: user
ofsauser
Please Enter ans of Qus :: lucky user
ofsauser is lucky user
Can not proceed for the Operation as its NON SMS authentication Enviornment and action on user is not SMSAUTHONLY
/scratch/ofsaaapp/OFSAAI_804/utility/userpasswdreset/bin>
```

14.16 Configuring OFSAA OIM Connector

OFSAA OIM Connector is used for provisioning users in the Oracle Financial Services Analytical Applications (OFSAA) from Oracle Identity Manager (OIM). For information on OIM, see http://www.oracle.com/technetwork/middleware/id-mgmt/overview/index-098451.html.

This section provides information to configure the OFSAA Connector with OIM. The connector supports OIM versions 11.1.2.2 and 11.1.2.3 on WebLogic Server. This section also provides information on configuring Entitlements.

14.16.1 Knowing the Prerequisites

The following are the prerequisites for this configuration:

- You must have the user credentials with which you installed IDM Suite.
- You must have the host information for OIM and OFSAA server(s).

14.16.2 Configuring the Connector

This section provides information to configure the OFSAA Connector with OIM that enables mapping of policies from OFSAA and user configuration.

The following steps describe the procedure to configure the OFSAA OIM Connector:

1. Login to the OFSAA host with your OFSAA user credentials.
    a. Navigate to `$FIC_HOME/utility` folder.
    b. Copy the `OFSConnector` directory to your local system.
2. Login to the OIM host with OIM user credentials.
3. Copy the `OFSConnector` directory from your local system to `$OIM_ORACLE_HOME/connectors`.
4. Check and ensure that the following environment variables are set in the OIM host:

    `JAVA_HOME= <Path to Java Dir>`

    For example, `/u01/java/jdk1.7.0_91`

    `MW_HOME=<Middleware Home Path>`

    For example, `/u01/oracle/products/fmw/10.3.6`

    `WL_HOME=<Weblogic Home Dir>`

    For example, `$MW_HOME/wlserver_10.3`

    `LD_LIBRARY_PATH=<Webtier lib path>`

    For example, `/u01/oracle/products/fmw/Oracle_WT1/lib`

    `APP_SERVER=<App server>`

    For example, `weblogic/websphere`

    `OIM_ORACLE_HOME=< OIM install dir>`

    For example, `/u01/oracle/products/fmw/10.3.6/Oracle_IDM`

    `DOMAIN_HOME=<OIM Domain path>`

    For example, `/u01/oracle/domains/idm_domain`

    `ANT_HOME=<Ant Home>`

    For example, `$MW_HOME/modules/org.apache.ant_1.7.1`

    `PATH=$JAVA_HOME/bin:$ANT_HOME/bin:$PATH:$OIM_ORACLE_HOME/OPatch`
5. Generate `wlfullclient.jar` by using the following procedure:
    a. Navigate to the `$DOMAIN_HOME/bin` directory and run the following command: `./setDomainEnv.sh`
    b. Navigate to the `$WL_HOME/server/lib` directory and run the following command: `java -jar wljarbuilder.jar`
    c. Copy the newly created `wlfullclient.jar` from `$WL_HOME/server/lib` to the path `$OIM_ORACLE_HOME/designconsole/ext`.

6. Execute the following command from the `$OIM_ORACLE_HOME/server/bin` directory to upload the OFSAA connector to OIM:

```
sh UploadJars.sh -username << Xellerate admin username>> -password <<
admin password>> -serverURL << serverURL>> -ctxFactory << context>> -
ICFBundle <<Full path of OFS connector>>
```

For example,

```
sh UploadJars.sh -username xelsysadm -password Welcome1 -serverURL
t3://whf00aum:14000 -ctxFactory weblogic.jndi.WLInitialContextFactory -
ICFBundle
/scratch/software/weblogic10.3.6/iam/connectors/OFSConnector/org.identi
tyconnectors.ofs-1.0.0.jar
```

NOTE `ctxFactory` value is `weblogic.jndi.WLInitialContextFactory` for WebLogic and `com.ibm.websphere.naming.WsnInitialContextFactory` for WebSphere.

7. Navigate to the `$OIM_ORACLE_HOME/server/plugin_utility` directory and set the following values in the `ant.properties` file:

```
wls.home=<Path to WebLogic Server Dir>
```

For example, `/u01/oracle/products/fmw/10.3.6/wlserver_10.3`

```
oim.home=<OIM Home Path>
```

For example, `/u01/oracle/products/fmw/10.3.6/Oracle_IDM/server`

```
login.config=<Login Configuration File Home Path>
```

For example, `${oim.home}/config/authwl.conf`

```
mw.home=<Middleware Home Path>
```

For example, `/u01/oracle/products/fmw/10.3.6`

8. Execute the following command from the `$OIM_ORACLE_HOME/connectors/OFSConnector/` directory and upload the schedule task in OIM:

```
sh deploySchTask.sh -username << Xellerate admin username>> -password
<< admin password>> -serverURL <<oim_server_url>> -id <<OFSAA_ID>>
```

9. Upload the OFSAA Connector metadata to OIM by executing the following command from the `$OIM_ORACLE_HOME/connectors/OFSConnector` directory:

```
sh ImportMetadata.sh <xellerate admin username> <admin password>
<oim_server_url> OFS-ConnectorConfig_<OIM_VERSION>.xml <OFSAA_ID>
<OFS_USER> <OFS_PASSWD> <OFS_URL>
```

NOTE For SSO, <OFS_USER > is a valid OIM user. If the setup is non-SSO, then <OFS_USER> is SYSADMIN.

> Based on the OIM version 11.1.2.2 or 11.1.2.3, select the appropriate version of the files to upload.

If the file upload from the shell script is successful, the following message is printed:

```
File imported successfully: OFS-ConnectorConfig_11.1.2.2.xml
```

10. For other OFSAA environments such as DEV, UAT and PROD, use the following command to create IT Resource and Access Policy:

