# APM Connect

# Contents

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# Chapter 1

# Overview

**Topics:**

# About APM Connect

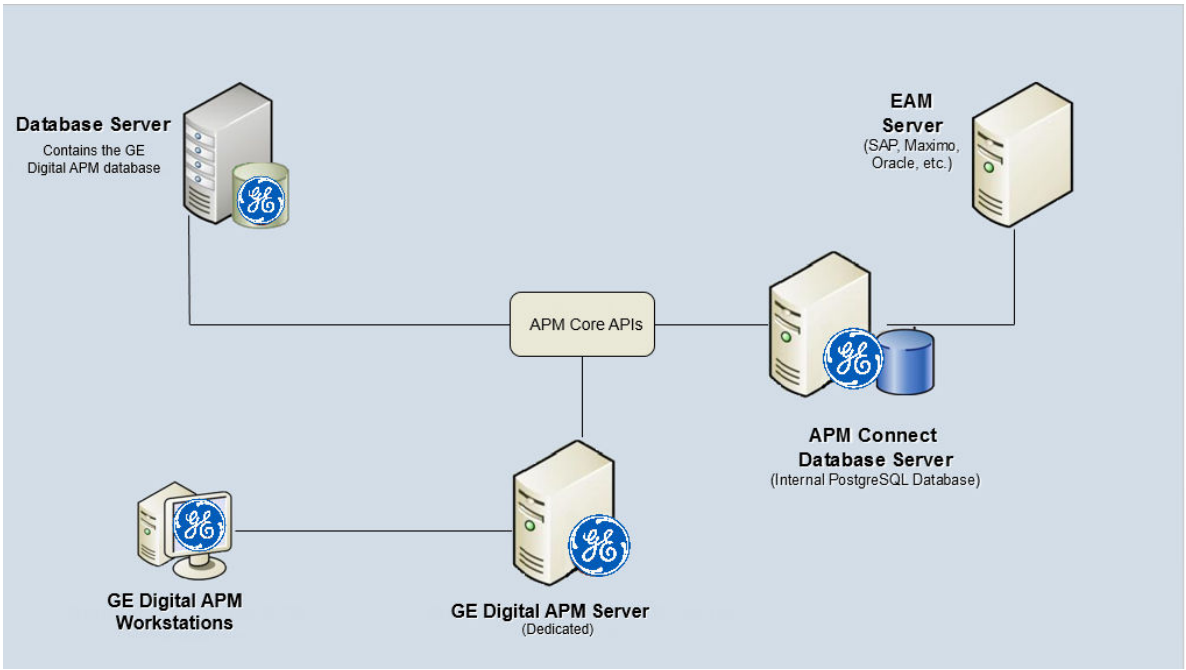
The APM Connect system provides the means to load data from the Industrial Internet of Things (IIOT) into GE Digital APM.

The system uses data loaders and adapters to establish a data flow between GE Digital APM and EAM systems, Field Service Management systems, and other assets. The APM Connect context file defines the communication path between the IIOT and GE Digital APM.

### System Architecture for EAM Adapters

Single Server Configuration (Recommended)

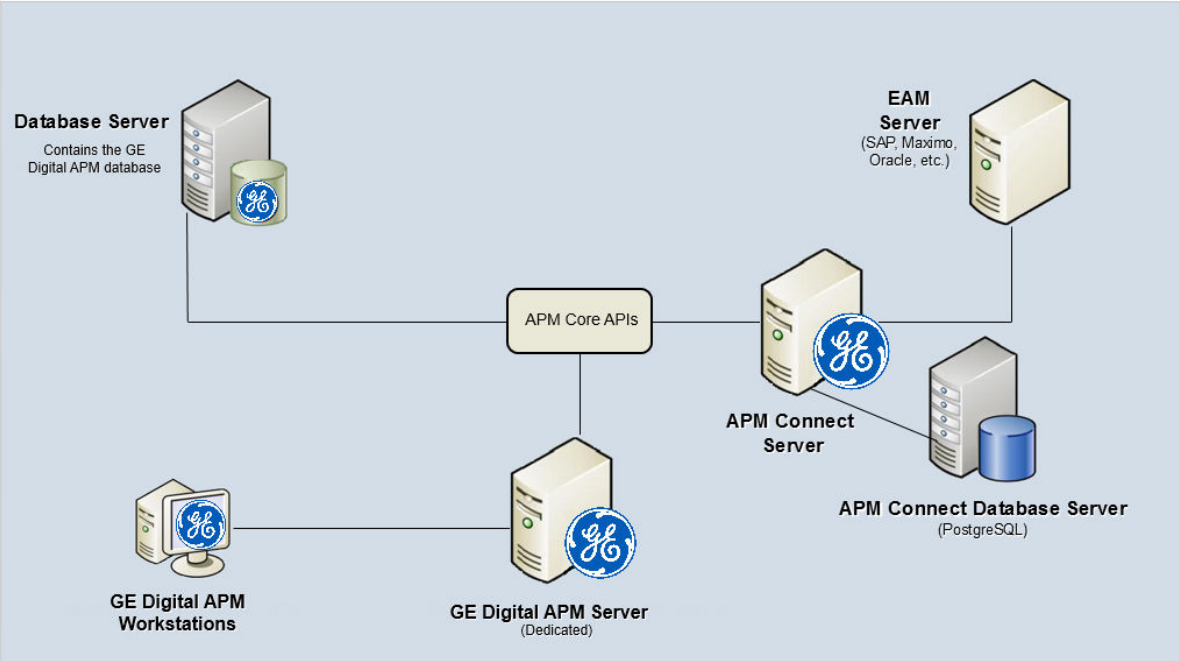
The single server configuration is the simplest way to configure APM Connect. However, it does include an embedded database. The following image depicts this configuration.




### External Database Configuration

Many organizations choose to separate their databases. It is possible to install the intermediate repository database on an external server, and to keep the APM Connect System database on a different server. The following image depicts this configuration.

**Note:** The external configuration will affect performance. The single server configuration results in faster performance.




# About Time Zone Data

GE Digital APM stores the dates and times of transactions in Universal Coordinated Time (UTC) format. This enables the data to flow through the system in a single time zone format. APM Connect supports the time zones defined in https://docs.microsoft.com/en-us/previous-versions/windows/embedded/gg154758(v=winembedded.80).

To provide information with the time stamp relevant to your operations, the system converts UTC to your time zone by using the time zone information configured in your user definition.

**Important:** If you change the time zone information configured in your user definition, all the records will reflect the new time zone.

The following sections contain the time zone considerations relevant to specific systems.

### Maximo

GE Digital APM stores the time stamp associated with the data extracted from Maximo in UTC and displays the time stamp based on your configured time zone.

### SAP

SAP provides a set of baseline time zone codes, which contain most of the standard time zones across the world. SAP also provides the ability for administrators to define their own custom time zone, as needed. Before you use a customized time zone, you must configure the timezone_control table in APM Connect to include the customized time zone.

SAP defines two types of time zones:

- **System:** This time zone is based on SAP Application Server Operating System and is derived from the context file. You cannot modify this type of time zone.
- **User:** This time zone is based on the user who created the SAP record. You can modify and store this type of time zone in the SAP user interface.

GE Digital APM stores the time stamp associated with the data extracted from SAP in UTC and displays the time stamp based on the time zone configured for the user who created the SAP record.

**Note:** If the data extracted from SAP contains only the date, then GE Digital APM will assign the time 00:00:00 and adjust the assigned time with the SAP system or user time zone. This may lead to a date mismatch when you choose to display the data in GE Digital APM. To prevent this, GE Digital APM stores the assigned reference time stamp as a string within the data, which is hidden by default. If you need this information, you can configure GE Digital APM to display the data.

# Support for Multiple Source Systems

Whether in a cloud environment or an on-premise installation, APM Connect enables you to connect multiple source systems to a single GE Digital APM system.

There are occasions when you need to connect multiple source systems to a single GE Digital APM system. For example, when your company acquires another company, rather than immediately attempting to merge two systems together, you need to keep the systems running separately but want to implement strategies centrally. The two systems might be the same type or of different types. You can configure APM Connect to handle either scenario.

The steps to configure these scenarios is similar to configuring a single system; you repeat the steps that define the EAM system records and, after creating the intermediate repository for the first system, run a job that adds the other systems to the intermediate repository with any required extraction filters.

### Multiple Source Systems of the Same Type

This scenario is most useful when you all systems you need to support are the same type. The context file configuration for each source system will look the same for the target GE Digital APM and APM Connect system for all the source systems. The unique parts of the context file are those that describe the particulars of the source system, for example, the system ID and filters used.

### Multiple Source Systems of Different Types

Use this scenario if you need to support multiple disparate systems, for example, an SAP and a Maximo system. In this case, you will need to configure context files for each different type of source system, each pointing to the same target GE Digital APM and APM Connect system. This does not preclude having multiple systems of a specific type (for example, one SAP, one ServiceMax, and two Maximo).

### Considerations

There are some things to consider when connecting multiple source systems to a single GE Digital APM with APM Connect:

- You must make sure that each source system has a unique system ID.
- The logs will contain the messages from all of the source systems. Each message will identify the source system using the system ID.
- Some source system types have unique requirements that must be performed for each source system. For example, you must run the Static Data job for all SAP systems.
- Each source system in a cloud environment will need an intermediate repository, even though they are communicating with a single tenant.
- Do not schedule running the same adapter job types (for example, functional location extractions) simultaneously from different source systems.

# Support for Multiple Culture Settings from a Single Source System

APM Connect enables you to send data to GE Digital APM from a single source system that supports plants using different language or extraction requirements.

**Important:** This feature is not supported for Technical Characteristics, Work Management, Asset Criticality Analysis, Asset Strategy Management, or Asset Strategy Implementation.

Globalization has increased the need to improve management of assets in different culture settings. Your solution may involve including these new plants in a single source system that communicates with GE Digital APM but requires the data to be presented to the user in their native language. You can accomplish this by configuring APM Connect so that the plants that require specific languages or extractions appear to be different source systems, one for each language or extraction requirement. This capability provides a better user experience for all users of GE Digital APM regardless of their location.

A key advantage of this support is that you can combine your source systems and then configure APM Connect to extract the data correctly.

### Considerations

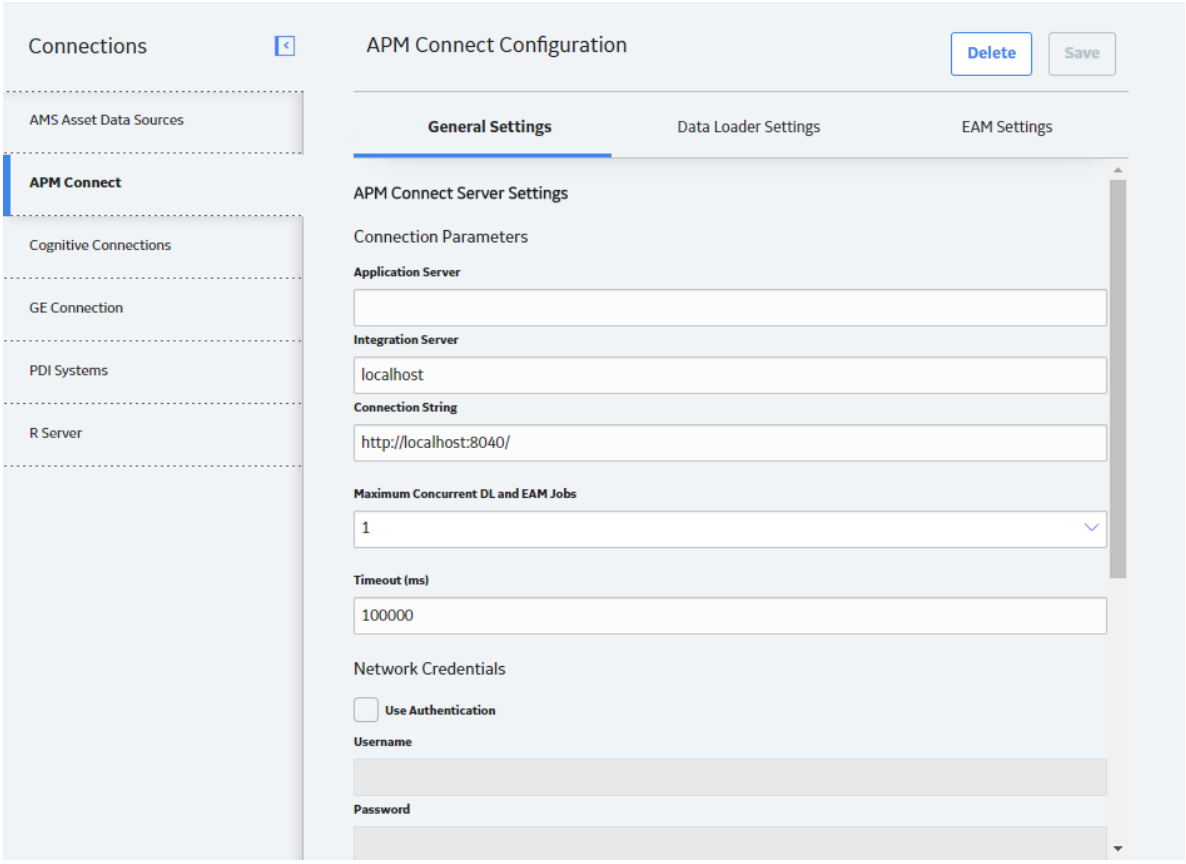
- The user defined in the source system that communicates with GE Digital APM must use the same decimal notation.
- You must have unique system IDs and the correct language parameter value or extraction requirements for each plant.
- You must configure filters to make sure that the data is routed correctly to the specific location.

# Access the APM Connect Page

### Procedure

In the module navigation menu, select **Admin** > **Operations Manager** > **Connections**., and then select **APM Connect**.

