OFS Analytical Applications Infrastructure Installation Guide

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## Document Control

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| 1.0            | July 2019     | - Created document to capture OFSAAI 8.0.7.2.0 Maintenance Level Release.  
- Updated [Installing EMF Studio and integrating with OFSAA](Doc 30048811). |
| 2.0            | August 2019   | Updated [Installing and Configuring EMF Studio Service](Doc 30144762) and [Configuring and Starting Data Studio for R](Doc 30144762) for default port information. |
| 3.0            | November 2019 | Updated [Installing and Configuring R Packages](Doc 30561491) for ORE and [Configuring and Starting Data Studio for R](Doc 30561491) for URL. |
| 4.0            | March 2020    | Added post installation step for database table aai_app_pack_b (Doc 30449762). |
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1 OFS AAI Release 8.0.7.2.0

OFS AAI 8.0.7.2.0 Maintenance Level (ML) includes all the bug fixes and minor enhancements done since the previous GA (General Availability) release, that is, 8.0.7.0.0.

This ML release of OFS AAI can be installed on a setup with any OFSAA 8.0.7.0.0 Application Pack.

1.1 Conventions and Acronyms

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<td>IR</td>
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<td>OFSAAI</td>
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<td>Atomic Schema</td>
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<td>Configuration Schema</td>
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1.2 Pre Installation Requirements

- You should have OFS AAI version 8.0.7.0.0 as the minimum patch set level.
- Ensure unlimited cryptographic policy for Java is enabled during the installation of OFS AAI 8.0.7.0.0. For more information, see the Enabling Unlimited Cryptographic Policy section from the OFS Analytical Applications Infrastructure Administration Guide.

**NOTE**
Do not enable unlimited cryptographic policy for Java if the Java versions in OFS AAI and the Web Application servers are higher than 7u171 for Java 7, and 8u161 for Java 8.

1.3 How to Apply This Maintenance Level Release?

Refer to the following instructions to install this patch set.

1. Login to [https://support.oracle.com/](https://support.oracle.com/) and search for 29920053 under the Patches & Updates tab.
2. Download the OFSAA 8.0.7.0.0 AAI ML RELEASE #2 archive file and copy it to your OFSAA server in Binary mode.

**NOTE**
There are different archive files for different operating systems such as AIX, Solaris, and RHEL/OEL.

3. Stop all the OFSAAI services. For more information, see the Starting/ Stopping Infrastructure Services section in the Oracle Financial Services Analytical Applications Infrastructure Installation & Configuration Guide 8.0.2.0.0.
4. Login to the OFSAA server as a non-root user and navigate to the $FIC_HOME folder.
5. Assign WRITE permission to the files/ folders such as commonscripts, EXEWebService, ficapp, ficweb, and ficdb by executing the command:
   ```
   chmod -R 775 *
   ```
6. If you have Unzip utility, skip to the next step or download the Unzip utility (OS specific) and copy it in Binary mode to the directory that is included in your PATH variable, typically $HOME path or directory in which you have copied the 8.0.7.2.0 ML.
   - Uncompress the unzip installer file using the command:
     ```
     uncompress unzip_<os>.Z
     ```
   **NOTE**
   If you notice an error message “uncompress: not found [No such file or directory]” when the package is not installed, contact your UNIX administrator.
   - Give EXECUTE permission to the utility using the command:
     ```
     chmod 751 unzip_<os>
For example, chmod 751 unzip_aix

7. Extract the contents of the 8.0.7.2.0 ML archive file using either of the following commands:
   unzip_<os> -a <name of the file to be unzipped>
   Or
   unzip -a <name of the file to be unzipped>
   
   **NOTE**  The above “-a” option is mandatory to unzip the archive file.  
   For example: For AIX operating system unzip_aix -a p29920053_80720_AIX64-5L.zip

8. Give EXECUTE permission to the ML patch installer script. Navigate to the path where the folder
   OFS_AAI exists and execute the command:
   chmod 755 OFSAAIUpdate.sh

9. Execute the following command:
   ./OFSSAAIUpdate.sh

10. Verify if the ML is applied successfully by checking the log file generated in OFS_AAI/logs
    folder. You can ignore ORA-00001 and ORA-02292 in the log file. In case of any other errors,
    contact Oracle Support Services.

   **NOTE**  In case of upgrade on Hive Infodom, you may encounter an
   exception "PL/SQL: ORA-00942: table or view does not exist".  
   You can ignore this error.