```
sh ImportMetadata.sh <xellerate admin username> <admin password>
<oim_server_url> OFS-ITResource_<OIM_VERSION>.xml <OFSAA_ID> <OFS_USER>
<OFS_PASSWD> <OFS_URL>
```

> **NOTE**
>
> **1.** For SSO, <OFS_USER > is a valid OIM user. If the setup is non-SSO, then <OFS_USER> is SYSADMN.
>
> **2.** <OFSAA_ID> should always be unique for each environment. For example, UAT01.
>
> **3.** Based on the OIM version 11.1.2.2 or 11.1.2.3, select the appropriate version of the files to upload.

11. Set the System Property `XL.AllowAPHarvesting` to **TRUE**. See the following steps for the procedure to set the property:

a. Login to the **SYSADMIN** console.

b. Click **System Configuration** to view *System Properties*.

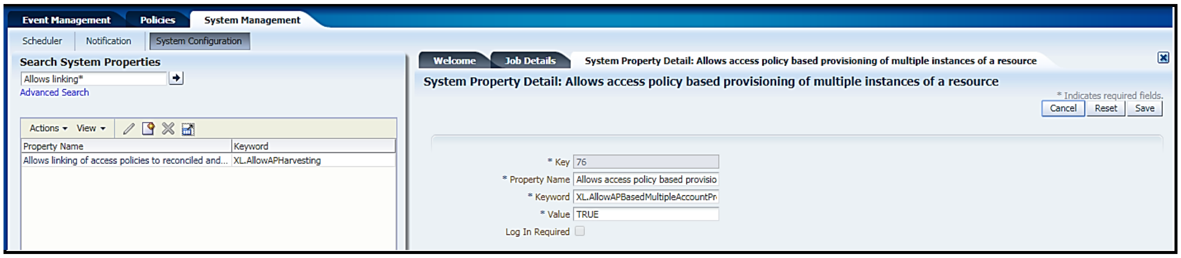
c. Enter **XL.AllowAPHarvesting** in **Search System Properties** and click ➔ to view the property name in the search results pane.

d. Click **Allows access policy based provisioning of multiple instances of a resource** in the results pane to view the *System Property Detail: Allows access policy based provisioning of multiple instances of a resource* window.

e. Enter **TRUE** in the **Value** field.

f. Click **Save**.

g. Restart the OIM Server.



Allows linking*

Property Name	Keyword
Allows linking of access policies to reconciled and...	XL.AllowAPHarvesting

System Property Detail: Allows access policy based provisioning of multiple instances of a resource

System Property Detail: Allows access policy based provisioning of multiple instances of a resource

* Indicates required fields.

* Key 76
* Property Name Allows access policy based provisio
* Keyword XL.AllowAPBasedMultipleAccountPr
* Value TRUE
Log In Required □

NOTE Further instructions apply only if SSO is configured in OFSAA. If you use Native Authentication, skip these instructions and proceed to Configuring Entitlements.

12. Upload the OAM Policy file to set the authentication for REST APIs, which the OFSAA Connector uses. The following is the procedure to upload:

    a. Edit the `oam-policies.xml` file in a text editor. Replace the placeholders ${OHS_PORT}, ${OHS_HOST}, and ${IDM_HOST} with the respective values of OHS Port, OHS Host Name, and IDM Host Name of the server where the IDM is hosted and the Oracle HTTP Server (OHS)) is configured.

    b. Execute the command **wlst**.

    For example, `$OIM_ORACLE_HOME/common/bin/wlst.sh`

    c. Connect to the **OAM Admin** server using the following:

    ```
    wls:/offline>
    connect('<user_id>','<password>','t3://<IDM_HOST>:<ADMIN_PORT>')
    ```

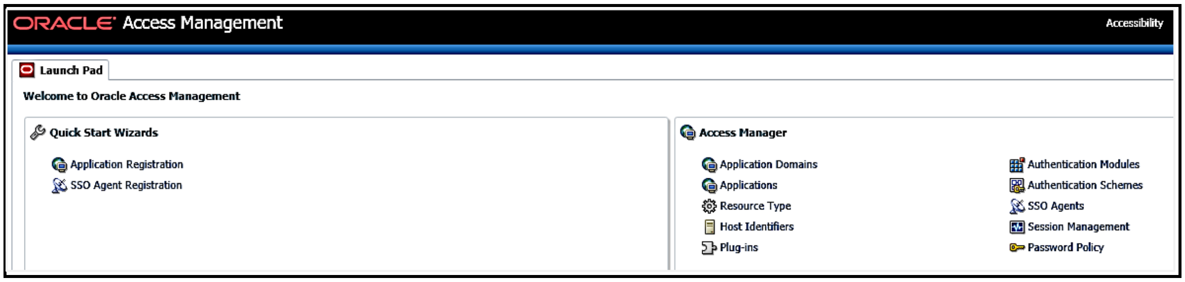
    d. Import the OAM Policies using the following:

    ```
    wls:/idm_domain/serverConfig>
    importPolicy(pathTempOAMPolicyFile="/<path>/oam-policies.xml")
    ```

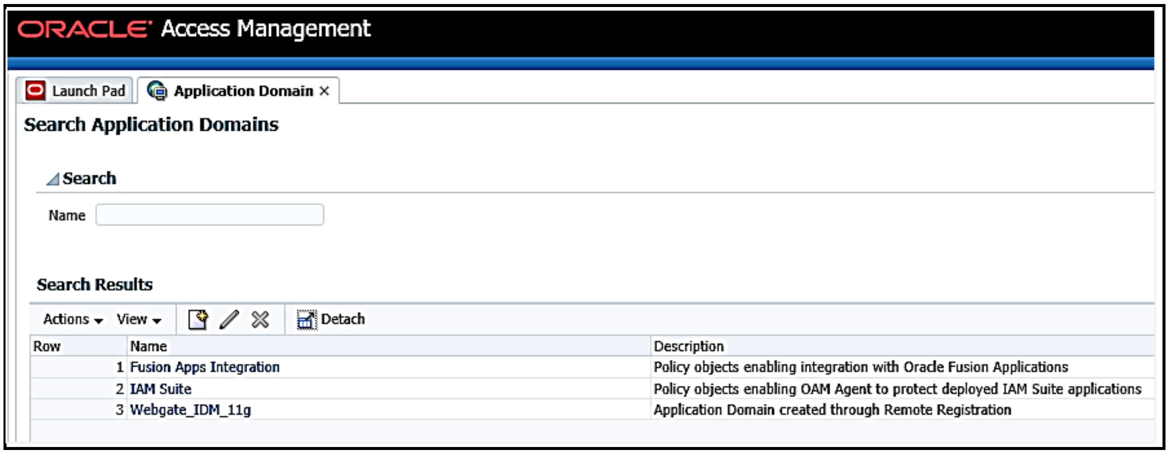
13. Perform OFSAA User Provisioning Configuration by applying Pre-authentication Advanced Rules to the basic Authorization Policy for users in the system. It is applied from the OAM console after IDM Provisioning and is done to switch to a form-based authentication scheme if the authorization header is not a basic scheme. Update the pre-authentication advanced rules to a form-based authentication scheme using the following steps:

    a. Login to the **OAM Administrator Console**.

    b. From the **Launch Pad**, click **Application Domains** from the **Access Manager** widget. The *Application Domain* window is displayed.



    c. Search for the required application domain for which you want to switch the authentication scheme and click **Name** from the search results to display the details for the application domain.



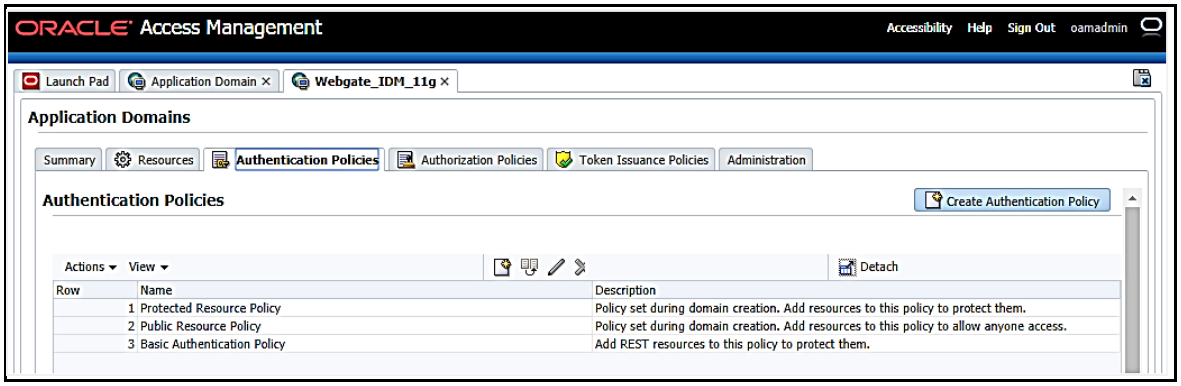
Search Application Domains

Name

Search Results

Row	Name	Description
1	Fusion Apps Integration	Policy objects enabling integration with Oracle Fusion Applications
2	IAM Suite	Policy objects enabling OAM Agent to protect deployed IAM Suite applications
3	Webgate_IDM_11g	Application Domain created through Remote Registration

d. Click the **Authentication Policies** tab to view the existing policies in the system.

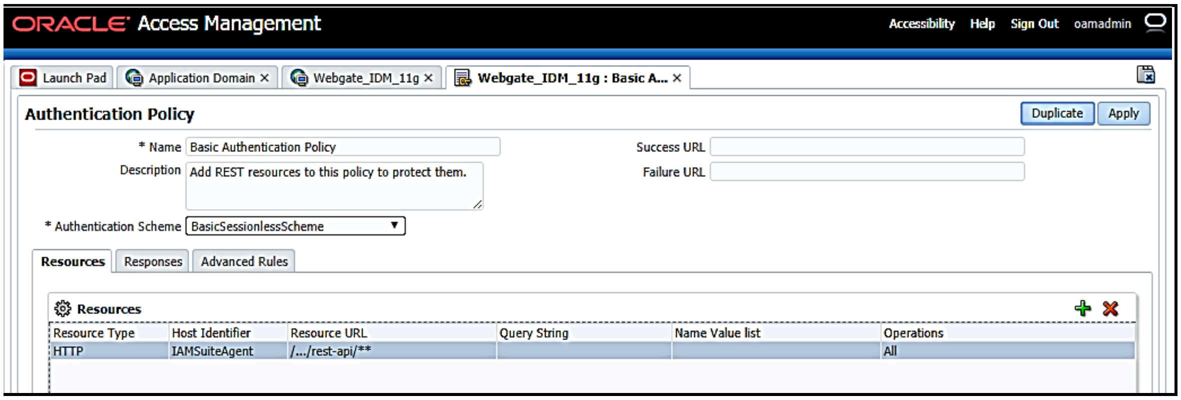


Application Domains

Authentication Policies

Row	Name	Description
1	Protected Resource Policy	Policy set during domain creation. Add resources to this policy to protect them.
2	Public Resource Policy	Policy set during domain creation. Add resources to this policy to allow anyone access.
3	Basic Authentication Policy	Add REST resources to this policy to protect them.

e. Click **Basic Authentication Policy** from the list to view the details for the policy.



Authentication Policy

* Name Basic Authentication Policy

Description Add REST resources to this policy to protect them.

* Authentication Scheme BasicSessionlessScheme

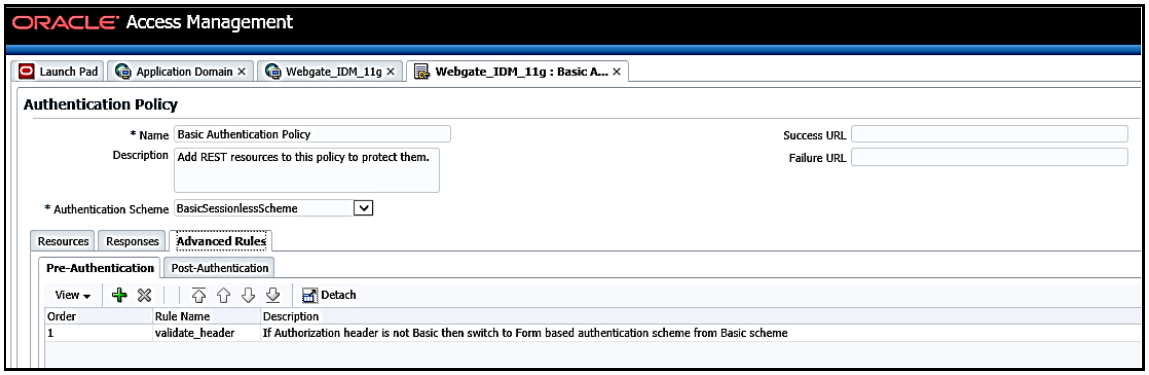
Success URL

Failure URL

Resources

Resource Type	Host Identifier	Resource URL	Query String	Name Value list	Operations
HTTP	IAMSuiteAgent	/.../rest-api/**			All

f. Click **Advanced Rules** tab to view the details for Pre-Authentication.

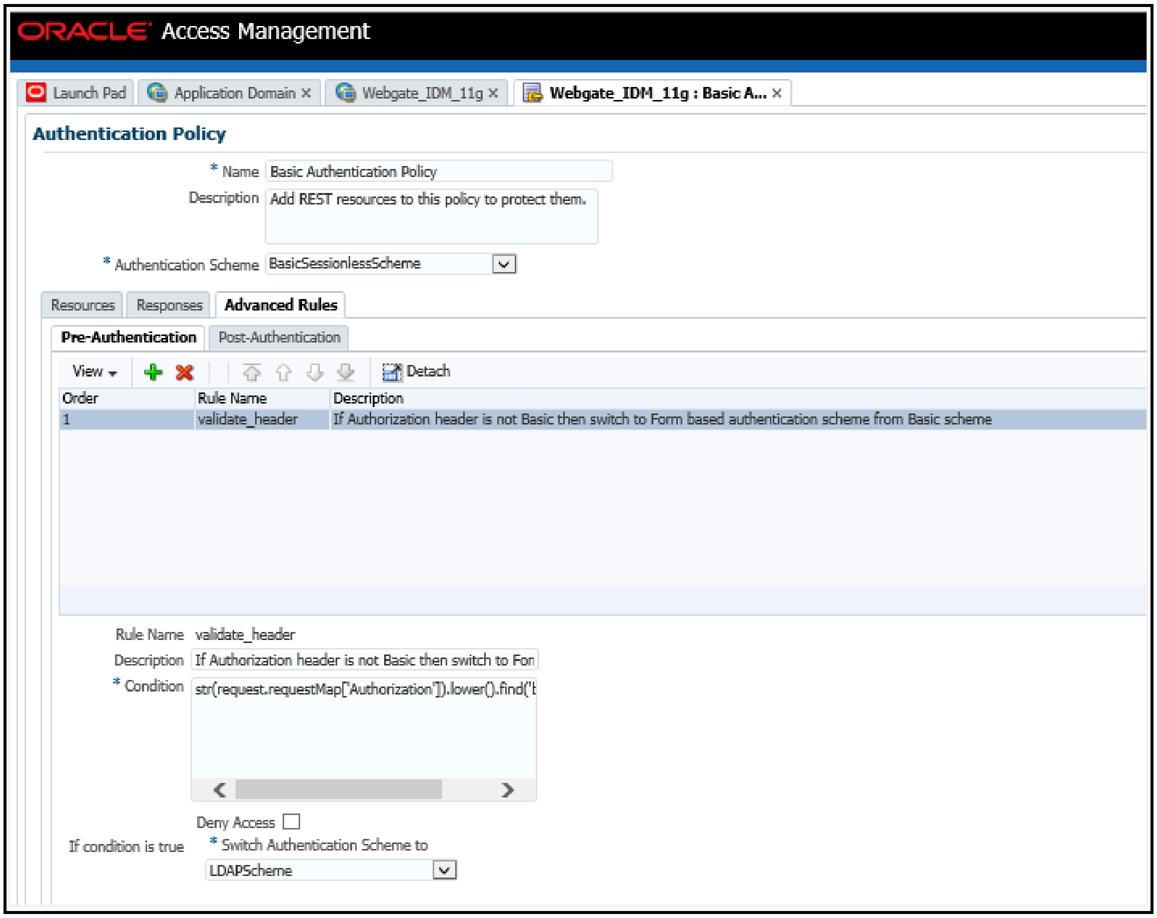


Authentication Policy

* Name	Basic Authentication Policy
Description	Add REST resources to this policy to protect them.
* Authentication Scheme	BasicSessionlessScheme
Success URL	
Failure URL	

Order	Rule Name	Description
1	validate_header	If Authorization header is not Basic then switch to Form based authentication scheme from Basic scheme

g. Click the **Add** ✚ button and create a rule with the following information:



Authentication Policy

* Name	Basic Authentication Policy
Description	Add REST resources to this policy to protect them.
* Authentication Scheme	BasicSessionlessScheme

Order	Rule Name	Description
1	validate_header	If Authorization header is not Basic then switch to Form based authentication scheme from Basic scheme

Rule Name	validate_header
Description	If Authorization header is not Basic then switch to For
* Condition	str(request.requestMap['Authorization']).lower().find('t

If condition is true

Deny Access □

* Switch Authentication Scheme to

LDAPScheme

- Rule Name: validate_header
- Description: If Authorization header is not Basic then switch to Form based authentication scheme from Basic scheme
- Condition: str(request.requestMap['Authorization']).lower().find('basic') == -1
- Switch Authentication Scheme to: (select LDAPScheme from drop down)

h. Click **Apply** to save.

14.16.3 Configuring Entitlements

This section explains how you can provision Entitlements to users in OIM. Users are provisioned with Entitlements to enable them to be grouped for specific privileges, which allows them to perform certain restricted functions.

The subsections in this section provide information for the various operations required to configure Entitlements.

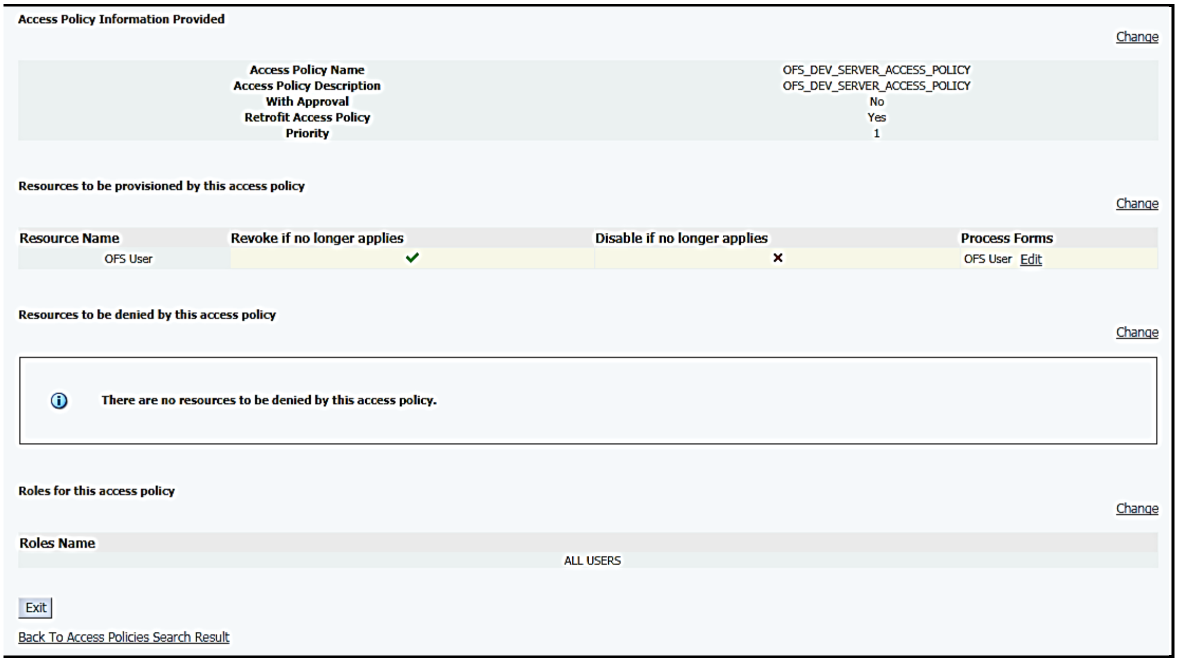
14.16.3.1 Performing User Group and User-User Group Mapping Reconciliation

Performing reconciliation activity creates accounts in OIM, and if a user exists, the OIM account is mapped to the user. If a user doesn't exist, create the user profile in OIM, where the user login is the same as the user account. This maps the user to the OIM account created during reconciliation.

> **NOTE** If you use OFSAA Native Authentication (SMS), then the password policy for OIM and OFSAA should be the same.
>
> If OFSAA is deployed on WebLogic, then add the following tag in the **security-configuration** tag in the `<domain_home>/config/config.xml` file to enable REST API authorization by OFSAA:
> `<enforce-valid-basic-auth-credentials>false</enforce-valid-basic-auth-credentials>`

The following is the procedure to perform user group reconciliation, and user-user group mapping reconciliation:

1. Login to **OIM SYSADMIN Console**.
2. Click **Access Policies** in **Policies** from the left menu to view the *Manage Access Polices* window.
3. Search for server access policy in the window and click the server access policy name to view the *Access Policy Information* window.



Access Policy Information Provided

Change

Access Policy Name	OFS_DEV_SERVER_ACCESS_POLICY
Access Policy Description	OFS_DEV_SERVER_ACCESS_POLICY
With Approval	No
Retrofit Access Policy	Yes
Priority	1

Resources to be provisioned by this access policy

Change

Resource Name	Revoke if no longer applies	Disable if no longer applies	Process Forms
OFS User	✓	✗	OFS User Edit

Resources to be denied by this access policy

Change

ⓘ **There are no resources to be denied by this access policy.**

Roles for this access policy

Change

Roles Name
ALL USERS

Exit

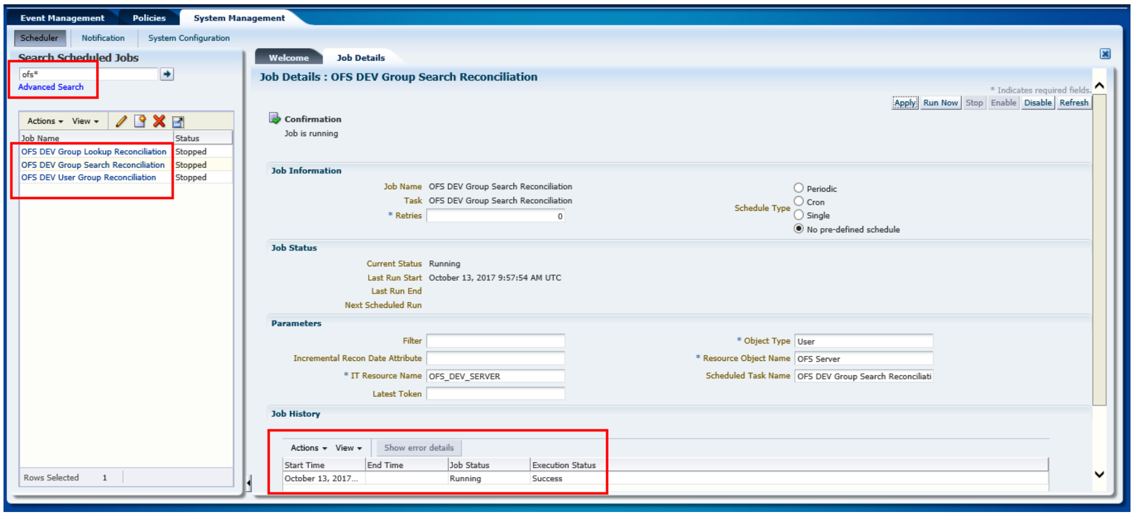
Back To Access Policies Search Result

4. By default, **All Users** role is mapped to the server access policy. To create and map Roles to provision specific users, see https://docs.oracle.com/cd/E40329_01/user.1112/e27151/role_mangmnt.htm#OMUSG3006.

5. Click **System Management** to view the window and click the **Scheduler** tab to view the *Scheduler* window.

6. Enter **OFS*** in **Search Scheduled Jobs** and click ➔ to view the OFSAA group jobs.

7. Click **OFS {OFSAA_ID} Group Search Reconciliation** to view the *OFS {OFSAA_ID} Group Search Reconciliation* window.



Search Scheduled Jobs

ofs*

Advanced Search

Job Name	Status
OFS DEV Group Lookup Reconciliation	Stopped
OFS DEV Group Search Reconciliation	Stopped
OFS DEV User Group Reconciliation	Stopped

Rows Selected 1

Job Details : OFS DEV Group Search Reconciliation

* Indicates required fields.

Confirmation
Job is running

Job Information

Job Name OFS DEV Group Search Reconciliation
Task OFS DEV Group Search Reconciliation
* Retries 0

Schedule Type ○ Periodic ○ Cron ○ Single ● No pre-defined schedule

Job Status

Current Status Running
Last Run Start October 13, 2017 9:57:54 AM UTC
Last Run End
Next Scheduled Run

Parameters

Filter
Incremental Recon Date Attribute
* IT Resource Name OFS_DEV_SERVER
Latest Token
* Object Type User
* Resource Object Name OFS Server
Scheduled Task Name OFS DEV Group Search Reconciliati

Job History

Start Time	End Time	Job Status	Execution Status
October 13, 2017...		Running	Success

8. Select from **Schedule Type**, the frequency at which you want to run the job. Select one from the following options:

a. **Periodic** - Select this option if you want to run the job at a specific time and on a recurring basis. Enter an integer value in the Run every field in the Job Periodic Settings section and select one of the following values:

   — mins

   — hrs

   — days

b. **Cron** - Select this option if you want to run the job at a particular interval and on a recurring basis. For example, you can create a job that runs at 8:00 A.M. every Monday through Friday, or at 1:30 A.M. every last Friday of the month. Specify the recurrence of the job in the Cron Settings section. Select any of the following values in the Recurring Interval field:

   — Daily

   — Weekly

   — Monthly on given dates

   — Monthly on given weekdays

   — Yearly

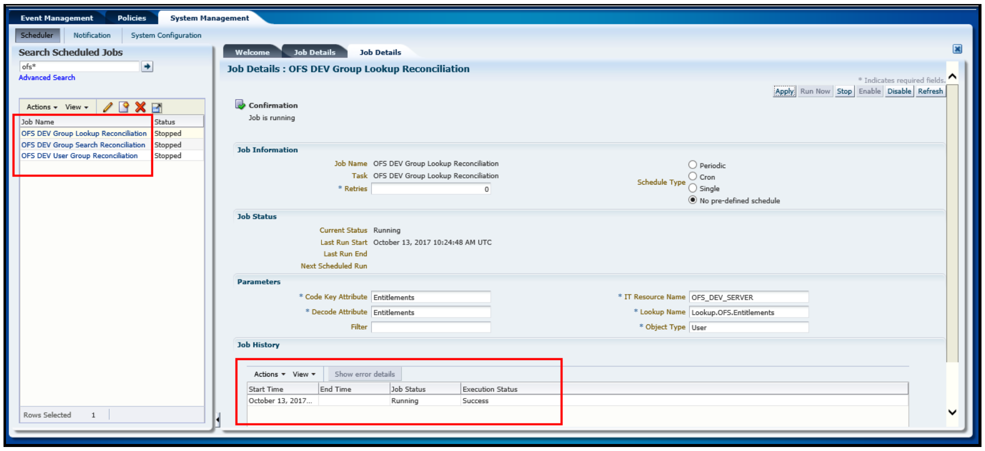
   After selecting a value, you can enter an integer value in the Days between runs field.

c. **Single** - Select this option if you want to run the job only once at a specific start date and time.

d. **No pre-defined schedule –** Select this option if you do not want to create a schedule that triggers the job automatically. To trigger the job, click **Save and Run Now**.

9. Run **OFS {OFSAA_ID} Group Search Reconciliation** and check for successful execution of the run.

10. Click **OFS {OFSAA_ID} Lookup Search Reconciliation** to view the *OFS {OFSAA_ID} Lookup Search Reconciliation* window.



Search Scheduled Jobs

ofs*

Advanced Search

Job Name	Status
OFS DEV Group Lookup Reconciliation	Stopped
OFS DEV Group Search Reconciliation	Stopped
OFS DEV User Group Reconciliation	Stopped

Rows Selected 1

Job Details : OFS DEV Group Lookup Reconciliation

* Indicates required fields.

Confirmation
Job is running

Job Information

Job Name OFS DEV Group Lookup Reconciliation
Task OFS DEV Group Lookup Reconciliation
* Retries 0

Schedule Type ○ Periodic ○ Cron ○ Single ● No pre-defined schedule

Job Status

Current Status Running
Last Run Start October 13, 2017 10:24:48 AM UTC
Last Run End
Next Scheduled Run

Parameters

* Code Key Attribute Entitlements
* Decode Attribute Entitlements
Filter
* IT Resource Name OFS_DEV_SERVER
* Lookup Name Lookup.OFS.Entitlements
* Object Type User

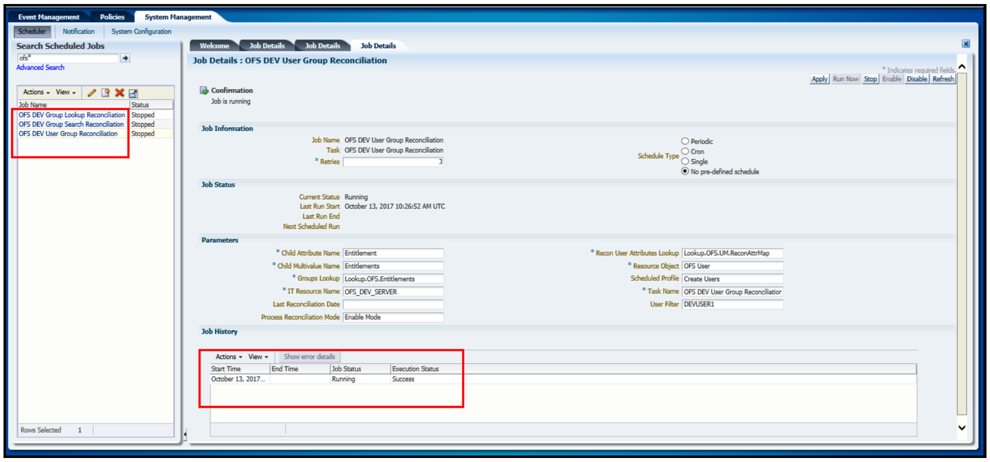
Job History

Start Time	End Time	Job Status	Execution Status
October 13, 2017...		Running	Success

11. Select from **Schedule Type**, the frequency at which you want to run the job. For description, see Schedule Type.

12. Run **OFS {OFSAA_ID} Lookup Search Reconciliation** and check for successful execution of the run.

13. Click **OFS {OFSAA_ID} User Group Reconciliation** to view the *OFS {OFSAA_ID} User Group Reconciliation* window. Reconcile existing user-group mapping from OFSAA to OIM based on the User Filter field on this window.



ofs*

Job Name	Status
OFS DEV Group Lookup Reconciliation	Stopped
OFS DEV Group Search Reconciliation	Stopped
OFS DEV User Group Reconciliation	Stopped

Rows Selected 1

Job Details : OFS DEV User Group Reconciliation

* Indicates required fields.

Confirmation
Job is running

Job Information

Job Name OFS DEV User Group Reconciliation
Task OFS DEV User Group Reconciliation
* Retries 3

Schedule Type ○ Periodic ○ Cron ○ Single ● No pre-defined schedule

Job Status

Current Status Running
Last Run Start October 13, 2017 10:26:52 AM UTC
Last Run End
Next Scheduled Run

Parameters

* Child Attribute Name Entitlement
* Child Multivalue Name Entitlements
* Groups Lookup Lookup.OFS.Entitlements
* IT Resource Name OFS_DEV_SERVER
Last Reconciliation Date
Process Reconciliation Mode Enable Mode
* Recon User Attributes Lookup Lookup.OFS.UM.ReconAttrMap
* Resource Object OFS User
Scheduled Profile Create Users
* Task Name OFS DEV User Group Reconciliatior
User Filter DEVUSER1

Job History

Start Time	End Time	Job Status	Execution Status
October 13, 2017...		Running	Success

14. Select from **Schedule Type**, the frequency at which you want to run the job. For description, see Schedule Type.

15. Enter the login user name in **User Filter** to apply the user group reconciliation to. To add more than one user name, separate by using commas (,). Leave the field empty to apply to all users.

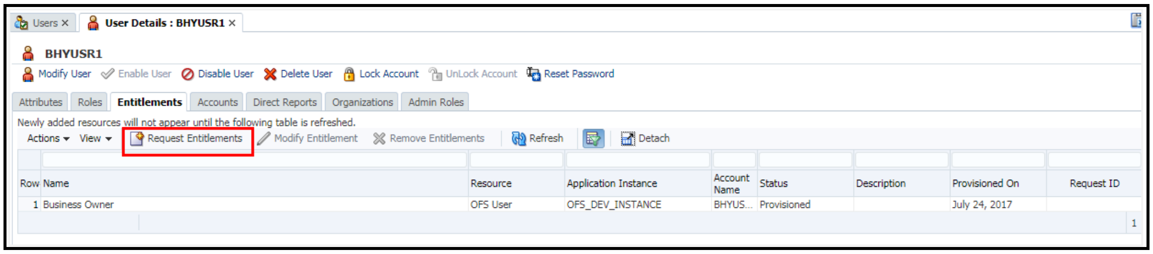
16. Run **OFS {OFSAA_ID} User Group Reconciliation** and check for successful execution of the run.

14.16.3.2 Provisioning Entitlement Requests

The following is the procedure to provision entitlement requests for Users:

1. Login to **OIM Identity Console**.

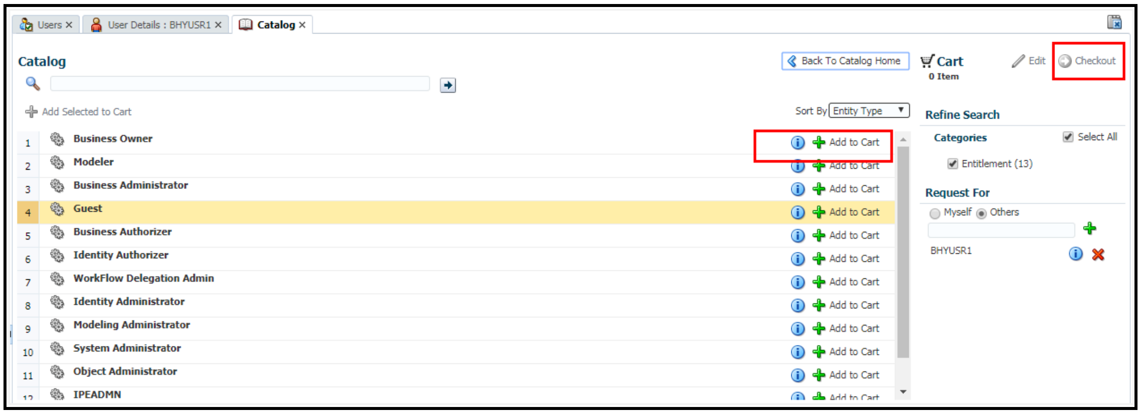
2. Select the User and click **Request Entitlements** on the Entitlements window to display the *Catalog* window. **Catalog** displays a list of all OFSAA group as Entitlements.



Newly added resources will not appear until the following table is refreshed.

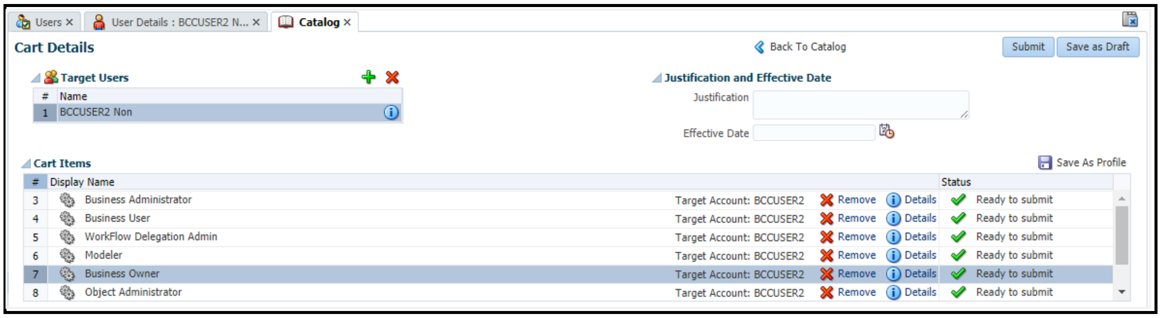