The **APM Connect** workspace appears.



# Chapter 2

# Deployment

**Topics:**

- Access the APM Connect Administration Center
- Change the APM Connect Administration Center User Password
- Create a Service Account User
- Uninstall APM Connect

# About the APM Connect Installation Package

GE Digital APM creates and delivers an installation package that provides the files and folders needed for a successful implementation of APM Connect. This topic describes what may be contained in your installation package based on your requirements.

### Contents of the Installation Package

The installation package contains the following folders:

**UDLP - EAM On Premise 2.7.0**

Contains the Job Packages for the On Premise Installation.

**APM Connect Base 2.0.0**

Contains the APM Connect Base.

**APM Connect Studio 2.0.0**

Contains the Developer Workbench on the Procurement of License.

# Upgrade the APM Connect Base to V2.0.0

### About This Task

The following table outlines the steps that you must complete to upgrade this module to V2.0.0.

These tasks may be completed by multiple people in your organization. However, we recommend that the tasks be completed in the order in which they are listed.

**Note:** As of the version of APM Connect released in the first quarter of 2019, you must keep these considerations in mind:

- Because of changes to the Check Connection function, the CMMS_ID and the System Name in the EAM System record must be the same. Before upgrading, make sure you update the EAM System record so these values match.
- If you are using multiple cultures from a single source system, existing data must be updated before you upgrade.

### Procedure

Upgrade from any version V1.0.0 through V1.0.3

1. Uninstall APM Connect.
2. Complete the steps to deploy the APM Connect Base for the first time.

# Deploy the APM Connect Base for the First Time

The topics outline the steps that you must complete to deploy and configure this module for the first time. These instructions assume that you have completed the steps for deploying the basic GE Digital APM system architecture.

### About This Task

These tasks may be completed by multiple people in your organization. We recommend, however, that the tasks be completed in the order in which they are listed.

**Note:** If you are deploying this module in APM Now, before you begin completing these tasks, review the system requirements for this module to identify the supported features for this module in APM Now.

### Next Steps

After deploying the APM Connect Base, deploy any adapters you need.

# Run the APM Connect Installer

### Before You Begin

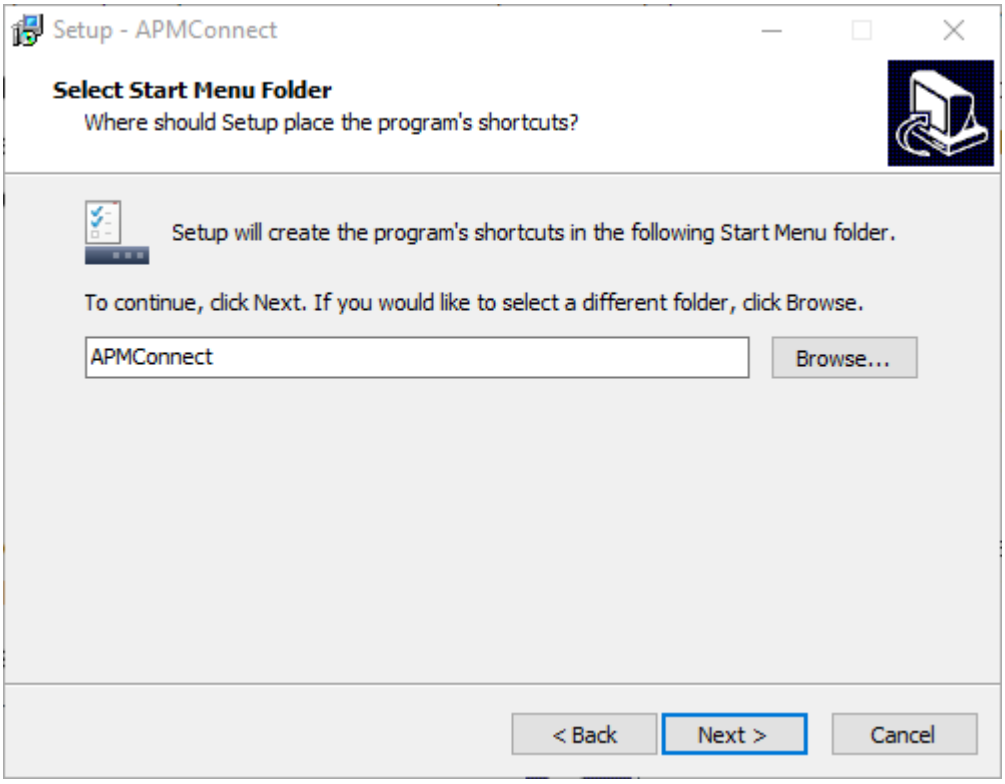
Before you can run the APM Connect Installer, you must:

- Ensure that your system meets the APM Connect system requirements.
- Access the APM Connect installation package.
- For SAP integrations, download the SAP Java Connector Files (SAP JCO) from the SAP marketplace.

### Procedure

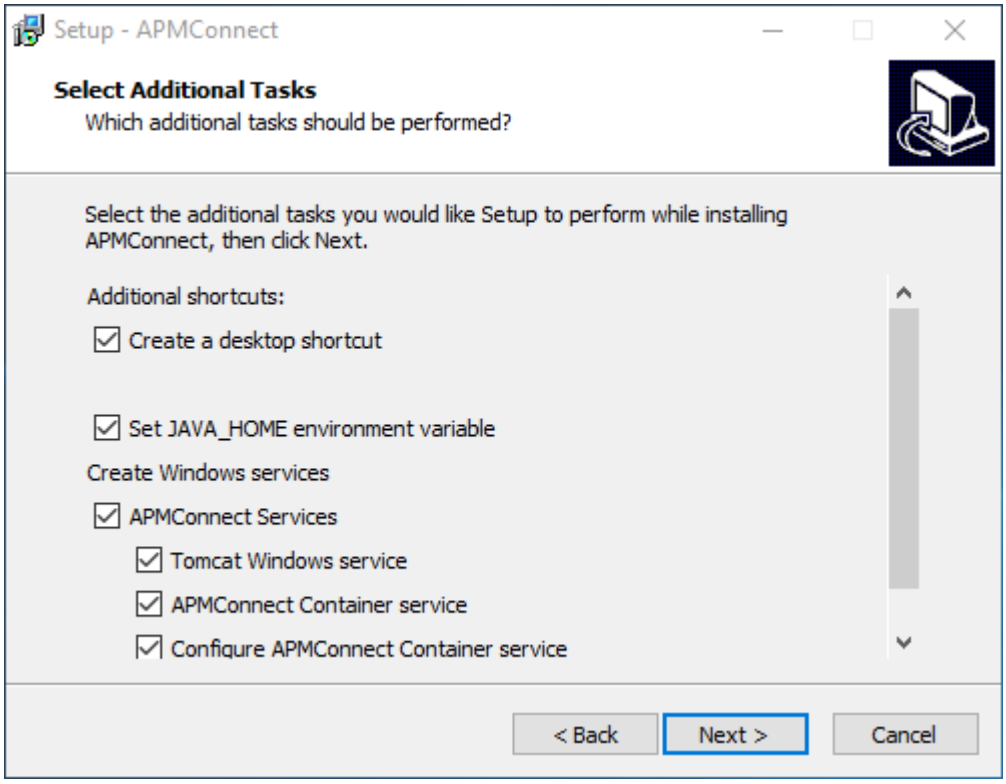
1. On your APM Connect server, access the APM Connect installation package, navigate the Installer folder, and then open the package.
2. Double-click the file **APMConnect-Base.exe**.
3. On the message that asks if you want the installer to make changes to your machine, select **Yes**.
4. In the **Setup - APM Connect** window, select **Next**.
5. In the **Select Destination Location** window, select the destination to which you want to save the software by doing one of the following:
   - To select the default location (`C:\APMConnect`), just select **Next**.
   - To use a different location, navigate to the folder you want to use, select **OK**, and then select **Next**.
6. In the **Select Components** window, select the components to you want to install, and then select **Next**.
   - **Install Oracle Java JDK 1.8 (uncheck if java already installed)**: If Java JDK 1.8 is already installed on your machine, clear the check box.
   - **Install PostgreSQL (required unless using external database)**: If you are using an external database configuration, clear the check box.
   - **Install APM Connect Container (required unless already installed)**: If you have previously installed the APM Connect Container, clear the check box.
7. Select **Next**.

   The screen appears.




8. In the **Select Start Menu Folder**, select the folder where the Start Menu folder is saved by doing one of the following :
   - To select the default folder (APMConnect), select **Next**.
   - Navigate to the folder to which you want to save the Start Folder, select **Ok**, and then select **Next**.

   The **Select Additional Tasks** screen appears.




9. In the **Select Additional Tasks** window, select any additional tasks the installer should perform based on your APM Connect and the APM Connect components you are deploying, and then select **Next**.
   - **Create a desktop shortcut**: If you do not want to create a shortcut on your desktop, clear the box.
   - **Set JAVA_HOME environment variable**: If Java is already installed, and an environment variable does not need to be created, clear the check box.
   - **APMConnect Services**: If the APM Connect Services do not need to be installed, clear the check box.
   - **Tomcat Windows service**: If the Tomcat Windows service does not need to be created, clear the check box.
   - **APMConnect Container service**: If you don't want to install the APM Connect Container service, clear the check box.
   - **Configure APMConnect Container service**: If you don't want to configure the APM Connect Container service, clear the check box.
   - **Install** APM Connect **Container service SAP JCO driver software**: If your source system is SAP, select this check box.
10. Select **Next**.
11. In the **Ready to Install** window, review the items to be installed, and then select **Install**.

    If you selected **Install APM Connect Container service SAP JCO driver software** in the previous window, the **Select the SAP JCO Driver Location** window appears.

    **Note:** If you did not select **Install APM Connect Container service SAP JCO driver software**, the **Select the Job Location** screen appears, and you can proceed to Step 13.

SAP JCO driver installation:

12. **Optional:** In the **Select the SAP JCO Driver Location** window, in the **SAP Bundle** box, specify the location of the file **sapjco3.jar**, which is part of the SAP Java Connector Files (SAP JCO) that you downloaded from the SAP marketplace.
    - To select the default location (`C:\APMConnect\Downloaded Jobs Package`), select **Next**.

- To select a different location, select **Browse...**, navigate to the location where the jobs package is located, select **OK**, and then select **Next**.

**Note:** The jobs package is not part of the APM Connect Installation package. Instead, you will receive it as a separate artifact (for example, download from a designated ftp site).

APM Connect set up:

13. In the **Select the APMConnect License file** window, select the folder that contains the APMConnect license.
    - To select the default location (`C:\APMConnect\license`), select **Next**.
    - To select another location, select **Browse...**, navigate and select the folder that contains the license, select **Ok**, and then select **Next**.
14. In the **APMConnect Server Information** window, in the **Hostname:** box, enter the name of your APM Connect server, and then select **Next**.

After the progress bar indicates that the APM Connect installer is finishing installation, the Java SE Development Kit installer starts.

Java SDK setup:

15. In the **Java SE Development Kit <JAVA_VERSION_NUMBER> - Setup** window, select **Next**.
16. In the **Select optional features to install** window, select **Next**.

    The Java installation progress bar appears. the screen appears.
17. When the progress bar indicates that the process is complete, in the **Destination Folder** window, select **Next** to install Java in the default location.

    **Important:** These instructions assume that Java is installed in the default location.
18. After the progress bar indicates that the installation is complete, in the **Successfully Installed Java SE Development Kit <JAVA_VERSION_NUMBER>** window, select **Close**.

    Java is installed.

**Tip:** If an error appears on the command prompt window, refer to creating Java environment variables.

19. In the command prompt, press any key to continue.
20. In the **Setup** window, select **OK**.

PostgreSQL setup:

21. In the **Setup - PostgreSQL** window, select **Next**.
22. In the **Installation Directory** window, select the location to install PostgreSQL.
    - If you are satisfied with the default location (`C:\Program Files\PostgreSQL\9.6`), select **Next**.
    - If you want to change the location where the software will be installed, select the  button, navigate to the location where you want to install PostgreSQL for APM Connect, and then select **Next**.
23. In the **Data Directory** window, select **Next**.

    The **Password** screen appears.
24. In the **Password** window, in the **Password** , and in the **Retype password** box, enter a password, and then select **Next**.

    **Tip:** This password will be used as a service account for PostgreSQL, and is needed in later configuration. Be sure to record it. Additionally, this documentation assumes admin as the password, and uses it in subsequent default configurations.
25. Select **Next**.
26. In the **Port** window, specify the port number. If you are satisfied with the default port,
    - To select the default port (5432) select **Next**.

- In the **Port** box, enter the port on which you prefer the server to listen, and then select **Next**.

  **Tip:** The port number is needed in later configuration. Be sure to record it. Additionally, these instructions and all subsequent instructions assume that the default port 5432 is used.

27. In the **Advanced Options** window, select **Next**.
28. In the **Ready to Install** window, Select **Next**.

    An installation progress bar appears. screen appears.
29. After the installation bar indicates that the installation is complete, in the **Completing the PostgreSQL Setup Wizard** window, clear the **Stack Builder may be used to download and install additional tools, drivers and applications to complement your PostgreSQL installation** check box, and then select **Finish**.

Complete setup:

**Note:** If you have selected the installation of APM Connect Container service or the SAPJCO driver software , the **Administrator: Windows Power Shell** and **Administrator: Karaf** windows appear. Installation progress may not be visible on the screen for 2-3 minutes. During this time, do not press any key or close the windows.

30. In the **Completing the APM Connect Setup Wizard** window, make sure **Yes, restart the computer now** is selected, and then select **Finish**.

    The APM Connect installer has completed its operations, and the machine should restart automatically.
31. **Optional:** If the machine does not do so automatically, restart your machine.