11. Post successful installation of the ML, perform the following steps:
    - Clear the application cache. Navigate to the following path depending on the configured web
      application server and delete the files.
        - Tomcat:
          <Tomcat installation folder>/work/Catalina/localhost/<Application name>/org/apache/jsp
        - WebLogic:
          <WebLogic installation location>/domains/<Domain name>/servers/<Server name>/tmp/_WL_user/<Application name>
        - WebSphere:
          <WebSphere installation directory>/AppServer/profiles/<Profile name>/temp/<Node name>/server1/<Application name>/.<.war file name>
    - Backup the database table aai_app_pack_b and update it by executing the following SQL query:
      
      UPDATE aai_app_pack_b
12. Delete the existing EAR/WAR file available in the folder $FIC_HOME/ficweb.

13. Install OFSAAIRunner package. This is an optional step and applicable only if you have installed ORE. For more information, see Installing OFSAAIRunner package with enhancements for OFS AAI 8.0.7.2.0.

14. Restart all the OFSAAI services. For more information, see the Starting/Stop Infrastructure Services section in the Oracle Financial Services Analytical Applications Infrastructure Installation & Configuration Guide 8.0.2.0.0.

15. Generate the application EAR/WAR file and redeploy the application onto your configured web application server. For more information on generating and deploying the EAR/WAR file, see the Post Installation Configurations section in the Oracle Financial Services Analytical Applications Infrastructure Installation & Configuration Guide 8.0.2.0.0.

```sql
SET v_version = '8.0.7.2.0'
WHERE v_app_pack_id = 'OFS_AAAI_PACK'
```
2 Additional Configurations

2.1 Installing EMF Studio and integrating with OFSAA

EMF Studio is browser-based workbench to create Models and publish to OFSAA. The integration allows for rapid creation and deployment of Models. The topics here provide details for the installation of EMF Studio and the configurations required to integrate it with OFSAA.

NOTE The integration of EMF with OFSAA works for both Java 7 and 8.

This chapter includes the following sections:

1. Knowing the Prerequisites
2. Installing and Configuring EMF Studio Service
3. Installing Rserve Manually
4. Configuring and Starting Data Studio for R
5. Installing and Configuring Python Package

2.1.1 Knowing the Prerequisites

The following are the prerequisites to install EMF Studio and integrate with OFSAA:

2.1.1.1 For R Package

1. OFSAA should be up and running. For OFSAA installation, see Chapters 1 - 6 in the OFS AAAI Applications Pack Installation Guide 8.0.2.0.0.
2. Data Studio should be installed in the OEL 7 box. R, R Serve and knitr R package should also be installed on the same box.
3. ORD 3.3.0 or standard R version 3.3.0 should be installed.

2.1.1.2 For Python Package

1. OFSAA must be up and running. For OFSAA installation, see Chapters 1 - 6 in the OFS AAAI Applications Pack Installation Guide 8.0.2.0.0.
2. Install Data Studio in the OEL 7 box.
3. Install the following libraries in the OEL 7 box where Data Studio is installed:
   - Python 2.7+ (Download link - https://www.python.org/download/releases/2.7/)
   - cx-Oracle 7.0.0+ (Download link - https://pypi.org/project/cx_Oracle/)
   - numpy 1.15.4 (Download link - https://pypi.org/project/numpy/)
   - scikit-learn 0.20.0 (Download link - https://pypi.org/project/scikit-learn/0.20.0/)
   - scipy 1.1.0 (Download link - https://pypi.org/project/scipy/)
   - pandas 0.17.1 (Download link - https://pypi.org/project/pandas/)
2.1.2 Installing and Configuring EMF Studio Service

The following is the procedure to install and configure EMF Studio Service:

1. Copy the nextgenemf directory from `<OFSA installation directory>/OFS_AAI/fichome/utility/emfstudio/nextgenemf` to your virtual machine (VM).

2. Configure JNDI for config and atomic schema in the `jetty-env.xml` and `web.xml` files from the `nextgenemf/lib/webapp/WEB-INF/` directory as shown in the following:
   - `jetty-env.xml`
     ```xml
     <New id="FICMASTER" class="org.eclipse.jetty.plus.jndi.Resource">
       <Arg><Ref refid="wac"/></Arg>
       <Arg>jdbc/FICMASTER</Arg>
     </New>
     <New class="oracle.jdbc.pool.OracleConnectionPoolDataSource">
       <Set name="DriverType">thin</Set>
       <Set name="URL">DB URL with host port and service name/SID</Set>
       <Set name="User">DB user name</Set>
       <Set name="Password">DB password</Set>
     </New>
     </New>
     </Arg>
   - `web.xml`
     ```xml
     <resource-ref>
       <res-ref-name>jdbc/EMFPROD</res-ref-name>
       <res-type>javax.sql.DataSource</res-type>
       <res-auth>EMFPROD</res-auth>
       <resource-ref>
     </resource-ref>
     </New>
     </Arg>

3. Set environment variable `EMF_HOME` to point to the `nextgenemf` directory.

4. Copy all files from OFSAA `$FIC_HOME/conf` directory to `$EMF_HOME/conf` directory.

5. Open `$EMF_HOME/conf/datastudio.properties` file and configure the data studio URL in the property `DATASTUDIO_URL`. The format is `https://<IP_Address>:7008` and `7008` is the default port for EMF Studio. Copy `OJDBC.jar` file from the installed database to `$EMF_HOME/lib` directory.