Row	Name	Resource	Application Instance	Account Name	Status	Description	Provisioned On	Request ID
1	Business Owner	OFS User	OFS_DEV_INSTANCE	BHYUS...	Provisioned		July 24, 2017	

3. Select User and click **Add to Cart**. Click **Checkout** to view the *Cart Details* window.



#	Name	
1	Business Owner	Add to Cart
2	Modeler	Add to Cart
3	Business Administrator	Add to Cart
4	Guest	Add to Cart
5	Business Authorizer	Add to Cart
6	Identity Authorizer	Add to Cart
7	WorkFlow Delegation Admin	Add to Cart
8	Identity Administrator	Add to Cart
9	Modeling Administrator	Add to Cart
10	System Administrator	Add to Cart
11	Object Administrator	Add to Cart
12	IPEADMN	Add to Cart

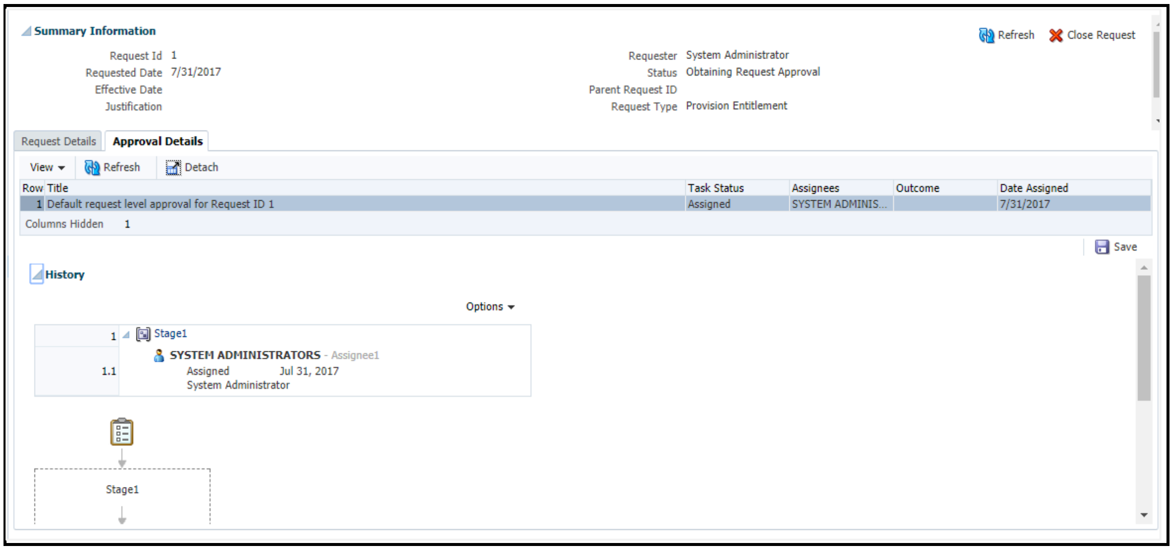
4. Click **Submit**. The request is processed for approval. See Approving Request Entitlements for more details.



#	Name
1	BCCUSER2 Non

#	Display Name				Status
3	Business Administrator	Target Account: BCCUSER2	Remove	Details	Ready to submit
4	Business User	Target Account: BCCUSER2	Remove	Details	Ready to submit
5	WorkFlow Delegation Admin	Target Account: BCCUSER2	Remove	Details	Ready to submit
6	Modeler	Target Account: BCCUSER2	Remove	Details	Ready to submit
7	Business Owner	Target Account: BCCUSER2	Remove	Details	Ready to submit
8	Object Administrator	Target Account: BCCUSER2	Remove	Details	Ready to submit

5. Verify and confirm that the user group mapping is completed in OFSAA. Use the *Summary Information* window to check the stage that the request is in.



Request Id 1
Requested Date 7/31/2017
Effective Date
Justification

Requester System Administrator
Status Obtaining Request Approval
Parent Request ID
Request Type Provision Entitlement

Row	Title	Task Status	Assignees	Outcome	Date Assigned
1	Default request level approval for Request ID 1	Assigned	SYSTEM ADMINIS...		7/31/2017

Columns Hidden 1

1 Stage1
1.1 SYSTEM ADMINISTRATORS - Assignee1
Assigned Jul 31, 2017
System Administrator

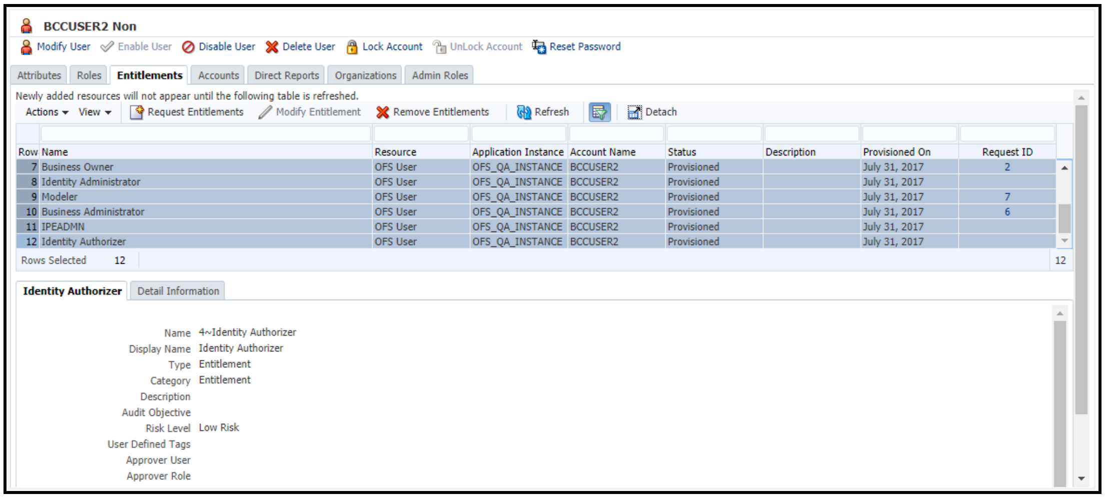
14.16.3.3 Removing Provisioned (Deprovisioning) Entitlements

Remove Entitlements provisioned to users if you want to update the system for changes in user's status.

The following is the procedure to remove entitlements:

1. Login to **OIM Identity Console**.

2. Select the User to deprovision and check for status **Provisioned** to confirm that the User is assigned to an Entitlement. Click **Remove Entitlements** ✖ to display the *Remove Entitlements* window.



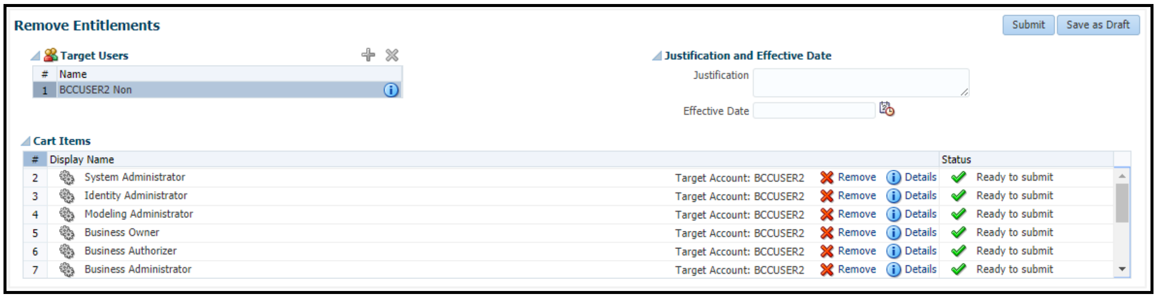
Newly added resources will not appear until the following table is refreshed.

Row	Name	Resource	Application Instance	Account Name	Status	Description	Provisioned On	Request ID
7	Business Owner	OFS User	OFS_QA_INSTANCE	BCCUSER2	Provisioned		July 31, 2017	2
8	Identity Administrator	OFS User	OFS_QA_INSTANCE	BCCUSER2	Provisioned		July 31, 2017	
9	Modeler	OFS User	OFS_QA_INSTANCE	BCCUSER2	Provisioned		July 31, 2017	7
10	Business Administrator	OFS User	OFS_QA_INSTANCE	BCCUSER2	Provisioned		July 31, 2017	6
11	IPEADMN	OFS User	OFS_QA_INSTANCE	BCCUSER2	Provisioned		July 31, 2017	
12	Identity Authorizer	OFS User	OFS_QA_INSTANCE	BCCUSER2	Provisioned		July 31, 2017	

Rows Selected 12   12

Name 4~Identity Authorizer
Display Name Identity Authorizer
Type Entitlement
Category Entitlement
Description
Audit Objective
Risk Level Low Risk
User Defined Tags
Approver User
Approver Role

3. Click **Submit**. The request is processed for approval. See Approving Request Entitlements for more details.



#	Name
1	BCCUSER2 Non

Justification
Effective Date

#	Display Name				Status
2	System Administrator	Target Account: BCCUSER2	Remove	Details	✓ Ready to submit
3	Identity Administrator	Target Account: BCCUSER2	Remove	Details	✓ Ready to submit
4	Modeling Administrator	Target Account: BCCUSER2	Remove	Details	✓ Ready to submit
5	Business Owner	Target Account: BCCUSER2	Remove	Details	✓ Ready to submit
6	Business Authorizer	Target Account: BCCUSER2	Remove	Details	✓ Ready to submit
7	Business Administrator	Target Account: BCCUSER2	Remove	Details	✓ Ready to submit

14.16.3.4 Approving Request Entitlements

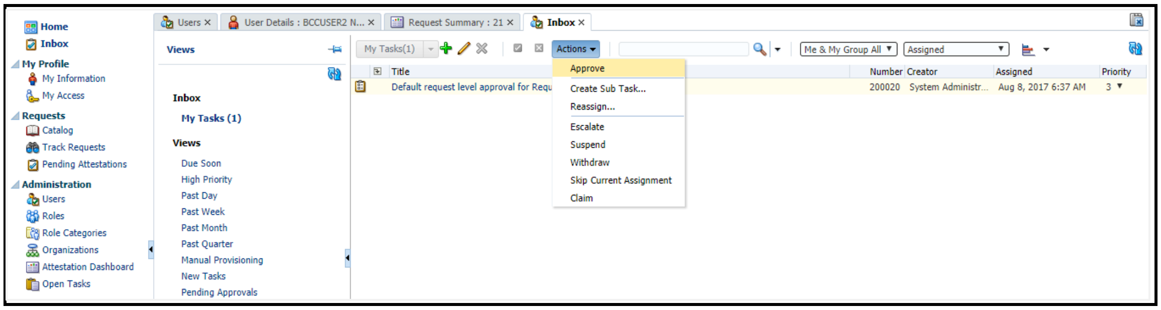
User submitted entitlement requests are processed for approval. Only a user with approver role can approve and activate the request in OFSAA.

Following is the procedure to approve an entitlement request:

1. Login to **OIM Identity Console**.

2. Click **Inbox** from the left menu to display the Inbox window with tasks assigned to you.

3. Select the task that requires you to approve and click the **Actions** drop-down list. Select **Approve** to approve the Request Entitlement.



Title	Number	Creator	Assigned	Priority
Default request level approval for Requ	200020	System Administr...	Aug 8, 2017 6:37 AM	3

14.17 Using REST APIs for User Management from Third-Party IDMs

> **NOTE** The APIs listed in this topic are available from release 8.0.4.0.0 and later. However, in release 8.0.5 and later, "rest" has been modified to "rest-api" in the REST URLs.

OFSAA provides connectors which integrates with OIM. However, if you want to integrate OFSAA with any other Identity Management (IDM) system, then you have to use the APIs listed in this topic to develop connectors that can connect with OFSAA for user provisioning.

14.17.1 Knowing the Prerequisites

The following are the prerequisites to configure the REST APIs for third-party IDM solutions:

1. The POST REST APIs referred in this topic are protected by Basic Authentication, it requires user ID and password to access.
2. To access these services, administrator users should be mapped to the **IDMGMTADVN** role.
3. The GET REST APIs referred in this topic are protected by Basic Authentication, it requires user ID and password to access.

14.17.2 Understanding REST API Specifications

The following table provides details for the REST APIs.

> **NOTE** Prefix *http://<Webserverip>:<servletport>/<context>* to the values in the URL column. For example, */rest-api/idm/service/create/user* should be *http://<Webserverip>:<servletport>/<context>/rest-api/idm/service/create/user*.

Number	Requirement	URL	Method Type	Request	Sample Request JSON	Comments

1	Create user	/rest-api/idm/service/create/user	POST	JSON	{
					"attributes": {
					"user_id": "user_id",
					"user_name": "user_name",
					"user_password": "password",
					"user_start_date": "start_date",
					"user_end_date": "End_date",
					"user_is_authorized": true(/false),
					"user_is_enabled": true(/false),
					"user_logon_holiday": true(/false)
					}
					}
						All FIELDS are mandatory.
						Date format is mm/dd/yyyy. If user_is_authorized is set to true, then user is authorized during creation.

2	Update user	/rest-api/idm/service/update/user	POST	JSON	{
					"attributes": {
					"user_id": "user_id",
					"user_name": "user_name",
					"user_password": "password",
					"user_start_date": "start_date",
					"user_end_date": "End_date",
					"user_is_authorized": true(/false),
					"user_is_enabled": true(/false),
					"user_logon_holiday": true(/false)
					}
					}
						All FIELDS are mandatory.
						Date format is mm/dd/yyyy. If user_is_authorized is set to true, then user is authorized during creation.

Number	Requirement	URL	Method Type	Request	Sample Request JSON	Comments
3	Delete User	/rest-api/idm/service/delete/user	POST	TEXT	USERID	User ID is mandatory.
4	Authorize User	/rest-api/idm/service/authorize/user	POST	TEXT	USERID	User ID is mandatory.
5	Reinstate user	/rest-api/idm/service/reinstate/user	POST	TEXT	USERID	User ID is mandatory.

6	Create Group	/rest-api/v1/group/create	POST	JSON	{
					"groupid": "ABCGRP",
					"groupname": "abc group",
					"groupdesc": "abc group",
					"precedence": "100"
					}
						The group id, group description and precedence must be unique for each group.
						NOTE:
						• The groupid must be in uppercase.
						• This requirement is applicable for the **8.0.8.3.0** release having one-off **32179201.**

7	Update Group	/rest-api/v1/group/modify	POST	JSON	{
					"groupid": "ABCGRP",
					"groupname": "abc group",
					"groupdesc": "abc group",
					"precedence": "100""
					}
						The group name, group description and precedence can be changed.
						NOTE:
						• The groupid must be in uppercase.
						• This requirement is applicable for the **8.0.8.3.0** release having one-off **32179201.**

Number	Requirement	URL	Method Type	Request	Sample Request JSON	Comments

8	Delete group	/rest-api/v1/group/delete	POST	JSON	{
					"groupid": "ABCGRP"
					}
						The group must not be mapped to any user, role, or infodom.
						NOTE:
						• The groupid must be in uppercase.
						• This requirement is applicable for the **8.0.8.3.0** release having one-off **32179201.**

9	Map user to group	/rest-api/idm/service/map/groupmembers	POST	JSON	{
					"user_id": "user_id",
					"group": [
					{
					"group_id": "group_id",
					"group_name": "groupname"
					},
					...
					]
					}
						• Mapping of user id to groups.

10	Unmap user from group	/rest-api/idm/service/unmap/groupmembers	POST	JSON	{
					"user_id": "user_id",
					"group": [
					{
					"group_id": "group_id",
					"group_name": "groupname"
					},
					...
					]
					}
						Unmapping of user ids from groups.
						NOTE: This requirement is applicable for release 8.0.6.1.0 and later versions.

Number	Requirement	URL	Method Type	Request	Sample Request JSON	Comments

11	Create Role	/rest-api/v1/role/create	POST	JSON	{
					"roleid":"ABCROLE",
					"rolename": "ABC Role",
					"roledesc" : "ABC Role"
					}
						The role id and rolename must be unique.
						NOTE:
						- The roleid must be in uppercase.
						This requirement is applicable for the **8.0.8.3.0** release having one-off **32179201.**

12	Update Role	/rest-api/v1/role/update	POST	JSON	{
					"roleid":"ABCROLE",
					"rolename": "ABC Role",
					"roledesc" : "ABC Role"
					}
						The role name and role description can be modified.
						NOTE:
						- The roleid must be in uppercase.
						This requirement is applicable for the **8.0.8.3.0** release having one-off **32179201.**

13	Delete Role	/rest-api/v1/role/delete	POST	JSON	{
					"roleid":"ABCROLE"
					}
						The Role must not be mapped to any group or function.
						NOTE:
						- The roleid must be in uppercase.
						This requirement is applicable for the **8.0.8.3.0** release having one-off **32179201.**

Number	Requirement	URL	Method Type	Request	Sample Request JSON	Comments

14	Map Role to group	/rest-api/v1/group/maproles	POST	JSON	{
					"groupid":"ABCGRP",
					"rolenames" : ["Identity MGMT access","Identity MGMT advanced"]
					}
						You can pass the rolenames in JSON Array.
						NOTE:
						• Mapping must be authorized if auto authorized is not enabled.
						• The groupid should be in uppercase
						• This requirement is applicable for the **8.0.8.3.0** release having one-off **32179201.**

15	Unmap Role to group	/rest-api/v1/group/unmaproles	POST	JSON	{
					"groupid":"ABCGRP",
					"rolenames" : ["Identity MGMT access","Identity MGMT advanced"]
					}
						You can pass the rolenames in JSON Array.
						NOTE:
						• Mapping must be authorized if auto authorized is not enabled.
						• The groupid should be in uppercase
						• This requirement is applicable for the **8.0.8.3.0** release having one-off **32179201.**

Number	Requirement	URL	Method Type	Request	Sample Request JSON	Comments
16	Get Infodoms	/rest-api/v1/infodoms	GET	-	Not Required	GET API to return the list of all infodoms **NOTE**: This requirement is applicable for the **8.0.8.3.0** release having one-off **32179201.**

17	Map infodom to a group	/rest-api/v1/group/mapdomains	POST	JSON	{
					"groupid":"ABCGRP" ,
					"domainnames" : ["OFSAAAIINFO-EMFLD"]
					}
						You can pass the infodom-segment as parameters in JSON Array.
						NOTE:
						• Mapping must be authorized if auto authorized is not enabled.
						• The groupid should be in uppercase
						• This requirement is applicable for the **8.0.8.3.0** release having one-off **32179201.**

Number	Requirement	URL	Method Type	Request	Sample Request JSON	Comments

18	Un-map infodom from a group	/rest-api/v1/group/unmapdomains	POST	JSON	{
					"groupid":"ABCGRP" ,
					"domainnames" : ["OFSAAAIINFO-EMFLD"]
					}
						You can pass the infodom-segment as parameters in JSON Array.
						NOTE:
						- Mapping must be authorized if auto authorized is not enabled.
						- The groupid should be in uppercase
						- This requirement is applicable for the **8.0.8.3.0** release having one-off **32179201.**

19	Map/Unmap function with role	/rest-api/v1/role/mapfunctions	POST	JSON	{
					"roleid":"ABCROLE",
					"functioncodes": ["ADMINSCR","ALSLINK"]
					}
						For both map and unmap based on functioncodes. All the exsisting functions are unmapped and then functioncodes passed are mapped with role code.
						NOTE:
						- The roleid and functioncodes must be in upper case.
						- This requirement is applicable for the **8.0.8.3.0** release having one-off **32179201.**

Number	Requirement	URL	Method Type	Request	Sample Request JSON	Comments
20	Retrieves all the users and mapped groups based on the query parameters	• /rest-api/v1/users?id=<userid> • /rest-api/v1/users?user=<username> • /rest-api/v1/users?profile=<profile_code> • /rest-api/v1/users	GET	-	Not required	GET API to retrieve all the users and groups membership to read users in their compliance application. **NOTE**: This requirement is applicable for the **8.0.8.2.0** release having one-off **31780593** and the **8.0.8.3.0** release having one-off **32179201.**
21	Retrieves all the groups and mapped roles based on the query parameters.	• /rest-api/v1/groups • /rest-api/v1/groups?code=<group code>&groupname=<group name>&desc=<group description>	GET	-	Not Required	GET API to retrieve all the groups and mapped roles based on the query parameters in their complaince application. **NOTE**: This requirement is applicable for the **8.0.8.2.0** release having one-off **32045135** and the **8.0.8.3.0** release having one-off **32179201.**

Number	Requirement	URL	Method Type	Request	Sample Request JSON	Comments
22	Retrieves all the roles and mapped functions based on the query parameters.	- /rest-api/v1/roles /rest-api/v1/roles?code=<role code>&role=<role name>&desc=<role description>	GET	-	Not Required	GET API to retrieve all the roles and mapped functions based on the query parameters in their complaince application. **NOTE**: This requirement is applicable for the **8.0.8.2.0** release having one-off **32045135** and the **8.0.8.3.0** release having one-off **32179201.**

14.18 Configuring the Logout URL for OBIEE in OFSAA

Logging out from OFSAA does not logout a user from Oracle Business Intelligence Enterprise Edition (OBIEE) if the OBIEE Logout URL is not configured in OFSAA.

Perform the following configuration in OFSAA to enable logging out of OBIEE when you logout of OFSAA:

1. Login to the OFSAA database with CONFIG user credentials:
2. In the database, update the configuration table by running the script in the following format:

```
update configuration set paramvalue = '<OBIEE_LOGOUT_URL>' where
paramname = 'OBIEE_LOGOUT_URL_VAL';
/
update configuration set paramvalue = '<IS_CROSSDOMAIN>' where
paramname = 'OBIEE_CROSS_DOMAIN_VAL';
```

   Replace `<OBIEE_LOGOUT_URL>` with the OBIEE logout URL.

   For example,

```
update configuration set paramvalue =
'http://obieehost:port/analytics/saw.dll?Logoff' where paramname =
'OBIEE_LOGOUT_URL_VAL';
```

   and

   Replace `<IS_CROSSDOMAIN>` with **true** if OBIEE is on another server.

   For example,

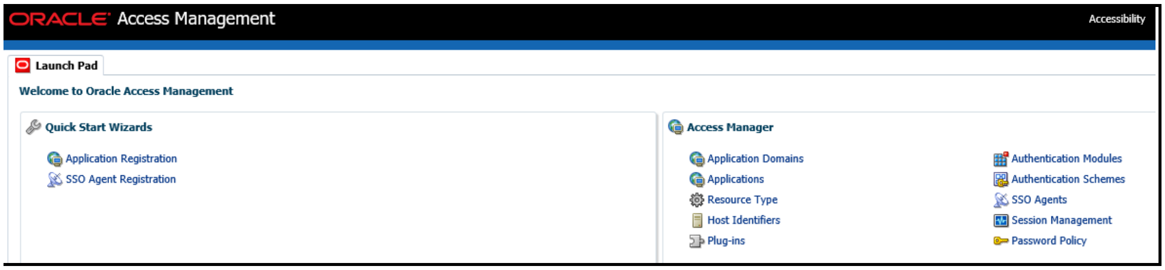
```
update configuration set paramvalue = 'true' where paramname =
'OBIEE_CROSS_DOMAIN_VAL';
```

14.19 Enabling Deep Linking in OFSAA

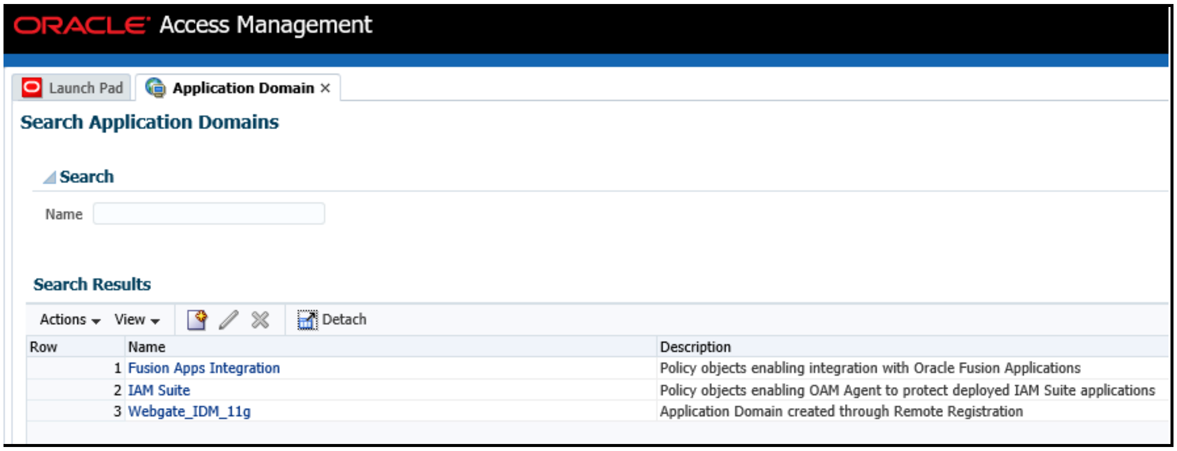
When a user logs into OFSAA, by default, the application opens the default landing page or the preferred landing page. However, it is possible to open a specific page (show requested resource URL) other than the default or preferred landing page by using Deep Linking in a SSO-enabled setup.

To enable deep linking, perform the following procedure:

1. Login to the **OAM Administrator Console**.
2. From the **Launch Pad**, click **Application Domains** from the **Access Manager** widget. The *Application Domain* window is displayed.

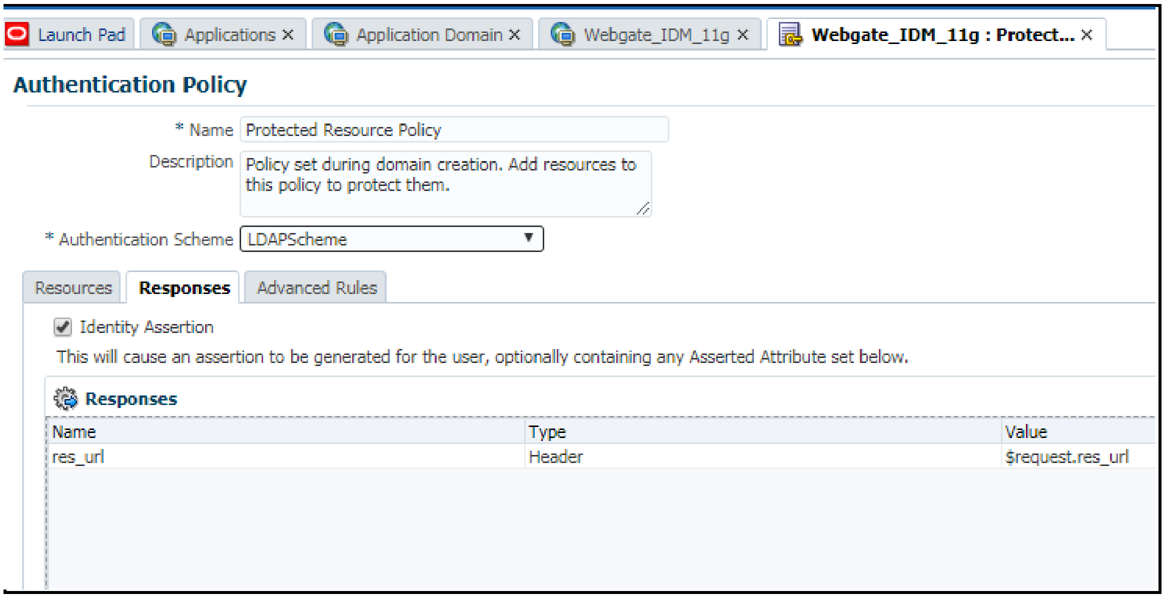


3. Search for the required application domain for which you want to switch the authentication scheme and click **Name** from the search results to display the details for the application domain.



Row	Name	Description
1	Fusion Apps Integration	Policy objects enabling integration with Oracle Fusion Applications
2	IAM Suite	Policy objects enabling OAM Agent to protect deployed IAM Suite applications
3	Webgate_IDM_11g	Application Domain created through Remote Registration

4. Click the **Authentication Policies** tab to view the existing policies in the system.



Authentication Policy

* Name: Protected Resource Policy

Description: Policy set during domain creation. Add resources to this policy to protect them.

* Authentication Scheme: LDAPScheme

☑ Identity Assertion

This will cause an assertion to be generated for the user, optionally containing any Asserted Attribute set below.

Responses

Name	Type	Value
res_url	Header	$request.res_url

5. Click **Protected Resource Policy** from the list to view the details for the policy.
6. Click **LDAPScheme** from Authentication Scheme.
7. Click **Responses** tab and click **Add** button.
8. To configure deep linking in your OFSAA, set **res_url** header in response to send Requested resource URL path. In the popup, select **Header** for **Type**. Enter **res_url** for **Name**, and enter **$request.res_url** for **Value**. Click **OK**.
9. Click **Apply** to save.

For reference information on the preceding instructions, see the following link for OAM:

https://docs.oracle.com/cd/E52734_01/oam/AIAAG/GUID-30AA255E-677D-4054-8C3E-2D991F50BCA8.htm#GUID-26E22714-19DF-42DB-98DE-1C8DF67DDF1F

14.20 Enabling Unlimited Cryptographic Policy for Java

Enabling unlimited cryptographic policy for Java enables you to use AES-256 keys for encryption. The JCE Policy JAR files, for the current Java versions required for OFSAA and also for later versions, are available in the following link:

https://bugs.java.com/view_bug.do?bug_id=JDK-8170157

For Java versions, where unlimited cryptographic policy is not enabled by default, perform the following steps to enable:

1. Download the JCE Policy related JARs `local_policy.jar` and `US_export_policy.jar`.

   — For Oracle Java 7, download it from https://www.oracle.com/technetwork/java/javase/downloads/jce-7-download-432124.html.

- For Oracle Java 8, download it from https://www.oracle.com/technetwork/java/javase/downloads/jce8-download-2133166.html.
- For IBM Java, download it from https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?source=jcesdk.

2. Copy (or replace) the downloaded JCE Policy related JARs `local_policy.jar` and `US_export_policy.jar` into the `/jre/lib/security` directory of Java installation directory used for OFSAAI and the Web Application Servers.

15 Configurations for Connecting OFSAA to Oracle Database using Secure Database Connection (TCPS)

This section is applicable only for OFSAAI versions 8.0.6.2.0 and Higher.

15.1 Prerequisites

The following are the prerequisites for this configuration:

1. Unix user credentials with which OFSAA was installed.
2. Unix user credentials with which Web Application Server (Oracle WebLogic (WLS)/Apache Tomcat/ IBM WebSphere) was installed.
3. OFSAAI version should be 8.0.6.2.0 or Higher.
4. Ensure OFSAA installed and deployed is having JAVA 8 (Java version must support Java unlimited cryptographic policy. Java version 1.8.0_161+ supports unlimited cryptographic policy.)

   NOTE To upgrade to Java 8, see the *Upgrading an Existing OFSAA 8.0.x Java 7 Instance to Java 8* section in OFS AAAI Applications Pack Language Pack Installation Guide.

5. On the OFSAA processing server, Oracle Wallet configuration with trusted certificates should done between DBServer having TCPS configured and DBClient to communicate via SSL protocol.

   For example, all the db utils like sqlplus, tnsping ,sqlldr should work between Client and Server.

15.2 Configuring OFSAA and various Web Application Servers with Oracle Wallet

The following are the details to configure OFSAA and various Web Application Servers with Oracle Wallet:

1. Import all the wallet certificates from Oracle Database and Oracle Database Client into JDK cacert store:

   - Login as unix user which as permission to cacerts of java and use below command to add the wallet certificates to JDK store of JRE used for OFSAA Processing Server.

     ```
     /usr/java/jdk1.8.0_161/bin/keytool -importcert -trustcacerts -alias
     sslorclserver -file <locationofservercerts>/server_certs/
     dbsrvhostname-certificate.crt -keystore
     /usr/java/jdk1.8.0_161/jre/lib/security/cacerts -storepass changeit
     ```

     ```
     /usr/java/jdk1.8.0_161/bin/keytool -importcert -trustcacerts -alias
     ssloraclclient -file <locationofclientcerts>/client_certs/
     dbclthostname-certificate.crt -keystore
     /usr/java/jdk1.8.0_161/jre/lib/security/cacerts -storepass changeit
     ```