# Configure APM Connect Server to Run Talend Administration Center (TAC) Jobs after Server Restart

### About This Task

Use this procedure to configure the APM Connect server if you want to ensure that the APM Connect jobs run automatically after the server is restarted for maintenance activity.

### Procedure

1. On the APM Connect server, go to the folder `<root:>\APMConnect\`.
2. Create a folder `JobWatcher`.
3. Create files named `APMC_Service.properties` and `joblist.csv` in the `<root:>\APMConnect\JobWatcher` folder according to the details given below.

   Enter the parameters in the `APMC_Service.properties` file as shown in the example below:

| Parameter | Description |
|---|---|
| JOB_LIST=C:/APMConnect/JobWatcher/joblist.csv | Job list to monitor |
| TAC_PWD=XXXXX | TAC password |
| TAC_ADMIN=abc.xyz@ge.com | TAC user |
| HOSTNAME=roaperflabvm3.meridium.com | TAC hostname |
| LOCALUSER=Administrator | System user |

   Enter the list of jobs that need to be triggered if not running in the `joblist.csv` file.

4. Navigate to the folder containing the updated jobs package and copy the `jobWatcher.zip` file.
5. On your APM Connect server, navigate to `<root:>\APMConnect-jobMonitor` and paste the `jobWatcher.zip` file.
6. Extract the contents of the `jobWatcher.zip` file.
7. Create a task JobWatcher_APMConnect in Windows Task Scheduler, and perform the following actions:

   a) Create a trigger that runs at startup, and another that runs on a daily schedule.

      **Note:** You can configure both triggers to repeat the task every five minutes indefinitely.

   b) Create an action to start a program. Browse for the `jobWatcher_run.bat` batch file.

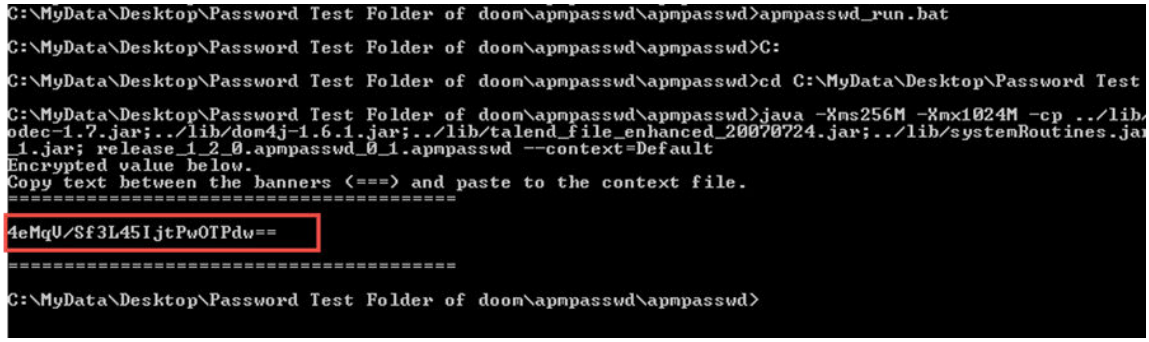
# Encrypt Parameters

Parameters in the context file are not encrypted by default, which results in values being transmitted in clear text over the network. However, you can manually encrypt any parameter manually.

### Procedure

1. On the machine on which you installed APM Connect, access the file `apmpasswd.zip`, and unzip it.
2. Open the `EncryptString` folder, and then run `apmpasswd_run.bat`.

   Command prompt opens, and then the **Talend Open Studio** window appears.
3. Enter the parameter value you want to encrypt in the **Enter the text to be encrypted:** box, and then select **OK**.
4. In the command prompt, copy the text between the banners that was generated.




5. Open the context file.
6. In the parameter you want to encrypt, paste the generated text.
7. In the parameter start tag, add `encrypted="true" algorithm="aes128"`, as shown in the following image:

```
<?xml version="1.0" encoding="utf-8"?>
<!--
This file contains all the possible filter parameters so that one file is maintained as a config file f
Based on the context used in the job, the parameters are loaded.
-->
<configuration>
    <IR_PASSWORD encrypted="true" algorithm="aes128">4eMqV/Sf3L45IjtPwOTPdw==</IR_PASSWORD>
</configuration>
```

8. Repeat Steps 2 on page 15-8 on page 16 for all of the parameters you want to encrypt.
9. Save the context file.

### Results

The parameters are encrypted.

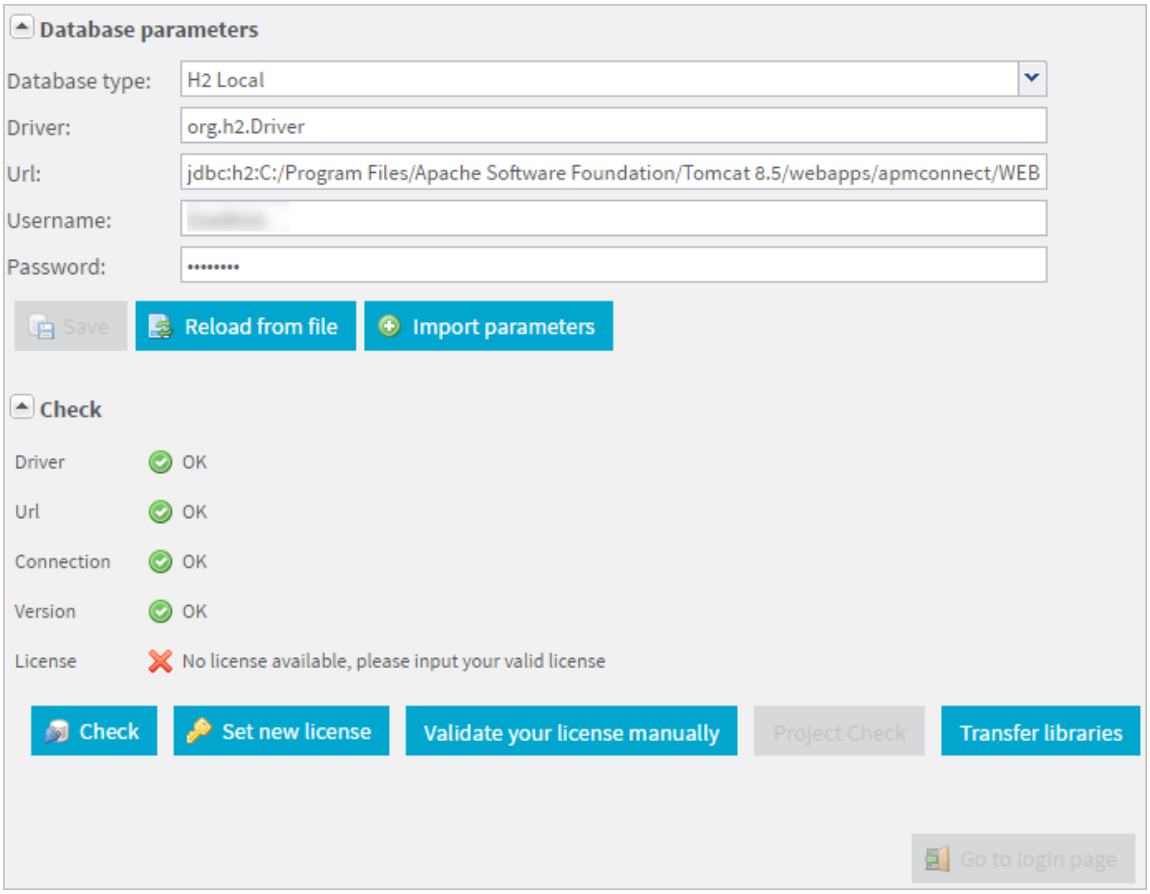
# Access the APM Connect Administration Center

Using the APM Connect Administration Center, you can run extraction and load jobs. Before you can begin running jobs, you must set up the APM Connect Administration Center. This topic explains how to access and deploy the APM Connect Administration Center for the first time.

### Procedure

1. Open a web browser, and then enter the following URL into your web browser: http://localhost:8080/apmconnect/.
2. In the **Login** window, in the **Password** box, enter `admin`, and then select **OK**.
3. Select .

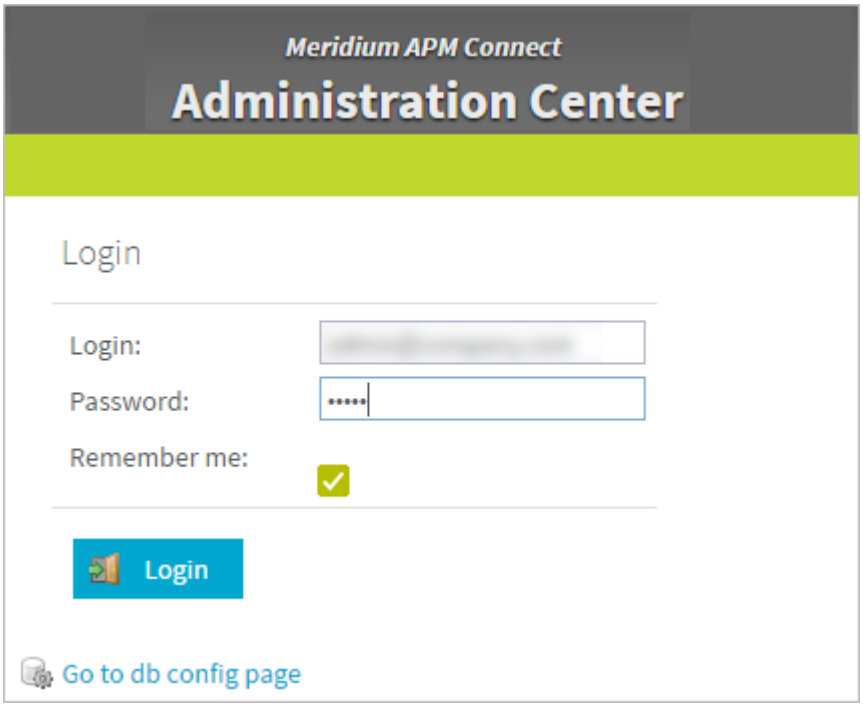
   The **Database parameters** window appears, and a check is performed by the APM Connect Administration Center.




**Important:** If your license does not validate as shown in the previous image, you can validate your license manually.

4. If your license validates, in the **Database parameters** window, select **Go to login page**.

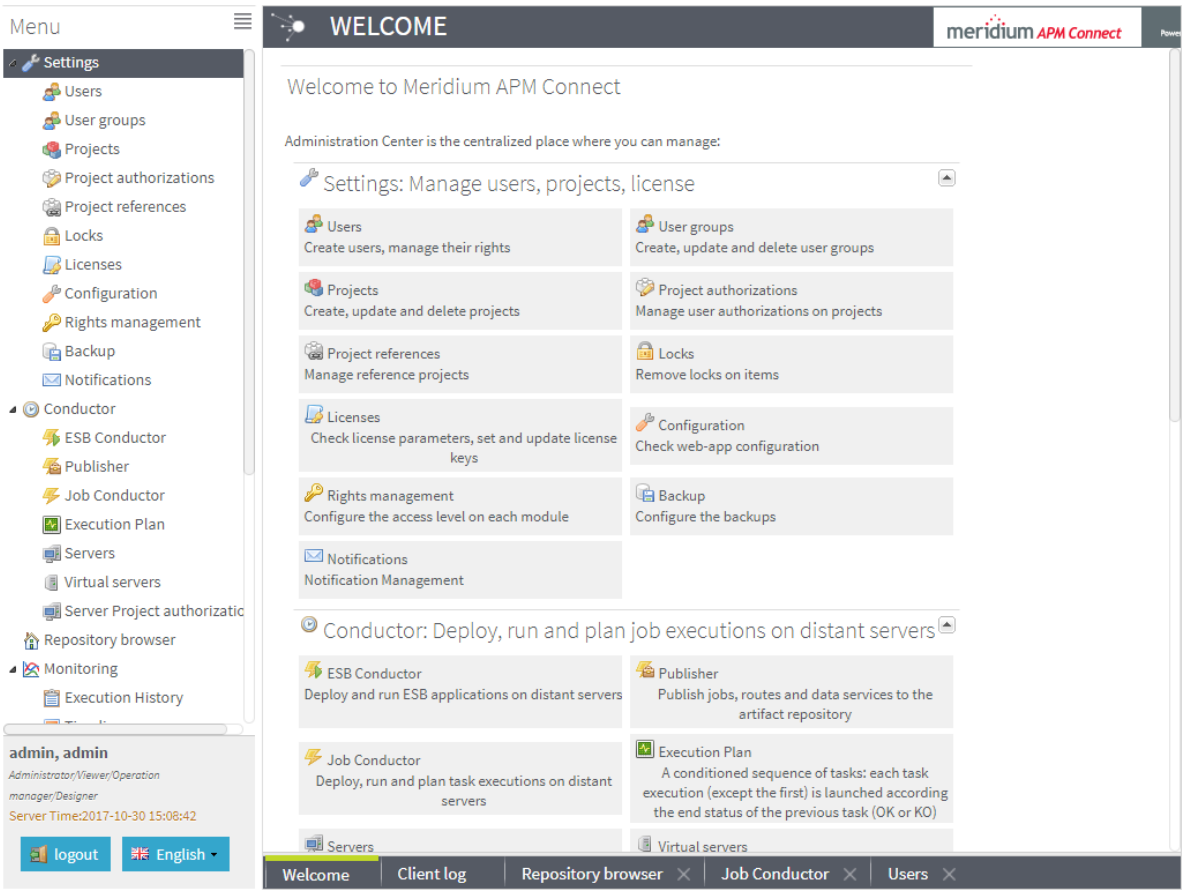
   The **Login** page appears.




5. In the **Login** window, enter the required information and then select **Login**.
   - In the **Login** box, enter the default username: `admin@company.com`.
   - In the **Password** box, enter the default password: admin.

### Results

The APM Connect Administration Center is successfully deployed, and the APM Connect Administration Center **Welcome** page appears.