6. Change directory to `$EMF_HOME/bin`. Run the command `nohup ./startup.sh &` to start the installation.
2.1.3 Installing Rserve Manually

This topic explains how to install Rserve manually on a host. Installing Rserve on a host will expose the local R installation on that host to the network, so that remote Rserve clients such as R interpreter can use the local R installation.

From an architectural point of view, the R interpreter will always connect to an Rserve instance and run the R code remotely. The interpreter needs to be configured with the hostname or IP and the port of the remote instance (where Rserve is running). When the interpreter is initialized, it will try to connect to the remote instance.

The following sections provide details for installing Rserve:

1. Prerequisites
2. Installing Rserve
3. Configuring Rserve
4. Starting Rserve
5. Adding the certificate to the keystore
6. Installing Additional Libraries

2.1.3.1 Prerequisites

There are dependencies that have to be installed first. This topic assumes that Oracle Linux 7.x and Oracle JDK 8 were validated against Oracle Linux 7.4 and Oracle JDK 8u161. You must have root access for some of the steps in this topic. The packages that will be installed as instructed in this topic will require about 800MB of disk space. The following subsections provide more details for prerequisites:

1. Installing Oracle R Distribution
2. Knowing Install Dependencies
3. Installing ORE Client

2.1.3.1.1 Installing Oracle R Distribution

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

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

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

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

2.1.3.1.2 Knowing Install Dependencies

Rserve has a couple of dependencies to make it run correctly. Mostly, you will require openssl-devel for SSL support. Depending on the libraries that you have installed, you might have more dependencies. For example, to let knitr send plots as base64 encoded strings, you will require pango-devel.

We recommend the installation of the following packages:

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

2.1.3.1.3 Installing ORE Client

If you want to connect to ORE through Rserve, you will have to install the corresponding client libraries. This installation is optional. To install, see the documentation at https://docs.oracle.com/cd/E83411_01/OREAD/installing-ORE-client.htm#OREAD167 from the ORE project.

2.1.3.2 Installing Rserve

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

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

If you are behind a proxy, you have to make sure that R is communicated about it when you start the R Shell.

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

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

2.1.3.3 Configuring Rserve

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

```bash
  auth required
  plaintext disabled
  pwdfile /path/to/Rserve.pwd
  remote enable
  switch.qap.tls enable
  tls.port 6311
  qap disable
```
interactive no
rsa.key /path/to/server.key
tls.key /path/to/server.key
tls.cert /path/to/server.crt
```
This configuration tells Rserve to encrypt the communication with TLS and listen for incoming connections on port **6311**. The Rserve.pwd file appears as shown in the following:
```
exampleuser $5baa61e4c9b93f3f0682250b6cf8331b7ee68fd8
```
The file contains one line per user, where the first part is the username and the second part is the password. The password can either be plain text or a **MD5/SHA1** hash. In this example, the password **password** is hashed with SHA1. If you use hashed passwords, the password string has to start with a `'$'` sign.

The rsa.key, tls.key and tls.cert settings are pointing to the private key files you require for TLS. These keys can be generated using the **openssl** command line tool as shown in the following example:
```
bash
$ openssl genrsa -out server.key 2048
$ openssl req -new -key server.key -out server.csr
$ openssl x509 -req -days 265 -in server.csr -signkey server.key -out server.crt
```
The preceding sample is an example and for a production deployment, you should use relevant certificates. You can find more information about configuration options on the Rserve homepage - [https://www.rforge.net/Rserve/doc.html](https://www.rforge.net/Rserve/doc.html).

### 2.1.3.4 Adding the Certificate to the Keystore

The certificates that were generated in the previous step to configure Rserve to encrypt the communication has to be added to the Java keystore in order to be used by the R interpreter. The add procedure depends on your setup. However, the following is an example of how to add the certificate to a keystore:
```
bash
$ $JAVA_HOME/bin/keytool -import -alias rserve -file /path/to/server.crt -keystore /path/to/keystore -storepass storepassword -noprompt
```

It is essential that the certificate is imported correctly and the correct keystore is used by the Java process you use to start the R interpreter. Otherwise, you will get SSL related exceptions when the interpreter tries to connect to Rserve.

You can specify the keystore when starting the R interpreter as shown in the following example:
```
bash
$ JAVA_HOME/bin/java -Djavax.net.ssl.trustStore=/path/to/keystore -Djavax.net.ssl.trustStorePassword=storepassword <additional parameters>