```
/usr/java/jdk1.8.0_161/bin/keytool -importcert -trustcacerts -alias
sslorclcdb -file <locationofservercerts>/server_certs/
dbsrvhostname-certificate_xdb.crt -keystore
/usr/java/jdk1.8.0_161/jre/lib/security/cacerts -storepass changeit
```

2. Login to the OFSAA Processing Tier with the same user credentials with which the OFSAA processes run.
3. Verify the location of the wallet in the `sqlnet.ora` file found (location: `$TNS_ADMIN`) usually in the path `ORACLE_HOME/network/admin`. This file might have entries in the following format:

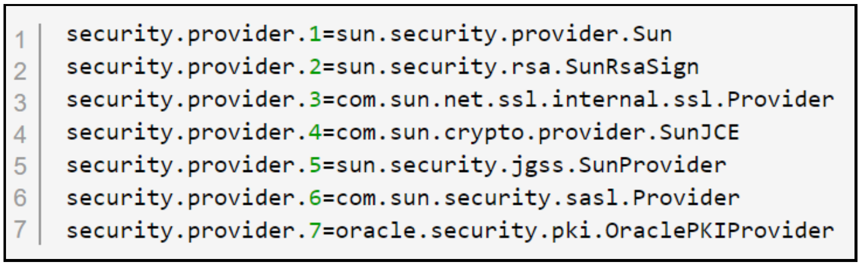
```
WALLET_LOCATION =