# Change and Encrypt the APM Connect Service User Names and Passwords

### About This Task

**Important:** During installation, the system defines default users and passwords in a configuration file. Complete these steps on the APM Connect server to correctly secure the server.

### Procedure

1. On the APM Connect server, if the service is running, stop the APM Connect service.
2. Navigate to `C:\APMConnect\Utilities\runtime\etc`.
3. Open the file `users.properties` in an application that you can use to modify a text file (for example, Notepad).
4. Change the passwords for the default user names.
5. Specify your own user names using the following format:

   user=password[,role] [,role] [,role]...

   - or -

   user=password[,group] [,group] [,group]...

   **Note:** For information about groups and defining roles, refer to the Talend documentation.

6. Save and close the file.
7. To specify authorizations for the jobserver, open the file `users.csv`.
8. Add the authorized user names and passwords in the following format:

   username,password

   **Note:** For information about jobserver requirements, refer to the Talend documentation.
9. Save and close the file.
10. To enable password encryption, open the file `system.properties`.
11. Add the following statements at the end of the file:

```
# edit config
config:edit org.apache.karaf.jaas
config:property-set encryption.enabled true
config:update

# force a restart
bundle:restart
```

12. Save and close the file.
13. Start the APM Connect service.

# Import the Karaf File into the APM Runtime Container

**About This Task**

In order to complete the connection between GE Digital APM, Karaf, and the APM Connect Administration Center, you must import the `StageDataLoaderServices.jar` file into the APM Runtime folder. This topic guides you through that process.

**Procedure**

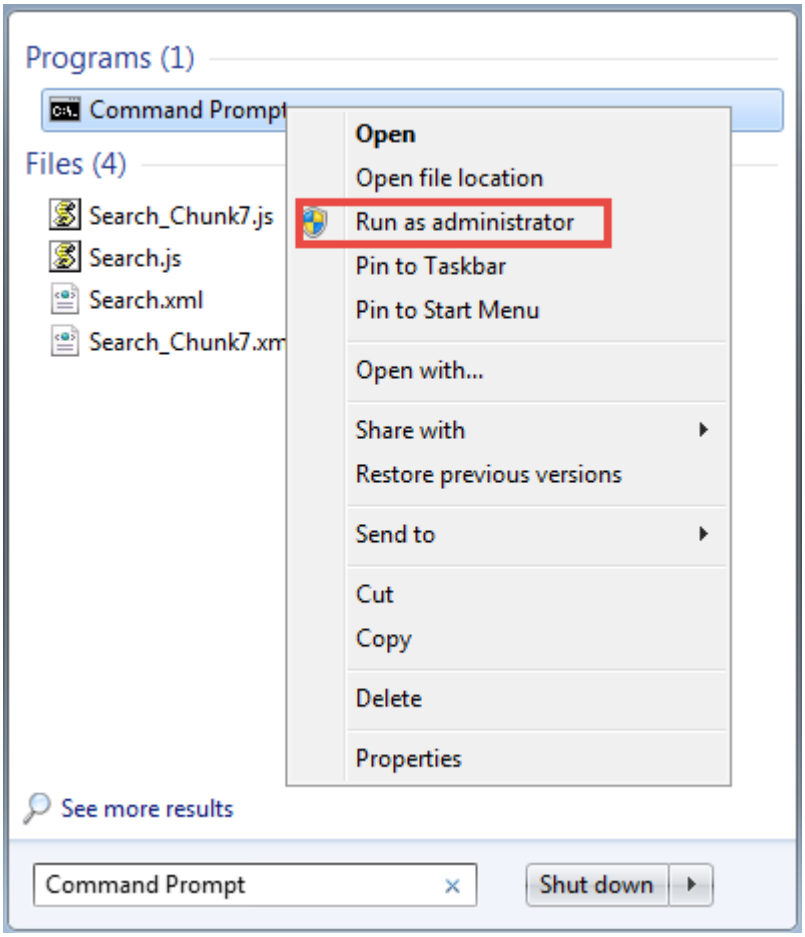
1. On your local machine, access and then copy the `StageDataLoaderServices.jar` file.
2. Navigate to the following path: <root:>\APMConnect\Utilities\runtime\deploy.
3. Right-click inside the folder, and then select **Paste** to copy the .jar file into the Runtime folder.

   The new service is deployed to the APM Connect host.

# Install and Start the APM Runtime Container

**Procedure**

1. On the APM Connect server, locate Command Prompt
2. Right-click on **Command Prompt**, and then select **Run as administrator**.

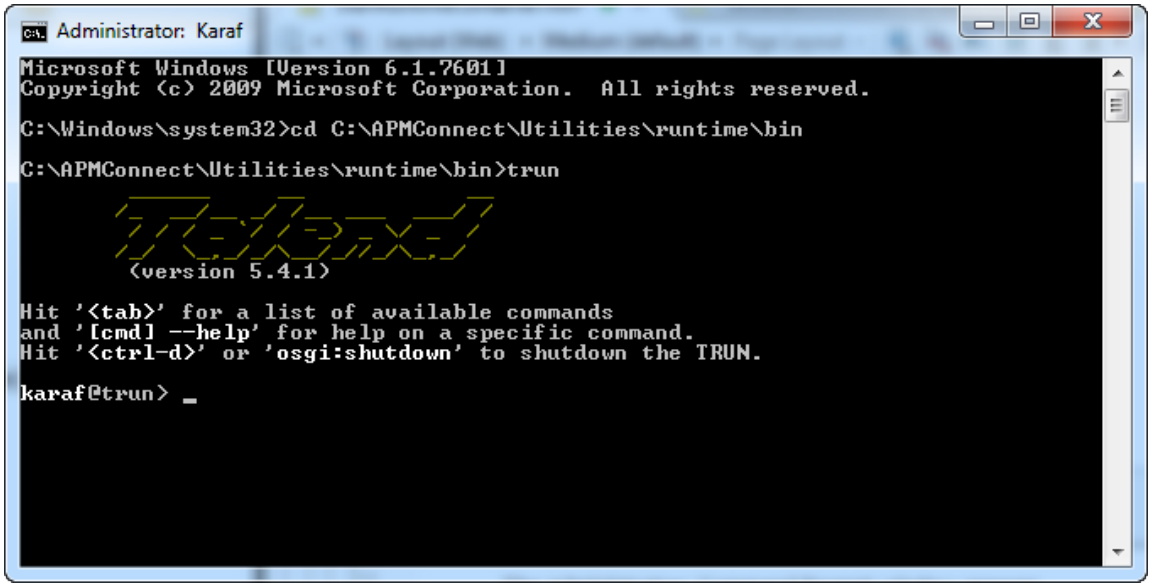



The **Administrator: Command Prompt** window appears.

3. Change the directory to: C:\APMConnect\Utilities\runtime\bin.
4. In the **Command Prompt**, after the new directory path, enter: trun.

   A message appears in the Command Prompt, and another **karaf@trun>** prefix appears.

   **Note:** When you first start Karaf, it takes a few minutes to load all of the commands. So, if you attempt to enter the features:install command in Step 5 and receive an error message in the Command Prompt, try the command again in a few minutes.




5. In the Command Prompt, after **karaf@trun>**, enter features:install wrapper.

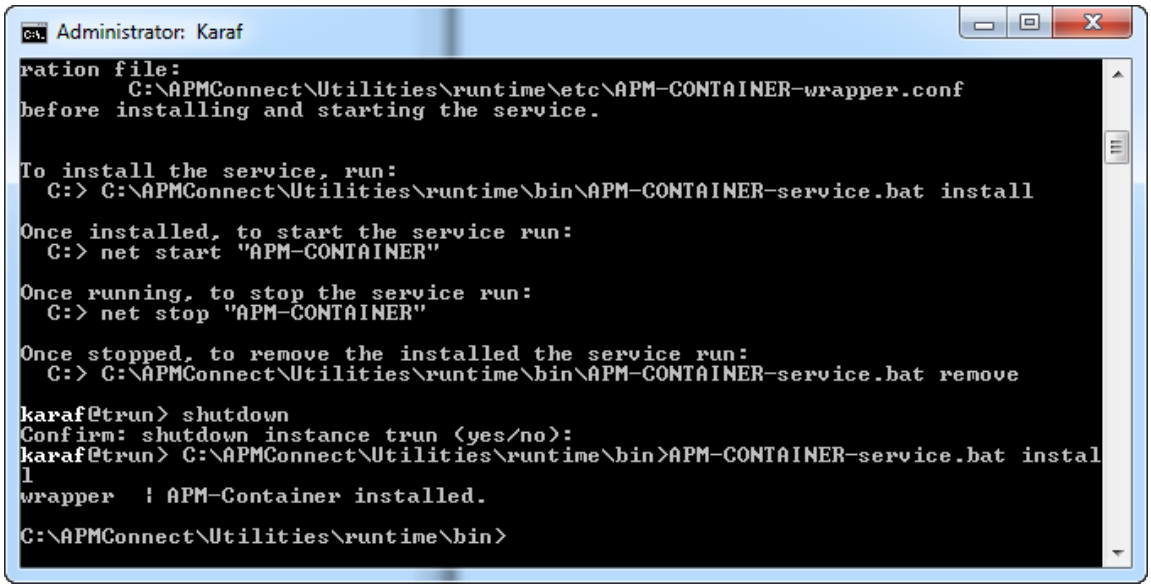
   Another **karaf@trun>** prefix appears.
6. After **karaf@trun>**, enter wrapper:install -s AUTO_START -n APM-CONTAINER -d APM-Container -D "APM Container Service".

   A service wrapper feature is now installed into the Runtime Container, and a batch file is created in your local APM folder.

   **Tip:** On your local computer, navigate to your APM Connect folder: C:\APMConnect\Utilities\runtime \bin. Notice that your local APM Connect folder now contains two new items: APM-CONTAINER-service.bat and APM-CONTAINER-wrapper.exe.

   Another **karaf@trun>** prefix appears.
7. After **karaf@trun>**, enter shutdown, and then enter yes to confirm you want to shut down karaf.

   Karaf is shut down, and another **karaf@trun>** prefix appears and the directory is changed to**c:\APMConnect\Utilities\runtime\bin**
8. After **c:\APMConnect\Utilities\runtime\bin>**, enter APM-CONTAINER-service.bat install.



The APM Container is installed, and a message appears indicating as such.

9. To start the APM Container, restart your machine.

# Enable Internet Explorer for APM Connect

**About This Task**

**Important:** This step is required only if you are using Internet Explorer to access the APM Connect Administration Center. If you are not using Internet Explorer, you can skip this procedure, and proceed to the next step, in the APM Connect Base First-Time Deployment Workflow.

**Procedure**

1. On the APM Connect server, access **Control Panel\Network and Internet**, and then select **Internet Options**.

   The **Internet Properties** screen appears
2. Select the **Security** tab, then, in the **Select a zone to view or change security settings** section, select **Local intranet**, and then select **Custom level...**.

   The **Security Settings -Intranet Zone** screen appears.
3. In the **Settings** section, access the **Include local directory path when uploading files to a server**, and select **Disable**.
4. Select OK.

   The **Security Settings -Intranet Zone** screen closes.
5. On the **Internet Properties** screen, select **Apply**.

   Internet Explorer is configured accommodate APM Connect.

# Update PostgreSQL Networking Configuration

To allow connections from the GE Digital APM Server to APM Connect, you must update the PostgreSQL networking configuration. This topic describes how to perform the configuration update.

**Procedure**

1. On the machine on which you installed APM Connect, navigate to your PostgreSQL installation files. The default location is `<root:>\Program Files\PostgreSQL\9.3\data`.
2. Locate the configuration file `pg_hba.conf`, then right-click on the file, and then open it with a text editor.

   The file `pg_hba.conf` opens in the text editing application.
3. Scroll down to the end of the document and locate the following line of text: host all all 127.0.0.1/32 md5

```
76
77  # TYPE  DATABASE        USER            ADDRESS                 METHOD
78
79  # IPv4 local connections:
80  host    all             all             127.0.0.1/32            md5
81  host    all             all             <APM IP address>/32     md5
82  # IPv6 local connections:
83  host    all             all             ::1/128                 md5
84  # Allow replication connections from localhost, by a user with the
85  # replication privilege.
86  #host    replication     postgres        127.0.0.1/32            md5
87  #host    replication     postgres        ::1/128                 md5
88
```

4. Add a host all all statement specifying the IP address of the GE Digital APM Server using method md5.
5. Save the file, and then close the text editor.

### Results

PostgreSQL is now configured to open the connection from the GE Digital APM Server.

# Change the PostgreSQL Passwords

### Procedure

1. Start pgAdmin.
2. Right-click on a database, and then select **Query Tool**.

   The workspace for the selected database appears.
3. In the workspace, enter ALTER statements for each role to be changed using the following format:

   ALTER ROLE username SET PASSWORD TO 'newpassword'
4. At the top of the workspace, select  .

   The query runs and the password is changed.

   **Note:** For more information about the PostgreSQL roles, see the PostgreSQL documentation.

# Configure SSL

If you want to use SSL for connections from APM Connect, this step is required.

### About This Task

If you want to use SSL when moving data through the system, you must import security certificates from the secured application into a truststore file accessible to APM Connect. This procedure describes the process for a single application. You can import multiple certificates into a single truststore file by repeating this procedure for each application requiring SSL.

**Important:** When copying the certificates, make sure that you only log in to the application requiring SSL access to APM Connect.