2.1.3.5 Installing Additional Libraries

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

For example:
```
```
```R
> install.packages('knitr')
```
```

2.1.4 Configuring and Starting Data Studio for R

Perform the instructions in this section to configure and start Data Studio for R:

1. Install and configure RServer. See section Installing Rserve Manually, for more information.
2. Set environment variable RSERVE_PATH= to the directory where R Serve configuration files are located.
3. Copy the datasetudio_distribution directory from <OFSA installation directory>/OFS_AAI/fichome/utility/emfstudio/datastudio_distribution to your virtual machine (VM).
4. Change directory to datasetudio_distribution/datastudio/server/conf. Open application.yml and configure the following attributes:
   a. ofsaaUrl – replace ofsaa host, port and the context name in the URL.
   b. metaserviceUrl – replace the placeholders with host and port to the values of the machine where the EMF service is up and running.
5. Change directory to datasetudio_distribution/datastudio/interpreter-conf. Open emfr.json and emfore.json files. Configure the following attributes in both the files:
   - URL - configure to point to EMF Studio services URL. The format is https://<IP_Address>:8080/nextgenemf, where and 8080 is the default port for EMF Studio Service.
   - Give 755 access to datasetudio_distribution/datastudio/interpreter-server directory.

In addition to the preceding attributes, you can configure for the following optional attributes:
   - emf_publish - set this flag to Y to configure the publish procedure to make an entry into the old EMF system, or set it to N to not make an entry.
   - http_proxy - configure this value if you want to install any R/ORE package from the FCC Datastudio Notebook.
   - https_proxy - configure this value if you want to install any R/ORE package from the FCC Datastudio Notebook.
   - repo_cran - configure this value to the cran repository path to download the packages.
2.1.5 Installing and Configuring Python Package

This section provides information to install and configure the Python package. The following is the procedure:

1. Copy the OFSAEmf-0.0.2.tar.gz file from the directory `<OFSA installation directory>/OFS_AAI/fichome/utility/emfstudio/nextgenemf/python` to your virtual machine (VM) where EMF Studio is installed. For more information about EMF Studio installation, see Configuring and Starting EMF Studio.

2. Extract (unzip) OFSAEmf-0.0.2.tar.gz.

3. Open command prompt and change directory to open OFSAEmf-0.0.2.

4. Run `install setup.py` command to install the Python package.

5. Change directory to `datastudio_distribution/datastudio/interpreter-conf`. Open `emfpy.json` file. Configure the following attributes in the file:
   - URL - configure to point to EMF Studio services URL.
   - Give 755 access to `datastudio_distribution/datastudio/interpreter-server` directory.

6. Change directory to `datastudio_distribution/datastudio/bin` and run `datastudio-starter` in bash mode.

2.1.6 Installing and Configuring R Packages

This section provides information to install and configure the R packages. The following is the procedure:

1. Copy the `emfore_1.0.0.tar.gz` and `emfr_1.0.0.tar.gz` files from the directory `<OFSA installation directory>/OFS_AAI/fichome/utility/emfstudio/emf_r_package` to your virtual machine (VM) where EMF Studio is installed. For more information about EMF Studio installation, see Configuring and Starting EMF Studio.

2. Run `R CMD INSTALL emfore_1.0.0.tar.gz` with root user.

3. Run `R CMD INSTALL emfr_1.0.0.tar.gz` with root user.

4. Install Oracle R Enterprise (ORE) Client and supporting packages from https://www.oracle.com/database/technologies/r-enterprise-downloads.html. If you do not have the license for ORE, install ROracle and Oracle Database Interface (DBI) from The Comprehensive R Archive Network (CRAN) available on https://cran.r-project.org/package=ROracle.
2.2 Installing OFSAAIRunner Package with Enhancements for OFS AAI 8.0.7.2.0

NOTE

1. This is a post installation configuration and is applicable if you have installed Oracle R Enterprise (ORE) for Oracle Financial Services Enterprise Modeling (OFS EMF) Application.

2. This configuration is not applicable for Tomcat.

If OFS Enterprise Modeling is licensed and enabled in your OFSAA instance, uninstall OFSAAIRunner package and reinstall the latest available OFSAAIRunner package. For details on uninstallation and reinstallation, see Configuring Oracle R distribution and Oracle R Enterprise (ORE) in the Oracle Financial Services Analytical Applications Infrastructure Installation & Configuration Guide 8.0.2.0.0.