   (SOURCE =
     (METHOD = FILE)
     (METHOD_DATA =
       (DIRECTORY = /scratch/ssldbtest/clientwallet)
     )
   )

SQLNET.WALLET_OVERRIDE = TRUE

SSL_CLIENT_AUTHENTICATION = FALSE

SSL_CIPHER_SUITES = (SSL_RSA_WITH_AES_256_CBC_SHA,
SSL_RSA_WITH_3DES_EDE_CBC_SHA)
```

4. Modify the tns entry in `tnsnames.ora` file for connecting the database with secured database connection (TCPS).

```
DBAAIB =
(DESCRIPTION =

 (ADDRESS = (PROTOCOL = TCPS)(HOST = dbsrvhostname.in.oracle.com)
            (PORT = 2484)
 )

 (CONNECT_DATA =
   (SERVER = DEDICATED)
   (SERVICE_NAME = DBAAIB)
 )
 (security=(ssl_server_cert_dn= "CN=dbsrvhostname"))
)
dbtyofsaaatm =
(DESCRIPTION =
  (ADDRESS = (PROTOCOL = TCPS)(HOST = dbsrvhostname.in.oracle.com)
   (PORT = 2484)
  )
 (CONNECT_DATA=
   (SERVER = DEDICATED)
   (SERVICE_NAME=DBAAIB)
 )
 (security=(ssl_server_cert_dn= "CN=dbsrvhostname"))
)
```

5. Enable Java Security Provider as Oracle PKI Provider statically on machines hosting OFSAA and the Web Application Servers, by performing the following step:

- Since SSO wallets (`cwallet.sso`) are used, add the OraclePKIProvider at the end of the provider list in the `java.security` file (this file is part of your JRE install located at `$JRE_HOME/jre/lib/security/java.security`) which typically looks like:



```
security.provider.1=sun.security.provider.Sun
security.provider.2=sun.security.rsa.SunRsaSign
security.provider.3=com.sun.net.ssl.internal.ssl.Provider
security.provider.4=com.sun.crypto.provider.SunJCE
security.provider.5=sun.security.jgss.SunProvider
security.provider.6=com.sun.security.sasl.Provider
security.provider.7=oracle.security.pki.OraclePKIProvider
```

For more information, refer the following link:

https://blogs.oracle.com/dev2dev/ssl-connection-to-oracle-db-using-jdbc,-tlsv12,-jks-or-oracle-wallets#Wallets

6. Connect to the OFSAA DB and modify the existing jdbc connect string value in the column **JDBC_CONN_STR** of the tables **AAI_DB_PROPERTY** and **DB_MASTER** from the Configuration Schema. Update the values for all entries in the aforementioned tables as given:

   Syntax: `jdbc:oracle:thin:@<tns entry DBserver points to tcps>`

   Example: `jdbc:oracle:thin:@(DESCRIPTION = (ADDRESS = (PROTOCOL = TCPS)(HOST = dbsrvhostname.in.oracle.com)(PORT = 2484)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME=DBAAIB)) (security=(ssl_server_cert_dn=CN=dbsrvhostname)))`

7. Modify **DEFAULT_CONNECTION_URL** in the files `$FIC_HOME/conf/DynamicServices.xml` and `$FIC_WEB_HOME/webroot/conf/DynamicServices.xml` from the Configuration Schema to the following:

   Syntax: `jdbc:oracle:thin:@< tns entry DBServer points to tcps>`

   Example: `jdbc:oracle:thin:@(DESCRIPTION = (ADDRESS = (PROTOCOL = TCPS)(HOST = dbsrvhostname.in.oracle.com)(PORT = 2484)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME = DBAAIB)) (security=(ssl_server_cert_dn=CN=dbsrvhostname)))`

8. To support TCPS with CBC256 and TLS 1.2, apply the following patches to Oracle client 12.1.0.1 or 12.1.0.2 to update oracle thin driver jars:

   - Patch 19030178
   - Patch 25797943

   NOTE You can proceed further, only after successful installation of the aforementioned patches.

9. Remove all the occurrences of `ojdbc7.jar` from `$FIC_HOME` folder and replace it with the `ojdbc7.jar` from `$ORACLE_HOME/jdbc/lib` folder.

   - To find all the occurrences of `ojdbc7.jar` from `$FIC_HOME` folder, execute the following command:

     ```
     find $FIC_HOME \( -name "ojdbc7.jar" \) -print
     ```

10. Copy `oraclepki.jar, osdt_cert.jar` and `osdt_core.jar` from `$ORACLE_HOME/jlib` or download from OTN to the following locations:

    - `$FIC_HOME/ficapp/common/FICServer/lib`
    - `$FIC_HOME/ficapp/icc/lib`
    - `$FIC_HOME /realtime_processing/WebContent/WEB-INF/lib`
    - `$FIC_HOME/ficweb/webroot/WEB-INF/lib`
    - `$FIC_HOME/ficdb/lib`

11. Add the environment variables **wallet_loc** and **X_ARGS_GEN** in `.profile` of OFSAA user and web server user. Add `-Doracle.net.tns_admin, -Doracle.net.ssl_server_dn_match, -Djavax.net.ssl.trustStoreType -Djavax.net.ssl.trustStore, -Doracle.net.ssl_version` and `-Doracle.net.wallet_location` locations as given below.

```
wallet_loc="(SOURCE=(METHOD=file)(METHOD_DATA=(DIRECTORY=/scratch/ssldb
test/clientwallet)))"

export wallet_loc

X_ARGS_GEN="-Doracle.net.tns_admin=$TNS_ADMIN

   -Doracle.net.wallet_location=$wallet_loc

   -Doracle.net.ssl_server_dn_match=true

   -Djavax.net.ssl.trustStoreType=SSO

   -Djavax.net.ssl.trustStore=cwallet.sso

   -Doracle.net.ssl_version=1.2"

export X_ARGS_GEN
```

12. Update the variables to append **X_ARGS_GEN** value in **X_ARGS_APP** and other X_ARGS property in `.profile` of the OFSAA user as shown in the following:

```
X_ARGS_APP="-Xms200m -Xmx8g -XX:+UseAdaptiveSizePolicy -
XX:MaxPermSize=1024M -XX:+UseParallelOldGC  -XX:+DisableExplicitGC
$X_ARGS_GEN"

export X_ARGS_APP

X_ARGS_OBJMIG="-Xms256m -Xmx512m -XX:+UseAdaptiveSizePolicy -
XX:MaxPermSize=1024M -XX:+UseParallelOldGC  -XX:+DisableExplicitGC
$X_ARGS_GEN"

export X_ARGS_OBJMIG

X_ARGS_RLEXE="-Xms512m -Xmx1024m -XX:+UseAdaptiveSizePolicy -
XX:MaxPermSize=1024M -XX:+UseParallelOldGC  -XX:+DisableExplicitGC
$X_ARGS_GEN"

export X_ARGS_RLEXE

X_ARGS_RNEXE="-Xms256m -Xmx512m -XX:+UseAdaptiveSizePolicy -
XX:MaxPermSize=1024M -XX:+UseParallelOldGC  -XX:+DisableExplicitGC
$X_ARGS_GEN"

export X_ARGS_RNEXE
```

```
X_ARGS_WSEXE="-Xms256m -Xmx512m -XX:+UseAdaptiveSizePolicy -
XX:MaxPermSize=1024M -XX:+UseParallelOldGC  -XX:+DisableExplicitGC
$X_ARGS_GEN"

export X_ARGS_WSEXE
```

13. Execute the `.profile` and restart OFSAA Services.

15.2.1 Configuring OFSAA and Tomcat as Web Application Server with Oracle Wallet

1. On Primary Tomcat Server instance, since there is no Oracle Client on the Tomcat Server instance, manually create a directory called "network" and copy `tnsnames.ora`, `sqlnet.ora` files into the "network" folder. Copy complete wallet directory "clientwallet" configured from OFSAA layer.
2. Modify `sqlnet.ora` with new WALLET_LOCATION path.
3. Add the following Java properties in `catalina.sh` file after - `Djava.io.tmpdir="\"$CATALINA_TMPDIR\"" \` entry. This needs to be added in multiple places in the same file.