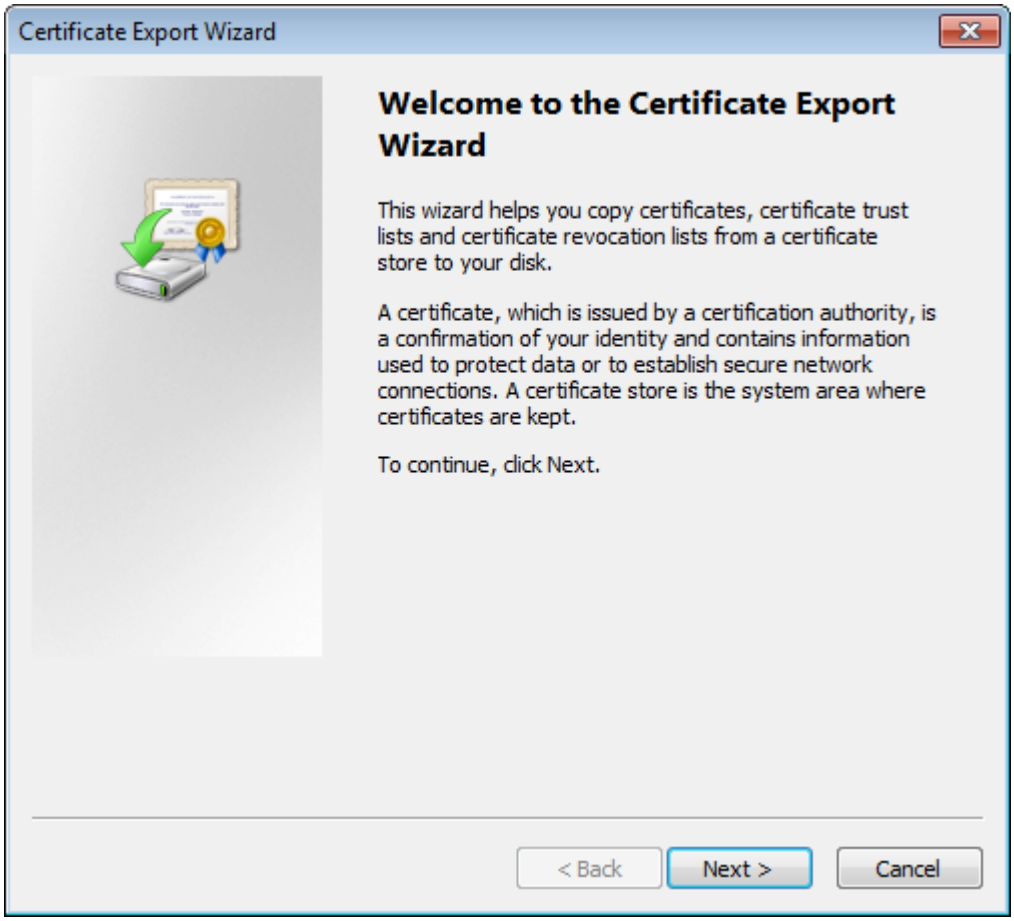
**Note:** If you want to use SSL with GE Digital APM web services, contact GE Global Support.

**Procedure**

1. Log in to your application, and then access the certificate information from your browser.

   **Note:** Typically, you can access certificate information by selecting the lock icon in the address bar.

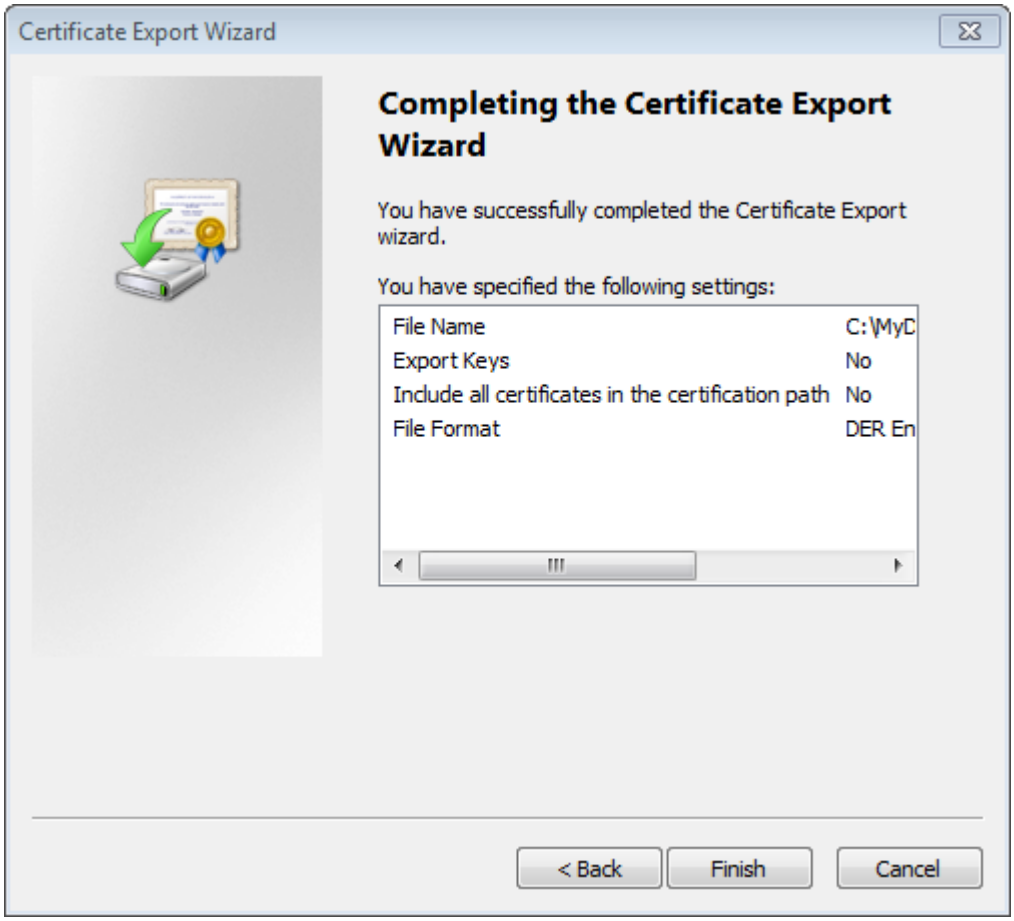
   The **Certificate** window appears.
2. Select **Details**, and then select **Copy to File...**.
   The **Certificate Export Wizard** window appears.




3. Select **Next**.
4. In the **Export File Format** window, select **DER encoded binary X.509 (.cer)**, and then select **Next**.
5. In the **File to Export** window, select **Browse...**.

   The **Save As** window appears.
6. Save the file to your Desktop under the name `certificate.cer`.
7. Select **Next**.
8. Select **Finish**.

   The **Certificate Export Wizard** window appears.




9. Select **OK**.
10. Copy the `certificate.cer` file, and then paste it into the folder that contains the Java files for your machine.

    **Tip:** For example, if your Java files are located at C:\Program Files\Java\jre7\bin, copy the certificate.cer file to that bin folder.
11. On the APM Connect server, access the Command Prompt window as an Administrator, and then navigate to the location of the Java files on your machine.
12. Enter `keytool`.
    Commands for the Key and Certificate Management Tool appear in the Command Prompt.
13. In the last line, `C:\Program Files\Java\jre7\bin>`, enter `keytool -importcert -alias test -file certificate.cer -keystore publickey.store`.
14. Enter a password, and confirm the password by reentering it.
    In the Command Prompt window, you are asked if you want to trust the certificate.
15. For yes, enter `y`.
    The keystore file is created.
16. For the Karaf service, navigate to the location of the Karaf JDK, and then repeat steps 12 on page 118 through 15 on page 118 using the path and password for the Karaf service JDK.
    - For the value of the keystore argument, use the file path of the Karaf JDK, (for example, `C:\Program Files\Java\<JDK version>\jre\lib\security\cacerts`).
    - The default password for keytool is changeit. Enter your unique value.
17. Access the context file, and then enter the following values for the corresponding parameters:
    - **TRUSTSTORE_FILE**: The location of the truststore file you created.

- **TRUSTSTORE_PASSWORD**: The password you entered in the Command Prompt window when you installed the certificate.
- **USE_SSL**: true.
- **APM_API_USE_SSL**: true, if you are using SSL on the GE Digital APM Server.

### Results

SSL is now enabled for the applications for which you imported the certificates.

# Configure the Karaf Server for SSL

To ensure proper communications between GE Digital APM and APM Connect, you must configure the server to use SSL.

### About This Task

To provide a more secure data flow, you must make sure that the connection that provides the path from the APM Connect system to GE Digital APM is protected. You can provide additional security to the data flow by configuring the APM Connect server, which processes the jobs that send and receive data between the endpoints, to use SSL.

### Procedure

1. Edit the file `etc/org.ops4j.pax.web.cfg` so that the HTTP feature uses SSL.

   When you are done, the file should look similar to this example, with *your_password* replaced with the passwords you will use.

   ```
   org.osgi.service.http.port=8040
   org.osgi.service.http.port.secure=9001
   org.osgi.service.http.secure.enabled=true
   org.ops4j.pax.web.ssl.keystore=${karaf.base}/etc/keystores/
   keystor.jks
   org.ops4j.pax.web.ssl.password=your_password
   org.ops4j.pax.web.ssl.keypassword=your_password
   #org.ops4j.pax.web.config.file=${karaf.base}/etc/jetty.xml
   ```

2. Enable HTTP client support in APM Connect.

   a) Navigate to `C:\APMConnect\Utilities\runtime`, and then enter `bin/trun`.

   b) At the prompt, enter `feature:install http`.

3. From a certificate authority, obtain two certificates: one for the server and one for the client.

   **Important:** Make sure you import the client certificate you receive into your application server.

4. In the APM Connect server, at the command prompt, import the server certificate into the server keystore.

   The command will resemble the following example.

   ```
   keytool -import -trustcacerts -keystore keystore.jks -storepass
   keystore_password
   -alias serverkey -file server.cer
   ```

5. In the APM Connect server, at the command prompt, import the client certificate into the server keystore.

The command will resemble the following example.

```
keytool -import -trustcacerts -keystore keystore.jks -storepass
keystore_password
-alias clientkey -file client.cer
```

6. In the APM Connect server, at the command prompt, verify that the client certificate is imported.
   a) In the APM Connect server, at the command prompt, enter `keytool -list -v -keystore keystore.jks`.
   b) At the password prompt, enter the keystore password.
   The system responds similarly to the following example.

```
Keystore type: JKS
Keystore provider: SUN
Your keystore contains 2 entries
.................
Alias name: serverkey
Creation date: Jun 1, 2018
Entry type: PrivateKeyEntry
.............
Alias name: clientkey
Creation date: Jun 1, 2018
Entry type: trustedCertEntry
.............................
```

7. Test the APM Connect server configuration.
   a) Start the Karaf service.
   `bin/client`
   b) Install the WebConsole feature.
   `karaf@trun> feature:install webconsole`
   c) In a browser, enter `https://localhost:9001/system/console`.
   You should get an error message similar to the following:

```
An error occurred during a connection to localhost:9001.

SSL peer cannot verify your certificate.

(Error code: ssl_error_bad_cert_alert)
```

   d) Import the client certificate from step 3 on page 26 into your browser using the process for managing certificates for that browser.
   e) Repeat step 7.c on page 27 to verify that the certificate imported successfully and you can access the APM Connect server.

### Results

The APM Connect server is configured to require SSL.

### Next Steps

Import any additional client application certificates for your installation.

# Configure Multiple Source Systems or Multiple Plants

Whether you have multiple source systems or multiple plants connected to GE Digital APM, the configuration process is similar.

### Before You Begin

- Identify the target APM Connect system and all required information, such as userids, passwords, IP addresses, and ports.
- Identify the source systems you need. These can be any type of source system or plants that have unique language or extraction requirements.
- Review the information about creating EAM system records.
- Review the information about configuring the context file for the types of source systems involved.
- Make sure that the language and decimal notation values for the source system System User and GE Digital APM match.
- Make sure GE Digital APM is deployed.

### About This Task

You need to follow these steps if you have multiple source systems using APM Connect performing Extractions and RFC/Notification Management for a single GE Digital APM system or for a single GE Digital APM Tenant in a cloud environment. The scenarios include:

- Multiple source systems of the same EAM type. This situation has multiple SAP, Maximo, or ServiceMax Systems connected to a single GE Digital APM system.
- Multiple source systems with a mixture of EAM types. This situation has multiple SAP, Maximo, and ServiceMax systems connected to a single GE Digital APM system.
- A single source system that has plants that need different languages or extractions.
- An asset can only be accessed by a single CMMS-ID.

You use similar steps to configure APM Connect to support either multiple source systems or multiple plants from a single source system. The main differences are addressing of the sources, any applicable filtering of data, and the contents of the context file for each source. The following steps outline what needs to be done in both an on-premise environment or a cloud environment.

This topic assumes familiarity with the process of deploying APM Connect for a single source system and that you have already configured GE Digital APM for the first source system.

### Procedure

1. For each source system or plant, create an EAM System Record.

   Each source system or plant must have a unique system ID (CMMS-ID).

   **Note:** If you are configuring multiple plants from a single source system, the IP addresses, user IDs, and other addressing information will be the same as the first EAM System Record you defined for the source system.
2. Run the job addSourceSystem to add configurations to the existing Intermediate Repository database with a different system ID for each source system or plant and the appropriate system type (SAP, Maximo, or ServiceMax).
3. Configure context files for each of the source systems or plants so they have separate jobs for the Extractions.

   **Important:** Do not schedule the same interface job simultaneously from different source systems.

4. Set up RFC and Notifications from GE Digital APM to the source systems for either on-premise or cloud environments.

| Environment | Action |
|---|---|
| **On-premises** | Deploy connectServices.jar service for the outbound interface to all the source systems from GE Digital APM. |
| **Cloud** | Import the connectServicesCloudClient job for each source system using the same context file used for the Extraction.<br>**Note:** You should use Intermediate Repositories on each EAM system clients to send data to a single GE Digital APM tenant. The tenant will have separate connectServicesCloudClient for each extraction context. |

5. **Optional:** For each SAP system, run the Static Data job to extract data for each SAP system.