```
-Doracle.net.tns_admin="\"$TNS_ADMIN\"" \

-Doracle.net.wallet_location="\"$wallet_loc\"" \

-Djavax.net.ssl.trustStoreType="SSO" \

-
Djavax.net.ssl.trustStore="/scratch/ssldbtest/clientwallet/cwallet.sso"
\

-Djavax.net.ssl.keyStore="/scratch/ssldbtest/clientwallet/cwallet.sso"
\

-Djavax.net.ssl.keyStoreType="SSO" \

-Doracle.net.ssl_version="1.2" \

-Doracle.net.ssl_server_dn_match="true" \
```

4. Specify the fully qualified JDBC URL in Connection pool settings of Tomcat `server.xml` or `Context.xml` used for DataSources.

   For example:

```
url="jdbc:oracle:thin:@(DESCRIPTION = (ADDRESS = (PROTOCOL = TCPS)(HOST
= dbsrvhostname.in.oracle.com)(PORT = 2484)) (CONNECT_DATA = (SERVER =
DEDICATED) (SERVICE_NAME=DBAAIB)) (security=(ssl_server_cert_dn=CN=
dbsrvhostname)))"
```

15.2.2 Configuring OFSAA and WebLogic as Web Application Server with Oracle Wallet

1. On Primary WebLogic Server instance, since there is no Oracle Client on the WebLogic Server instance, manually create a directory called "network" and copy `tnsnames.ora`, `sqlnet.ora`

files into the "network" folder. Copy complete wallet directory "clientwallet" configured from OFSAA layer.

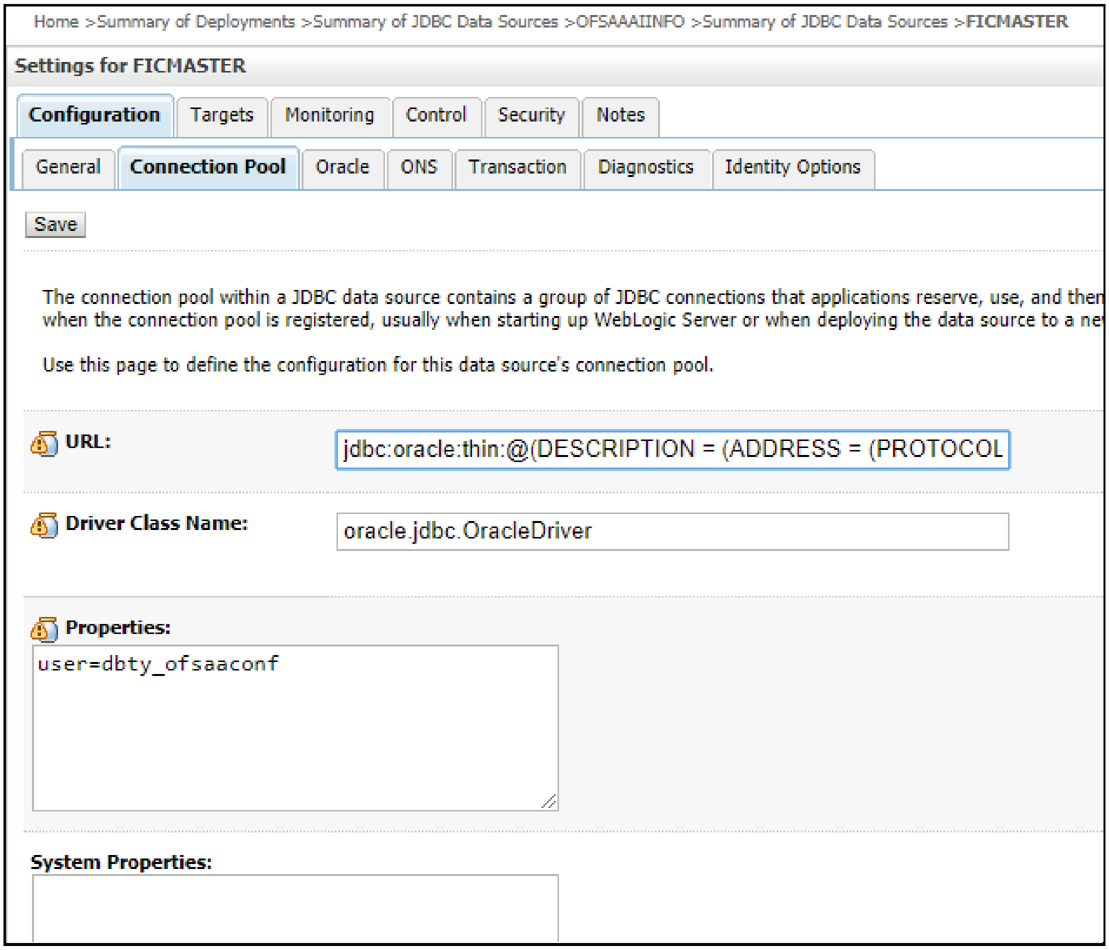
2. Modify `sqlnet.ora` with new WALLET_LOCATION path.

> **NOTE** Make sure the TNS_ADMIN and WALLET LOCATION are under *Domain* directory so that after Cluster configuration it is being copied to secondary Weblogic Server instances manually. For more information on clustered setup configuration, see Configuring OFSAA in Clustered Environment Guide .

3. Add parameters and its values (-`Doracle.net.tns_admin`, -`Doracle.net.ssl_server_dn_match`, -`Djavax.net.ssl.trustStoreType`, -`Djavax.net.ssl.trustStore`, -`Doracle.net.ssl_version` and -`Doracle.net.wallet_location`) in the `setDomainEnv.sh` file as given:

```
JAVA_PROPERTIES="${JAVA_PROPERTIES} ${EXTRA_JAVA_PROPERTIES}

-Doracle.net.tns_admin=

/scratch/ssldbtest/Oracle/Middleware/Oracle_Home/user_projects/domains/DBAAAIB/network

-Doracle.net.wallet_location=

  (SOURCE=(METHOD=file)

  (METHOD_DATA=(DIRECTORY=

   /scratch/ssldbtest/Oracle/Middleware/Oracle_Home/user_projects/domains/DBAAAIB/clientwallet)

  )

-Djavax.net.ssl.trustStoreType=SSO

-
Djavax.net.ssl.trustStore=/scratch/ssldbtest/Oracle/Middleware/Oracle_Home/user_projects/domains/DBAAAIB/clientwallet/cwallet.sso

-Doracle.net.ssl_version=1.2

-Doracle.net.ssl_server_dn_match=true

"

export JAVA_PROPERTIES
```

4. Login to the **WLS Admin console** and edit the **WLS JNDI Data Source** connection pool details.



The connection pool within a JDBC data source contains a group of JDBC connections that applications reserve, use, and then
when the connection pool is registered, usually when starting up WebLogic Server or when deploying the data source to a ne

Use this page to define the configuration for this data source's connection pool.

URL: jdbc:oracle:thin:@(DESCRIPTION = (ADDRESS = (PROTOCOL

Driver Class Name: oracle.jdbc.OracleDriver

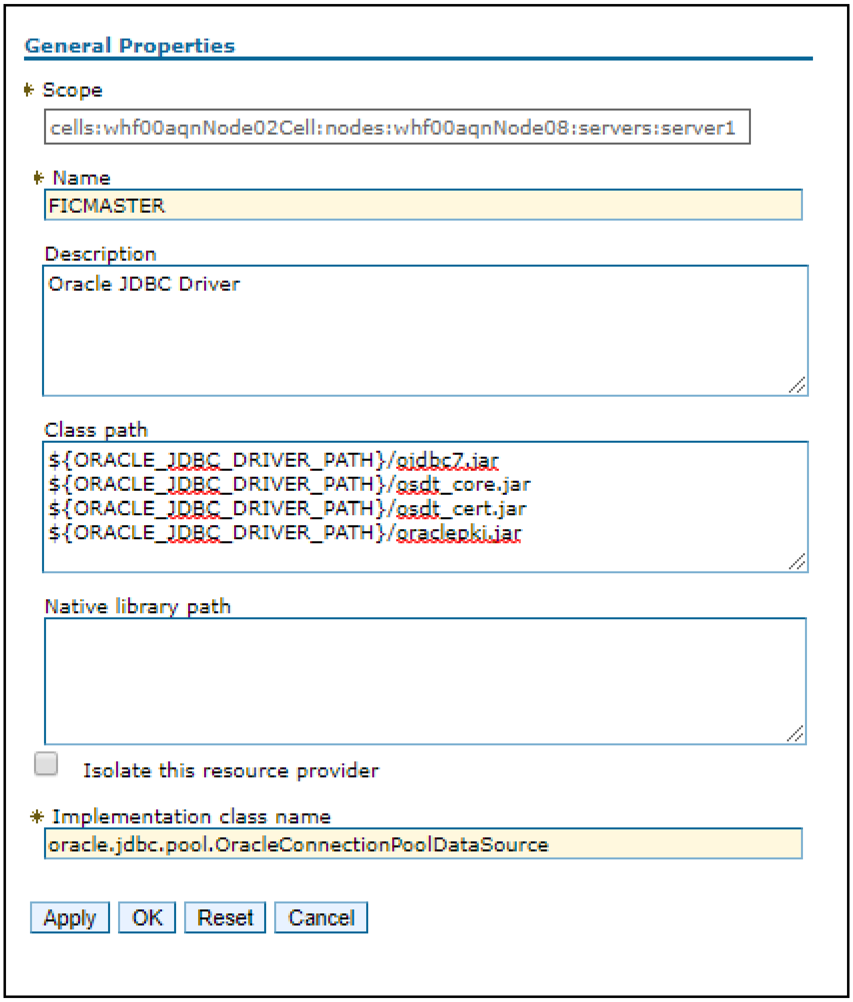
Properties: user=dbty_ofsaaconf

System Properties:

5. Modify **URL** and **Properties** values as displayed in the figure.
6. Similarly, edit the **WLS JNDI Data Source** connections **ATOMIC** and **SANDBOX** schemas, and perform a Test Connection on each data source.

15.2.3 Configuring OFSAA and WebSphere as Web Application Server with Oracle Wallet

1. Since there is no Oracle Client on the WebSphere server instance, manually create a directory called "network" and copy `tnsnames.ora`, `sqlnet.ora` files into the "network" folder. Copy complete wallet directory "clientwallet" configured from OFSAA layer.
2. Modify `sqlnet.ora` with new WALLET_LOCATION path.
3. Copy `ojdbc7.jar` and oracle PKI related jars `oraclepki.jar`, `osdt_cert.jar` and `osdt_core.jar` from `$FIC_HOME/ficapp/common/FICServer/lib` into <WebSphere located jdbc drivers> (that is usually referred in WebSphere as `${ORACLE_JDBC_DRIVER_PATH})`.
4. In the WebSphere console, navigate to *Resources >JDBC>JDBC Providers*, and click the link that corresponds to OFSAA Config, Atomic and Sandbox. Then add the references of oracle PKI related jars. Click OK and save to Master configuration.



General Properties

* Scope

cells:whf00aqnNode02Cell:nodes:whf00aqnNode08:servers:server1

* Name

FICMASTER

Description

Oracle JDBC Driver

Class path