# Enable Multiple Cultures From a Single Source System

To enable data flow when there are multiple cultures configured for a single source system, you must complete the following steps.

### Procedure

1. Create a context file for each culture originating from a specific source system.
   a) Assign a CMMS_ID and TARGET_CMMS_ID that indicates the culture.
   For example, consider a source system that supports both French and Spanish. Your CMMS_ID and TARGET_CMMS_ID for the two systems could resemble `SRC1_client_FR` and `SRC1_client_ES`.
2. Create the Intermediate Repository database for the first CMMS_ID you define.
3. For each additional CMMS_ID defined in Step 1.a on page 29, run the addSourceSystem job.
4. For each CMMS_ID defined in Step 1.a on page 29, create an EAM system record, using the CMMS_ID in the **System Name** field.
5. Select **Test Connection** for each EAM System record you created.

### Results

You have configured APM Connect to support multiple cultures from a single source system.

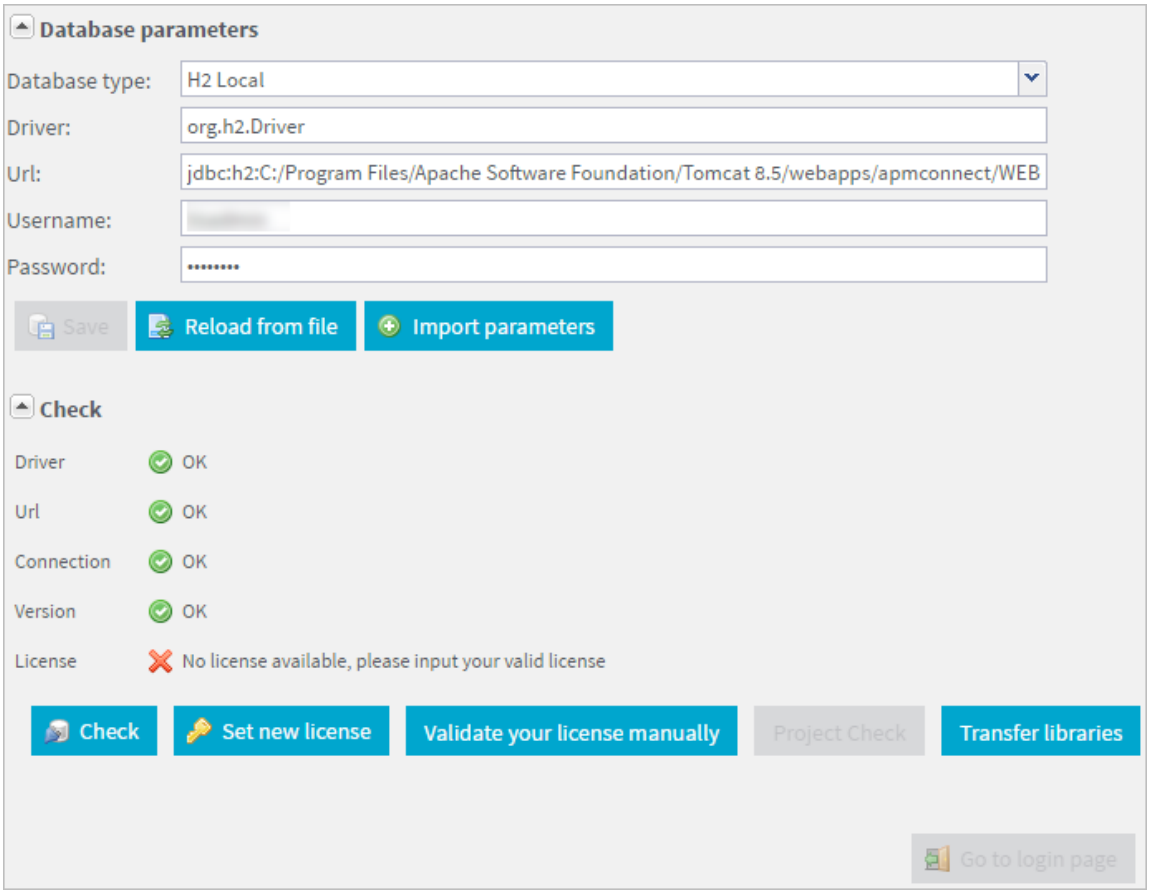
# Access the APM Connect Administration Center

Using the APM Connect Administration Center, you can run extraction and load jobs. Before you can begin running jobs, you must set up the APM Connect Administration Center. This topic explains how to access and deploy the APM Connect Administration Center for the first time.

### Procedure

1. Open a web browser, and then enter the following URL into your web browser: http://localhost:8080/apmconnect/.
2. In the **Login** window, in the **Password** box, enter `admin`, and then select **OK**.
3. Select .

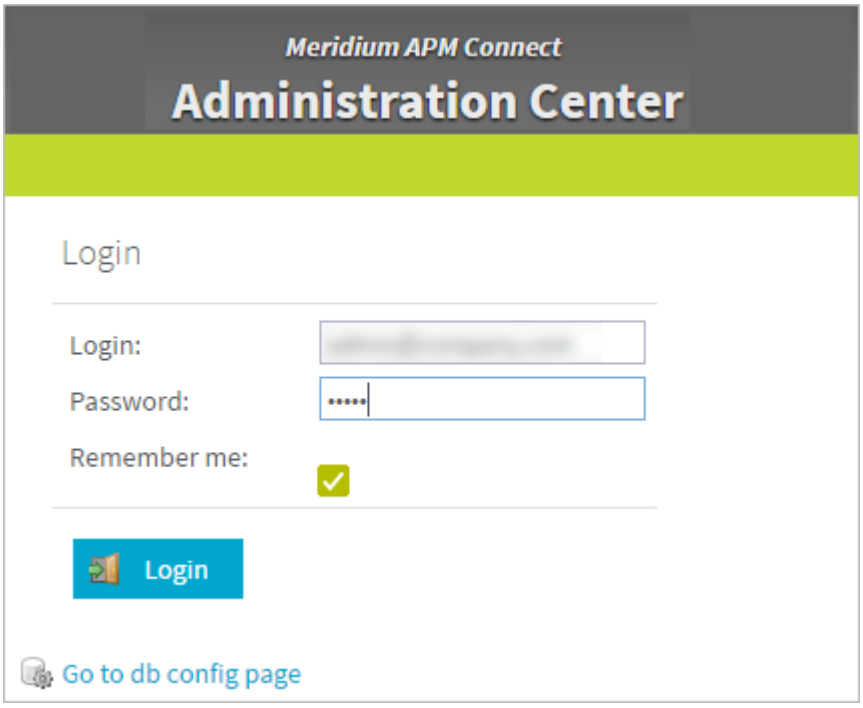
   The **Database parameters** window appears, and a check is performed by the APM Connect Administration Center.




**Important:** If your license does not validate as shown in the previous image, you can validate your license manually.

4. If your license validates, in the **Database parameters** window, select **Go to login page**.

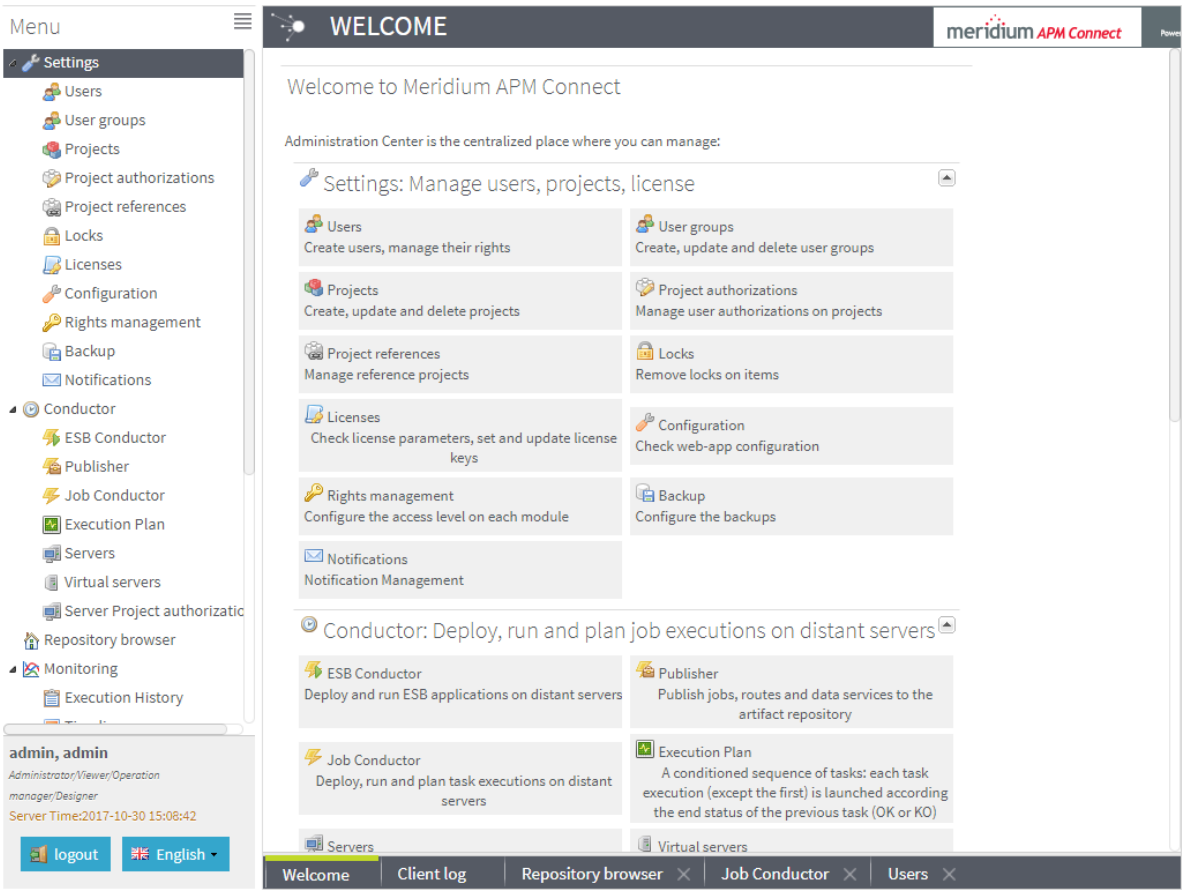
   The **Login** page appears.




5. In the **Login** window, enter the required information and then select **Login**.
   - In the **Login** box, enter the default username: `admin@company.com`.
   - In the **Password** box, enter the default password: admin.

**Results**

The APM Connect Administration Center is successfully deployed, and the APM Connect Administration Center **Welcome** page appears.

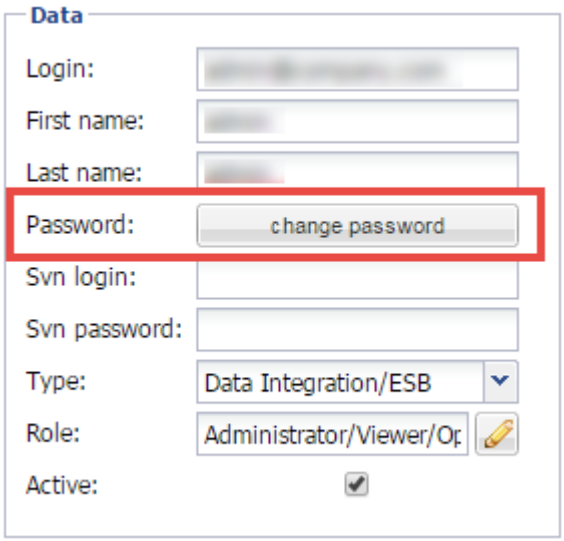



# Change the APM Connect Administration Center User Password

### Procedure

1. Access the APM Connect Administration Center.
2. In the **Menu** pane, in the **Settings** section, select the **Users** tab.

   The **Users** workspace appears.
3. In the **Users** workspace, select the user whose password you want to change.
4. In the **Data** pane, select **change password**.




The **User Password** window appears.

5. Enter the new password, and enter it again to confirm.
6. Select **Validate**.

   The password has been changed.

# Create a Service Account User

This topic describes how to create a service account user that has access to the SAP server and runs the Karaf service.

### About This Task

For security reasons, it is important to limit the number of users that can access the file shares between the SAP server and the APM Connect server. The best way to do this is to create one service account user to run the Karaf service and to access the SAP file shares on the SAP server.

### Procedure

1. In the same domain as the SAP server, create an active directory user.
2. On the SAP server, create a new folder that will be shared with the new user you just created.
3. Right-click the new folder.
4. Select **Properties**.

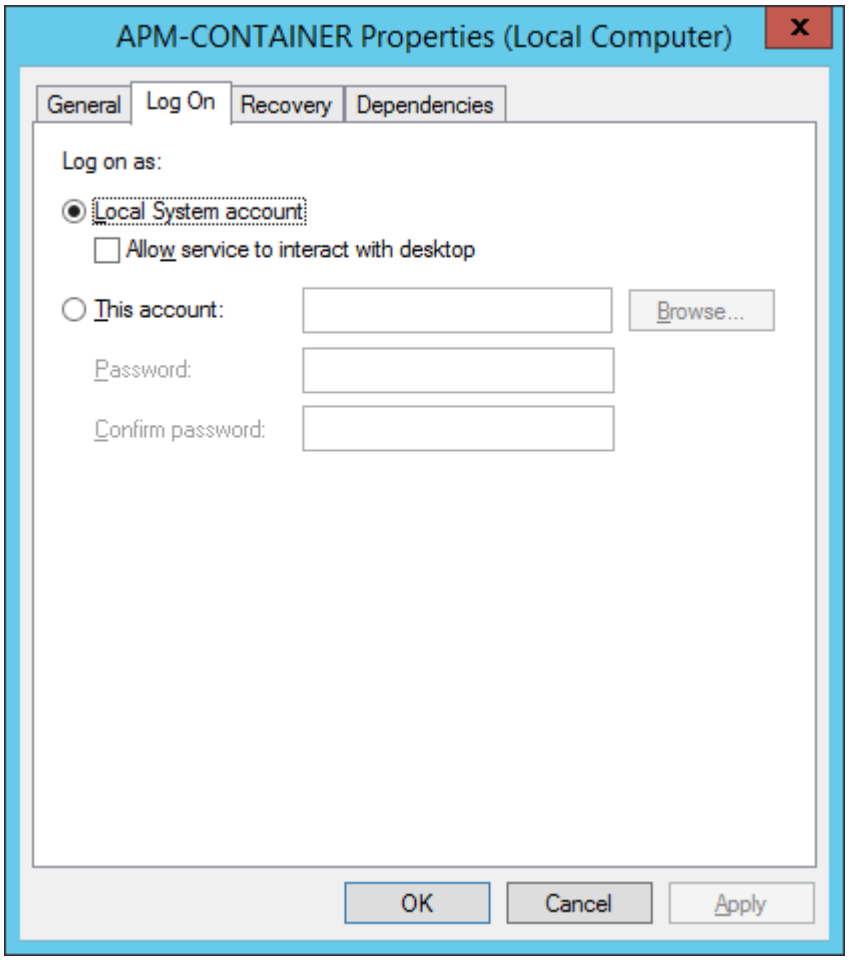
   The **<Folder Name> Properties** window appears.
5. In the **<Folder Name> Properties** window, select the **Sharing** tab, and then select **Share...**.
6. In the **File Sharing** window, in the text box, enter the user name of the service account user, and then select **Add**.

   The new user appears in the list of users.
7. In the **Permission Level** column, select ▼, and then select **Read/Write**.
8. Select **Share**, and then close the windows.
9. On the APM Connect server, select the Windows Start button to open the Windows Start menu.
10. In the **Search programs and files** box, enter `services`.

**Services** appears in the **Programs** list.

11. Select **Services**.
12. In the **Services** window, right-click the APM-CONTAINER service.
13. Select **Properties**.

    The **APM-CONTAINER Properties (Local Computer)** window appears.
14. In the **APM-CONTAINER Properties (Local Computer)** window, select the **Log On** tab.




15. In the **Log On** tab, select **This account:**, enter the name of the service account user, and then select **OK**.

### Results

The service account user has been created, authorized to run the Karaf service, and given access to the file shares on the SAP server.

# Uninstall APM Connect

Before you can upgrade the APM Connect Base, you must uninstall your current version of APM Connect.

### Procedure

1. On the APM Connect server, access the **Uninstall or Change a Program** section of the Control Panel.

2. Select APMConnect <*version*>, right-click, and then select **Uninstall**.
3. Access the **Services** section of the Control Panel (in the **Administrative Tools** section of **System and Security**) and stop the following services:
   - APM-CONTAINER
   - 7.0.57 APMConnect_Tomcat
4. Access the **Uninstall or Change a Program** section of the Control Panel again, select the Java programs (for example, Java 1.7.71 and Java SE Development Kit 1.7.71), right-click, and then select **Uninstall**.
5. On the APM Connect server, locate the folder C:\APMConnect, and then delete it.

   **Tip:** If files are locked and prevent you from deleting this folder, you may need to restart the APM Connect server machine.
6. Access the Command Prompt window, and run the following commands:
   - SC DELETE APM-CONTAINER
   - SC DELETE APMConnect_Tomcat
7. Restart the APM Connect server machine.

   APM Connect is uninstalled.

# Chapter 3

# Troubleshooting Deployment

**Topics:**

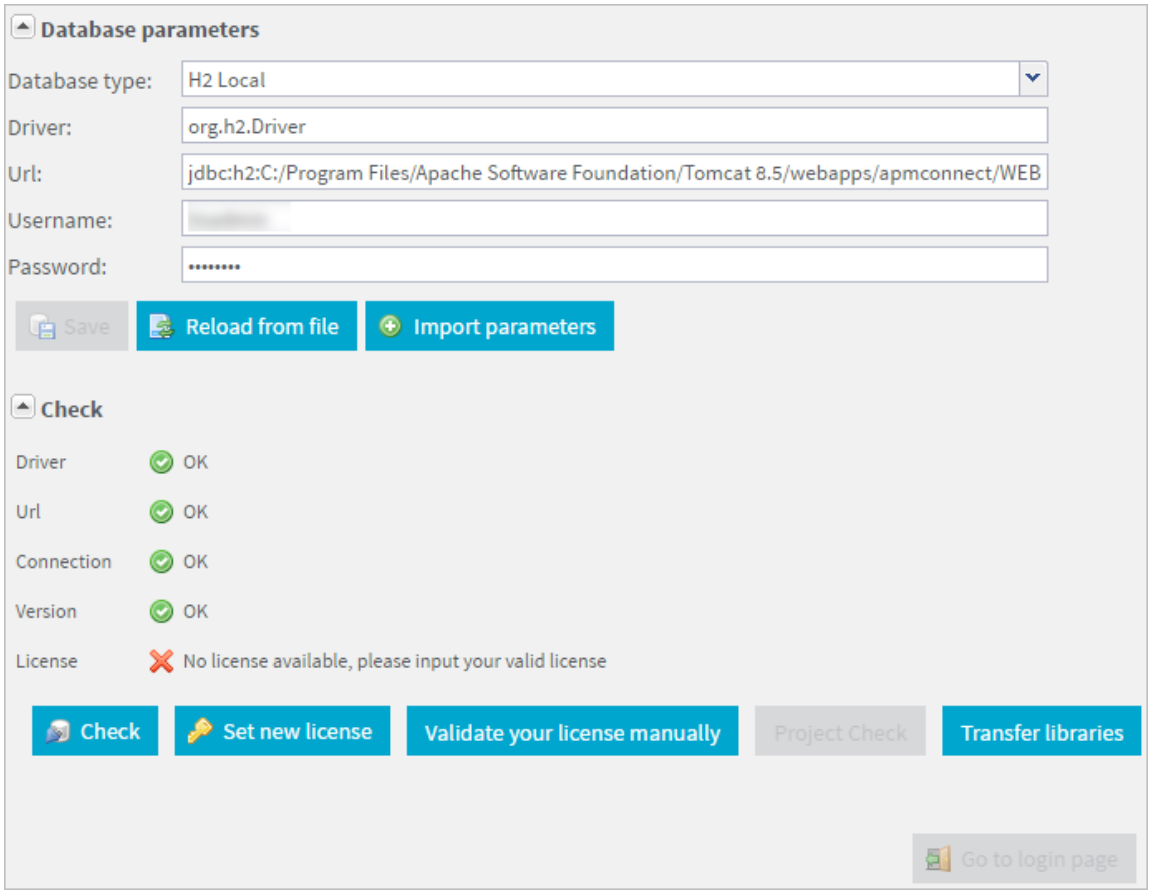
# Validate the APM Connect Administration Center License

To use the APM Connect Administration Center, you must validate your Administration Center license. Typically, validation is done automatically. However, user specific environment configuration, such as firewalls, may require manual validation. This topic describes how to manually validate your APM Connect Administration Center license.

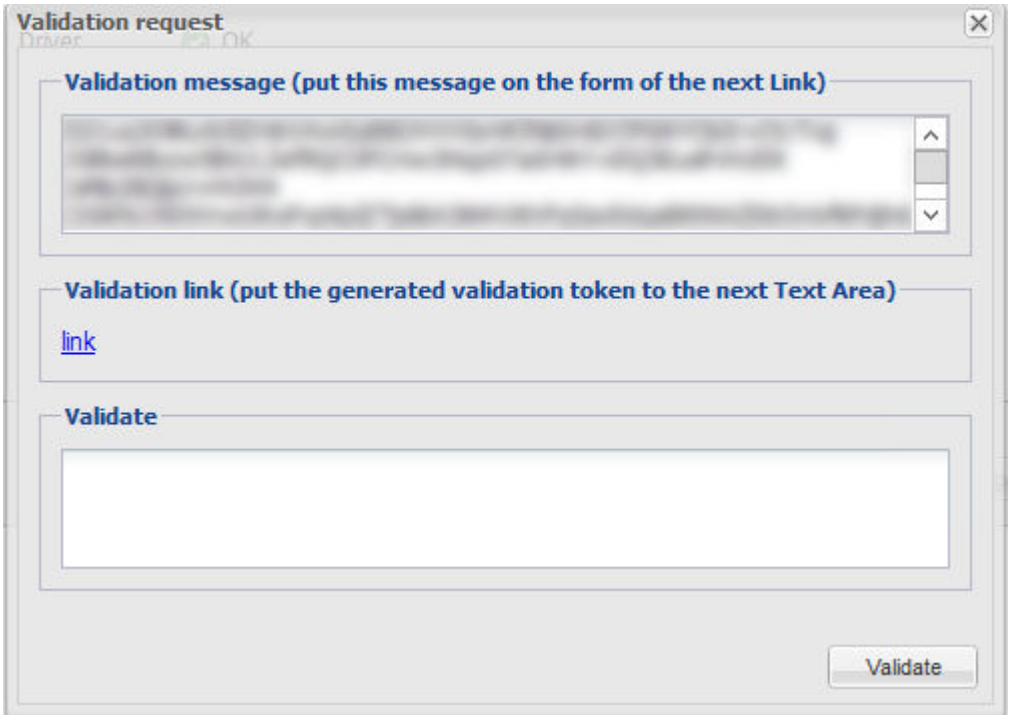
**Important:** This step is required only if your license was not validated automatically when you accessed the APM Connect Administration Center. If you did not receive the No token set error when accessing the APM Connect Administration Center, you can skip this procedure.

### Procedure

1. If you receive the No token set error when accessing the APM Connect Administration Center, as shown in the following image, select **Validate your license manually**.




The **Validation request** screen appears.




2. In the **Validation request** window, in the **Validation message (put this message on the form of the next Link)** box, copy the text.
3. In the **Validation link (put the generated validation token to the next text Area)** section, select **link**.

   If a browser opens, displaying the **Enter your validation request** page, skip to step 6.

   -or-

   If a browser does not open, proceed to the next step.
4. Complete the validation.

| Response from selecting link | How to complete validation |
|---|---|
| **A browser opens displaying Enter your validation request.** | Proceed to the next step. |
| **A browser does not open.** | a. Right-click **link**, and then select **copy link text**.<br>b. Via email or chat, send the link to a machine with internet access that is not behind the firewall, and then, on that machine, paste the link into a browser. |

5. Paste or enter the text from the **Validation message (put this message on the form of the next Link)** box into the box in the browser, and then select **Get your validation token**.
6. Select .
7. In the **Copy your validation token**, copy the text in the box.
8. Return to the APM Connect Administration Center.
9. Paste the token text into the **Validate** box.
10. Select **Validate**.

### Results

The license is validated manually.

# Set Java Environment Variables

### About This Task

The Java Environment variables are set automatically when you run the APM Connect installer. However, if you need to update or reinstall Java without reinstalling APM Connect, complete these steps to configure Java on your APM Connect server.

### Procedure

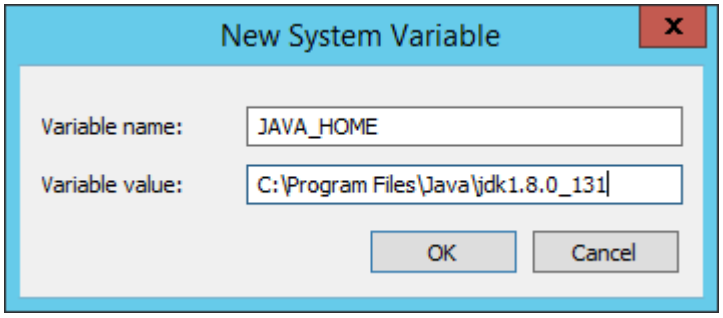
1. On the APM Connect server, navigate to `Control Panel\System and Security\System` to open system properties for the Windows machine.

   The **View basic information about your computer** screen appears.
2. In the **Control Panel Home** pane, select **Advanced systems settings**.

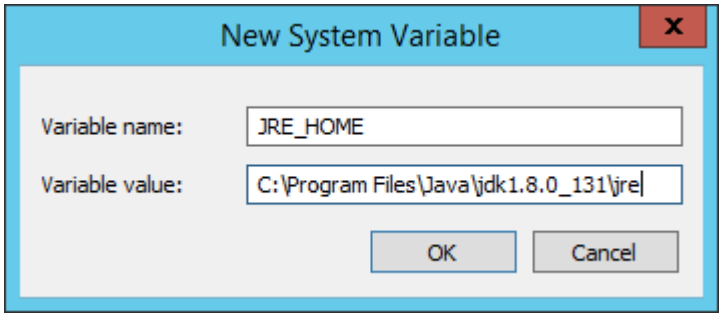
   The **System Properties** window appears, displaying the **Advanced** tab.
3. Select **Environment Variables...**.

   The **Environment Variables** window appears.
4. In the **System variables** section, select **New...**.

   The **New System Variable** window appears.
5. In the **Variable name** box, enter `JAVA_HOME`
6. In the **Variable value** box, enter the path to the root jdk installation directory. If you installed Java in the default location, the path you should enter is `C:\Program Files\Java\jdk<JAVA_VERSION_NUMBER>`. For example, the default path for Java 8 is `C:\Program Files\Java\jdk1.8.0_131`

   
   
7. Select **OK**.
8. In the **System variables** section, select **New...**.

   The **New System Variable** window appears.
9. In the **Variable name** box, enter `JRE_HOME`
10. In the **Variable value** box, enter the path to the root jre installation directory. If you installed Java in the default location, the path you should enter is `C:\Program Files\Java\jdk<JAVA_VERSION_NUMBER>\jre`. For example, the default path for Java 8 is `C:\Program Files\Java\jdk1.8.0_131\jre`




11. Select **OK**, and then close the properties window.

    The Java environment variables are created.