```
${ORACLE_JDBC_DRIVER_PATH}/ojdbc7.jar
${ORACLE_JDBC_DRIVER_PATH}/osdt_core.jar
${ORACLE_JDBC_DRIVER_PATH}/osdt_cert.jar
${ORACLE_JDBC_DRIVER_PATH}/oraclepki.jar
```

Native library path

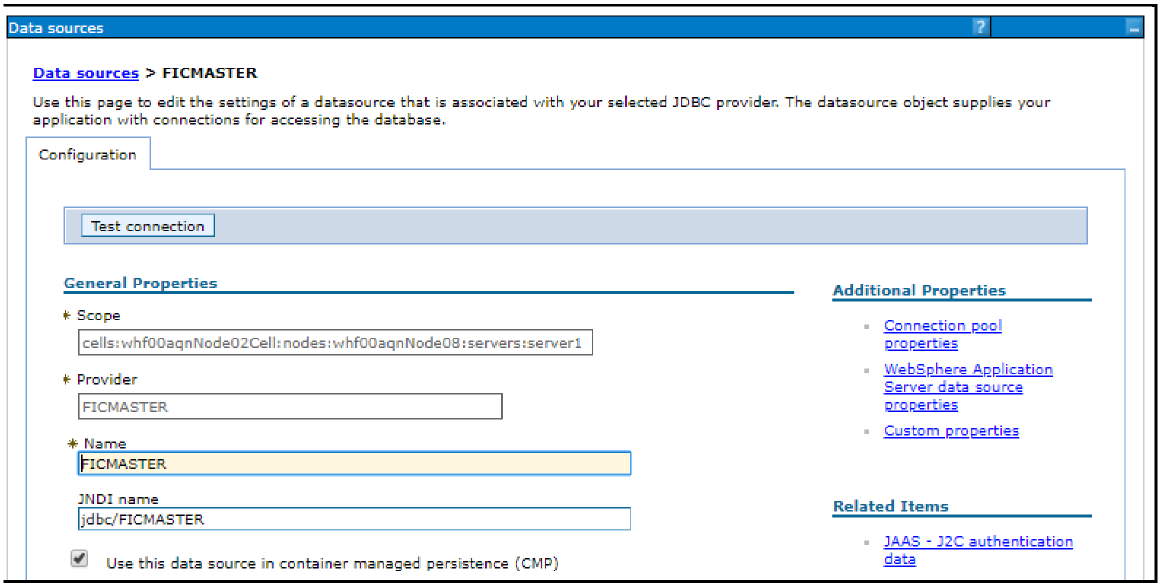
□ Isolate this resource provider

* Implementation class name

oracle.jdbc.pool.OracleConnectionPoolDataSource

TIP This Step requires restart of WebSphere profile restart.

5. Navigate to *Resources>JDBC>Data sources*, and click the link that corresponds to Config, Atomic and Sandbox Datasource to update to use SSL.



Data sources > FICMASTER

Use this page to edit the settings of a datasource that is associated with your selected JDBC provider. The datasource object supplies your application with connections for accessing the database.

General Properties

* Scope: cells:whf00aqnNode02Cell:nodes:whf00aqnNode08:servers:server1

* Provider: FICMASTER

* Name: FICMASTER

JNDI name: jdbc/FICMASTER

☑ Use this data source in container managed persistence (CMP)

Additional Properties

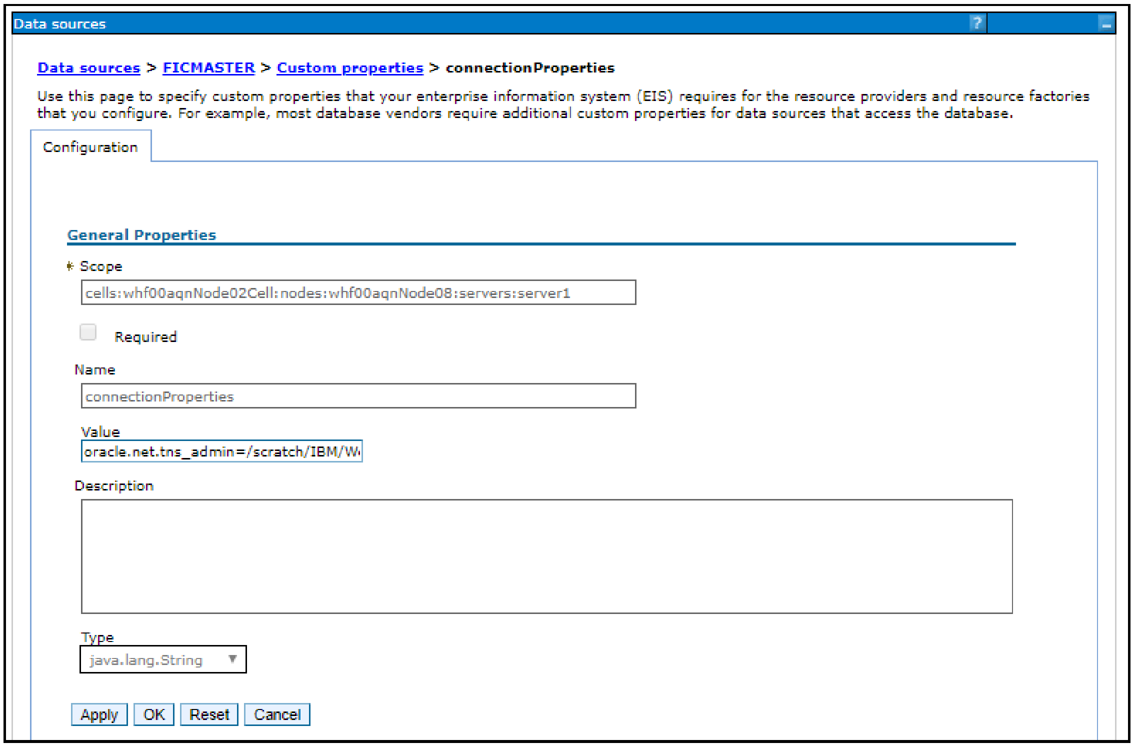
- Connection pool properties
- WebSphere Application Server data source properties
- Custom properties

Related Items

- JAAS - J2C authentication data

6. From the *Additional Properties* pane, click **Custom properties**.

7. Add "connectionProperties" with a value of `javax.net.ssl.trustStore=<wallet_locatioin>/cwallet.sso;javax.net.ssl.trustStoreType=SSO;oracle.net.ssl_version=1.2;oracle.net.ssl_server_dn_match=true; oracle.net.tns_admin=<path of network folder>;oracle.net.wallet_location=(SOURCE=(METHOD=file)(METHOD_DATA=(DIRECTORY=<wallet_locatioin>)))`



Data sources > FICMASTER > Custom properties > connectionProperties

Use this page to specify custom properties that your enterprise information system (EIS) requires for the resource providers and resource factories that you configure. For example, most database vendors require additional custom properties for data sources that access the database.

General Properties

* Scope: cells:whf00aqnNode02Cell:nodes:whf00aqnNode08:servers:server1

☐ Required

Name: connectionProperties

Value: oracle.net.tns_admin=/scratch/IBM/W

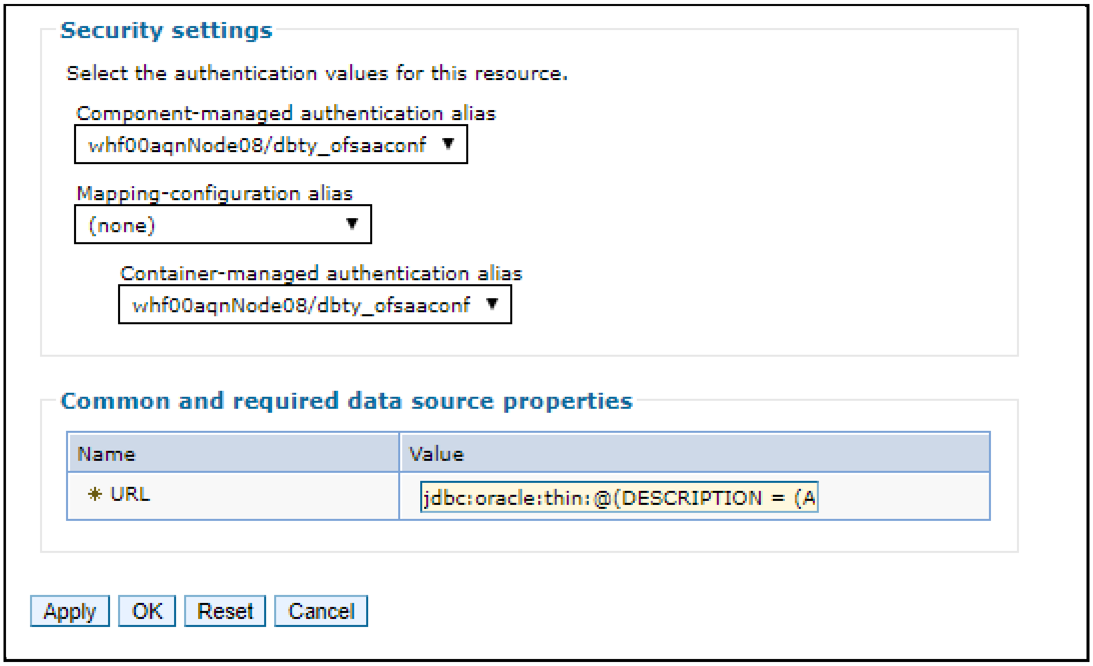
Description:

Type: java.lang.String

8. Click **OK** and return to the main Datasource configuration page. Scroll down to the bottom where the connection properties are displayed and update the **URL** to the SSL value.

For example,

```
jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS=(PROTOCOL=tcps)(HOST=db_host_na
me)(PORT=security_port))(CONNECT_DATA=(SERVICE_NAME=database_alias)))
```



Security settings

Select the authentication values for this resource.

Component-managed authentication alias: whf00aqnNode08/dbty_ofsaaconf

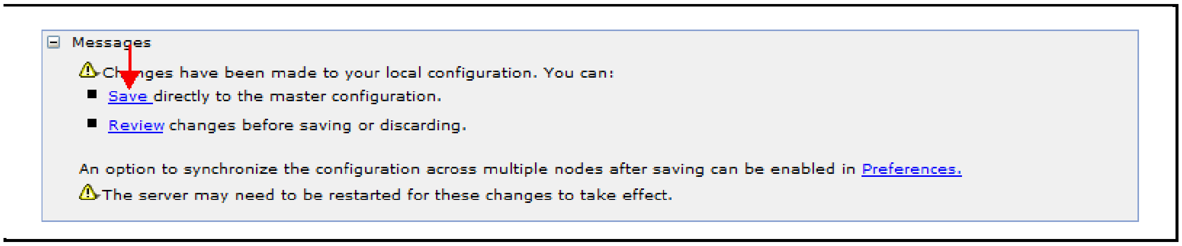
Mapping-configuration alias: (none)

Container-managed authentication alias: whf00aqnNode08/dbty_ofsaaconf

Common and required data source properties

Name	Value
* URL	jdbc:oracle:thin:@(DESCRIPTION = (A

9. Click **Save directly to the master configuration.**



Messages

⚠ Changes have been made to your local configuration. You can:

- Save directly to the master configuration.
- Review changes before saving or discarding.

An option to synchronize the configuration across multiple nodes after saving can be enabled in Preferences.

⚠ The server may need to be restarted for these changes to take effect.

10. Click **Test connection** to test the connection to Oracle server through secured port.

15.3 Generating EAR/WAR Files

Generate the application EAR/WAR file and redeploy the application onto your configured web application server. For more information on generating and deploying EAR/WAR file, refer to the *Post Installation Configuration* section in the Oracle Financial Services Advanced Analytical Applications Infrastructure Application Pack Installation and Configuration Guide.

15.4 Applying Major App Pack releases or new OFSAA Application Pack as Pack on Pack

In case it is required to apply Major App pack release, Maintenance Level release, one-off patch or new OFSAA Application Pack as pack on pack, perform the following instructions:

1. Keep webserver changes unchanged and shutdown the webserver.

2. Enquire with DBA Administrators to ensure Database is also running in TCP protocol normally on Non SSL port, say 1521.
3. Bring down all the OFSAA services.
4. Modify the existing jdbc connect string value in the column **JDBC_CONN_STR** of the tables AAI_DB_PROPERTY and DB_MASTER from the configuration schema. Update the values for all entries in the aforementioned tables as given:

   Syntax: `jdbc:oracle:thin:@<dbsrvhostname>:1521/<DBINSTANCE>`

   Example: `jdbc:oracle:thin:@dbsrvhostname.in.oracle.com:1521/DBAAIB`

5. Modify **DEFAULT_CONNECTION_URL** in the files `$FIC_HOME/conf/DynamicServices.xml` and $FIC_WEB_HOME/webroot/conf/DynamicServices.xml from the configuration schema to the following:

   Syntax: `jdbc:oracle:thin:@<dbsrvhostname>:1521/<DBINSTANCE>`

   Example: `jdbc:oracle:thin:@dbsrvhostname.in.oracle.com:1521/DBAAIB`

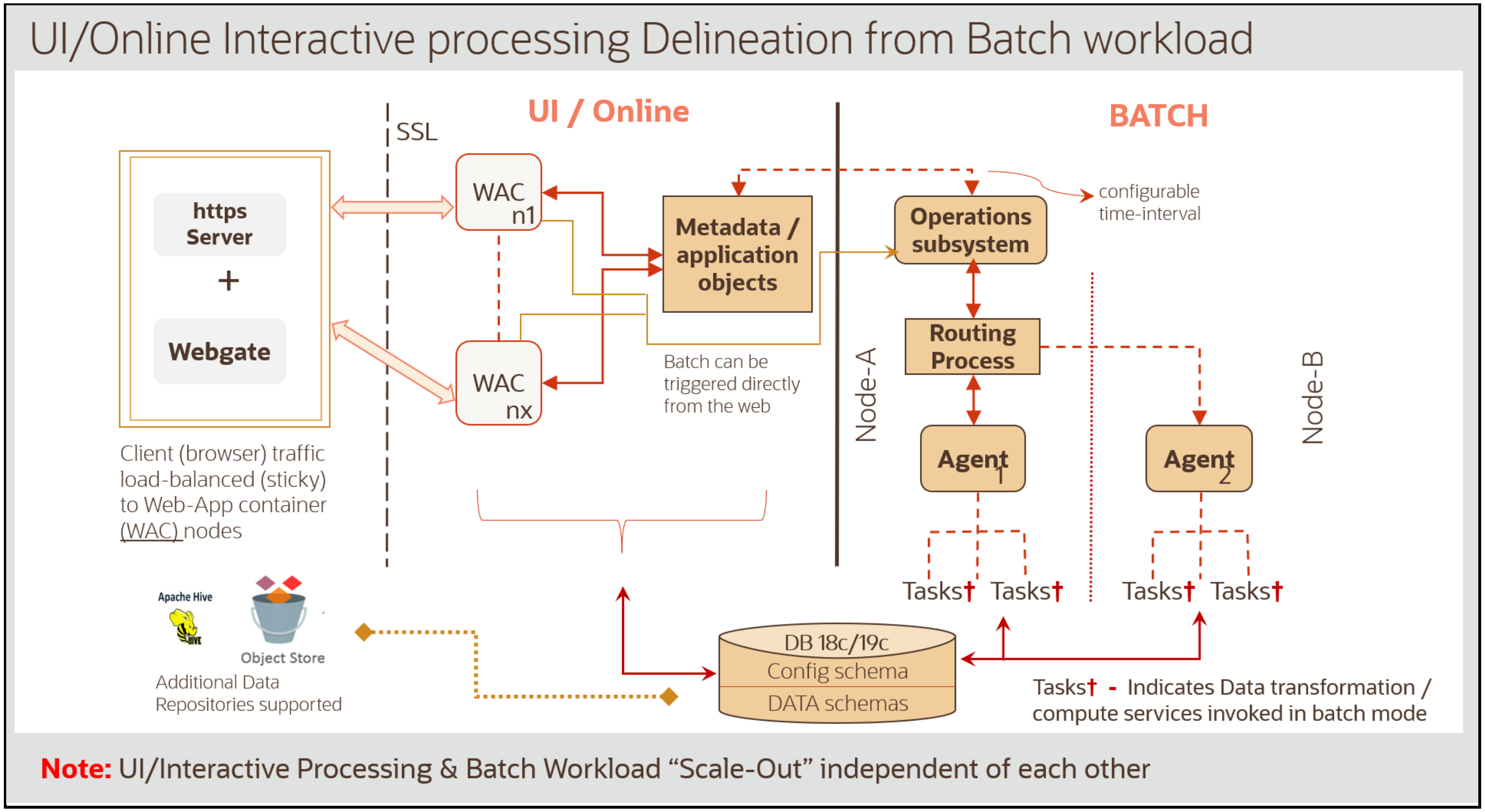
6. Once Installation are done successfully, bring back old JDBC URL to support TCPS, even for new Atomic and Sandbox if added due to Pack on Pack installation cases. See step 4 and step 5 for details on how to bring back old JDBC URL to support TCPS.
7. Execute the `.profile` and create EAR/WAR file. Then restart OFSAA Services and re-deploy onto your configured web application server.
8. Bring up webserver configure for Data Sources to connect new atomic, sandbox if added due to Pack on Pack installation cases via TCPS

15.5 Other Reference Documents

For information on Creating and Managing Oracle Wallet, see https://blogs.oracle.com/dev2dev/ssl-connection-to-oracle-db-using-jdbc,-tlsv12,-jks-or-oracle-wallets and https://blogs.oracle.com/weblogicserver/weblogic-jdbc-use-of-oracle-wallet-for-ssl

16 Appendix A – Distributed Activation Manager Deployment

Illustration of Distributed Activation Manager Deployment



UI/Online Interactive processing Delineation from Batch workload

UI / Online
BATCH
SSL
https Server
+
Webgate
WAC n1
WAC nx
Metadata / application objects
Operations subsystem
configurable time-interval
Routing Process
Node-A
Node-B
Agent 1
Agent 2
Batch can be triggered directly from the web
Client (browser) traffic load-balanced (sticky) to Web-App container (WAC) nodes
Tasks† Tasks†
Tasks† Tasks†
Apache Hive
Object Store
Additional Data Repositories supported
DB 18c/19c
Config schema
DATA schemas
Tasks† - Indicates Data transformation / compute services invoked in batch mode

Note: UI/Interactive Processing & Batch Workload “Scale-Out” independent of each other

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- Did you find any errors?
- Is the information clearly presented?
- Do you need more information? If so, where?
- Are the examples correct? Do you need more examples?
- What features did you like most about this manual?

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