# Enable Test Connection

### About This Task

**Note:** This step is completed automatically when you run the APM Connect installer. These steps are included here for your reference if necessary.

### Procedure

1. Access your APM Connect Installation package, navigate to the Jobs folder, and then copy the file CheckConnections.jar.
2. On your APM Connect server, navigate to C:\APMConnect\Utilities\runtime\deploy.
3. In the deploy directory, paste the file CheckConnections.jar.

### Next Steps

- Test the connections required to complete a data load.

# Change H2 Console Password

This topic describes how to change the H2 Console password associated with the APM Connect Administration Center.

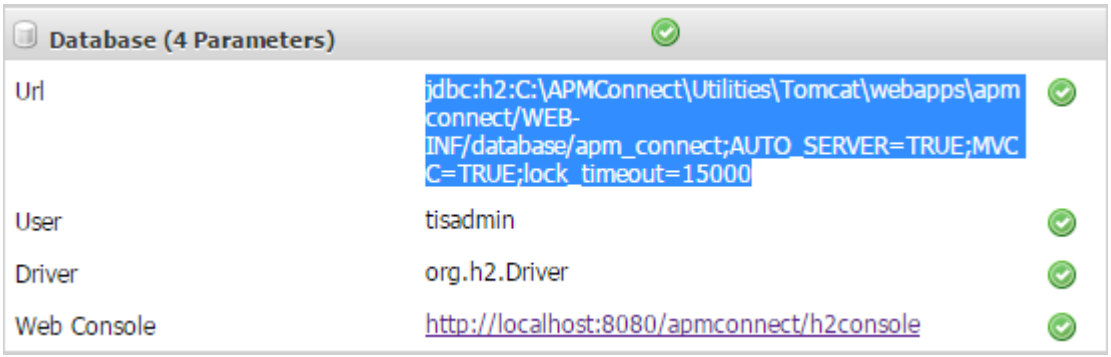
### About This Task

**Note:** This step is completed automatically when you run the APM Connect installer. These steps are included here for your reference if necessary.

### Procedure

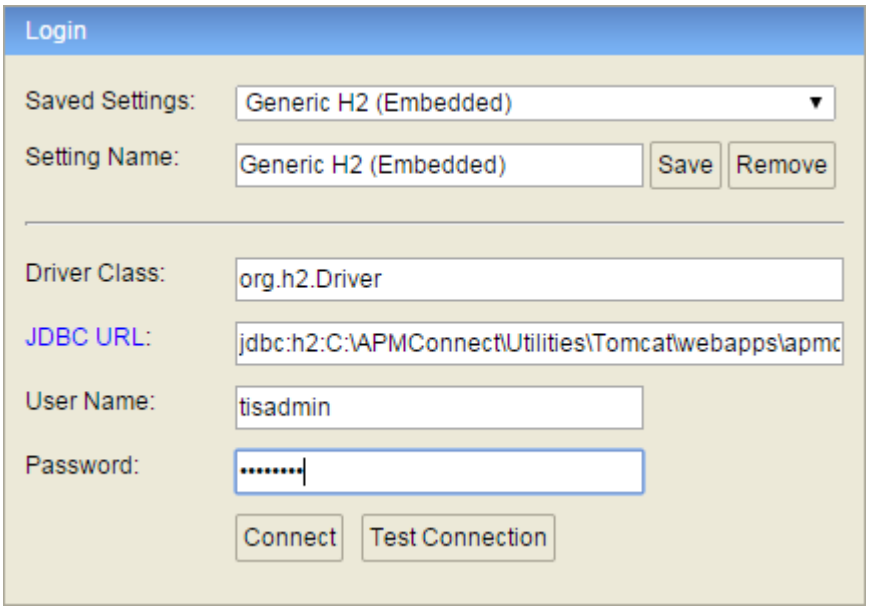
1. Access the APM Connect Administration Center.
2. In the **Menu** pane, in the **Settings** section, select the **Configuration** tab.

   The **Configuration** section appears.
3. Select the **Database (4 Parameters)** group to expand the workspace.
4. Highlight and copy the URL in the **URL** row.




5. Select the link in the **Web Console** row.

   In a new browser tab, the **H2 Console Login** screen appears.
6. In the H2 Console, in the **JDBC URL** field, paste the copied URL.
7. In the **User Name** field, enter the user name. The default user name is tisadmin.
8. In the **Password** field, enter the password. The default password is tisadmin.




9. Select **Connect**.
10. In the H2 Console, in the **SQL statement** pane, enter the following command: SET PASSWORD '<password>'.

    **Note:** The password must be in single quotes. Example: SET PASSWORD 'abcstrng!5'.
11. Select **Run (Ctrl+Enter)**.

    The H2 Console password is changed.

# Create APM Service User

Jobs in the APM Connect Administration Center are run by users. The apmService user is required to facilitate communication between APM Connect and GE Digital APM.

### About This Task

**Note:** This step is completed automatically when you run the APM Connect installer. These steps are included here for your reference if necessary.

### Procedure

1. In the APM Connect Administration Center, from the **Menu** pane, in the **Settings** section, select the **Users** tab, and then select **Add**.
2. In the **Users** pane, enter the user information into the empty fields as necessary according to the following table, and then select **Save**.

| Field | Description | Value |
|---|---|---|
| Login | Email login for user | apmService@meridium.com |
| First name | User first name | apm |
| Last name | User last name | service |
| Password | User password | apmConnect (default password) |
| Type | Type of data migration | Data Integration/ESB |
| Role | User role | Operation manager |
| Active | Select check box to signify active user | Must select check box |

### Results

The apmService user is created, and it appears in the list of users.

# Import Adapter Jobs

A job is used to extract information from the source and push it into GE Digital APM. Before you can initiate a job using the APM Connect Administration Center, you must first load the jobs into the APM Connect Administration Center.

### About This Task

**Note:** This step is needed only if the adapter jobs were not imported when you ran the APM Connect installer.

Loading the jobs is accomplished by importing the jobs from a .zip file. This topic describes how to import jobs into the APM Connect Administration Center.

### Procedure

1. In the **Menu** pane, in the **Conductor** section, select the **Job Conductor** tab.
2. In the **Job Conductor** menu, select **Add**.

   The **Execution task** pane is enabled.

3. In the **Execution task** pane, in the **Label** box, enter a label for the job.
4. In the **Description** box, enter a description for the Job.
5. Select the **Active** check box.
6. In the **Job** section, select  .
7. In the **Import generated code** window, select **Browse**, and then navigate to the folder containing the updated jobs package.
8. Depending on the type of deployment, select the file that contains the job based on the following tables.

   **Note:** You must import every job, or run the respective wrapper job, in the table for the respective deployment.

| Job Name | Description |
|---|---|
| CreateIntermediateRepository.zip | Creates the IR database. |
| Extraction_Wrapper_Maximo.zip | Wrapper job for all Maximo Adapters allowing easy configuration of multiple Maximo Adapters jobs. |

**Figure 1: Maximo Adapter Jobs**

| Job Name | Description |
|---|---|
| CreateIntermediateRepository.zip | Creates IR database. |
| EncryptString.zip | Used to encrypt passwords. |
| Extraction_Wrapper.zip | Wrapper job for all SAP Adapters allowing easy configuration of multiple SAP jobs. |

**Figure 2: SAP and SAP PI Adapter Jobs**

9. On the **Import generated code** window, select **Launch upload**.

   The **Project**, **Branch**, **Name**, **Version**, and **Context** boxes are automatically populated with appropriate values.
10. In the **Execution Server** list, select the server on which the task should be run.
11. Select **Save**.

    The Adapter Job is imported into the APM Connect Administration Center.
12. Repeat steps 2 on page 42 through 11 on page 43 for every job.

### Results

Each Job is automatically categorized into the correct project.

# Chapter 4

# Administer

**Topics:**

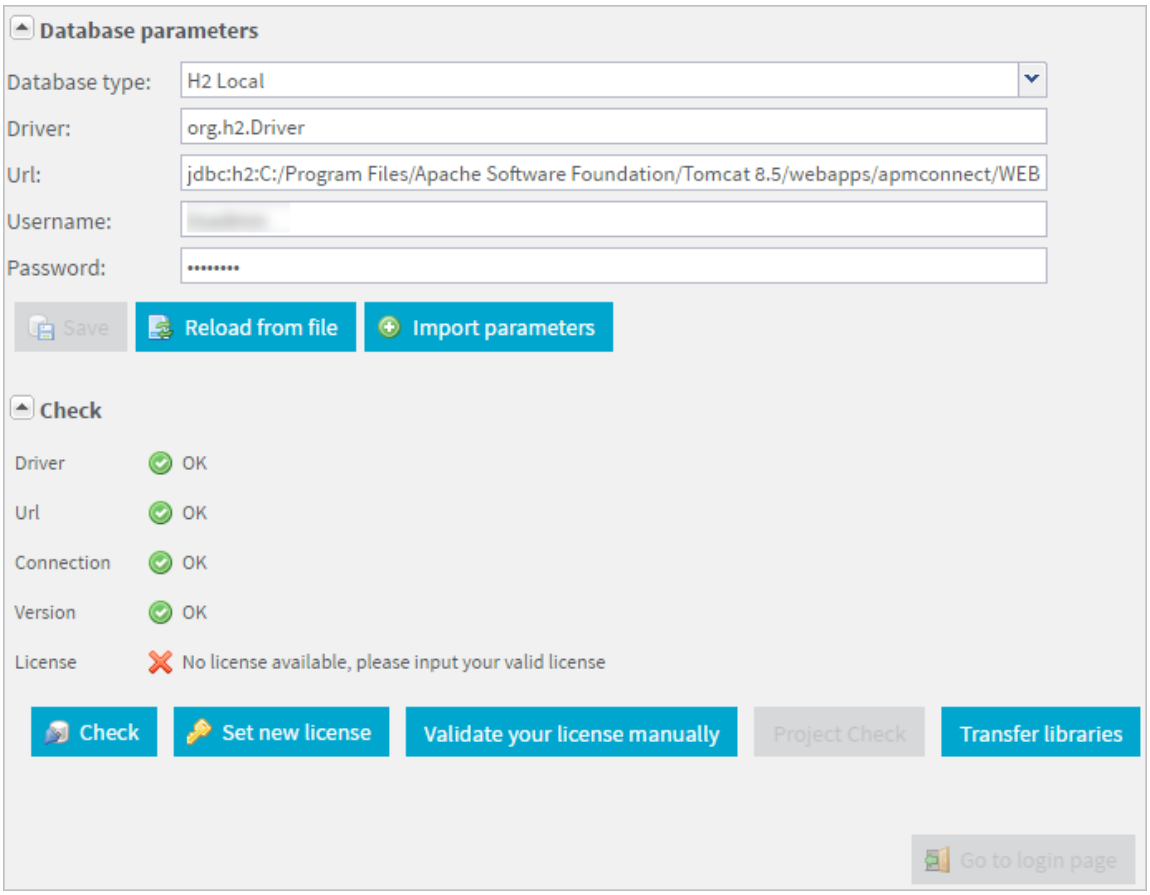
# Access the APM Connect Administration Center

Using the APM Connect Administration Center, you can run extraction and load jobs. Before you can begin running jobs, you must set up the APM Connect Administration Center. This topic explains how to access and deploy the APM Connect Administration Center for the first time.

### Procedure

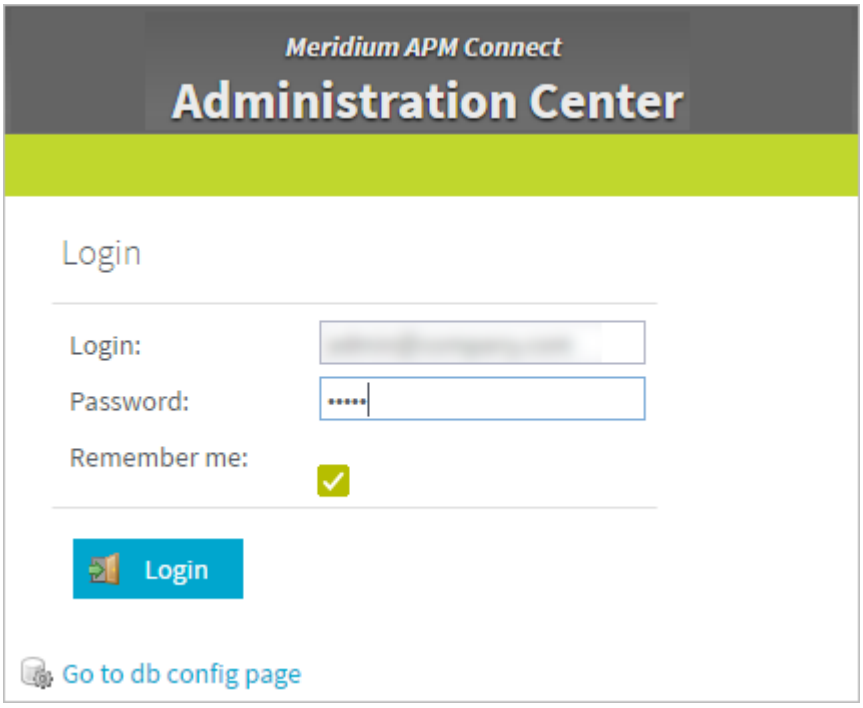
1. Open a web browser, and then enter the following URL into your web browser: http://localhost:8080/apmconnect/.
2. In the **Login** window, in the **Password** box, enter `admin`, and then select **OK**.
3. Select .

   The **Database parameters** window appears, and a check is performed by the APM Connect Administration Center.




   **Important:** If your license does not validate as shown in the previous image, you can validate your license manually.
4. If your license validates, in the **Database parameters** window, select **Go to login page**.

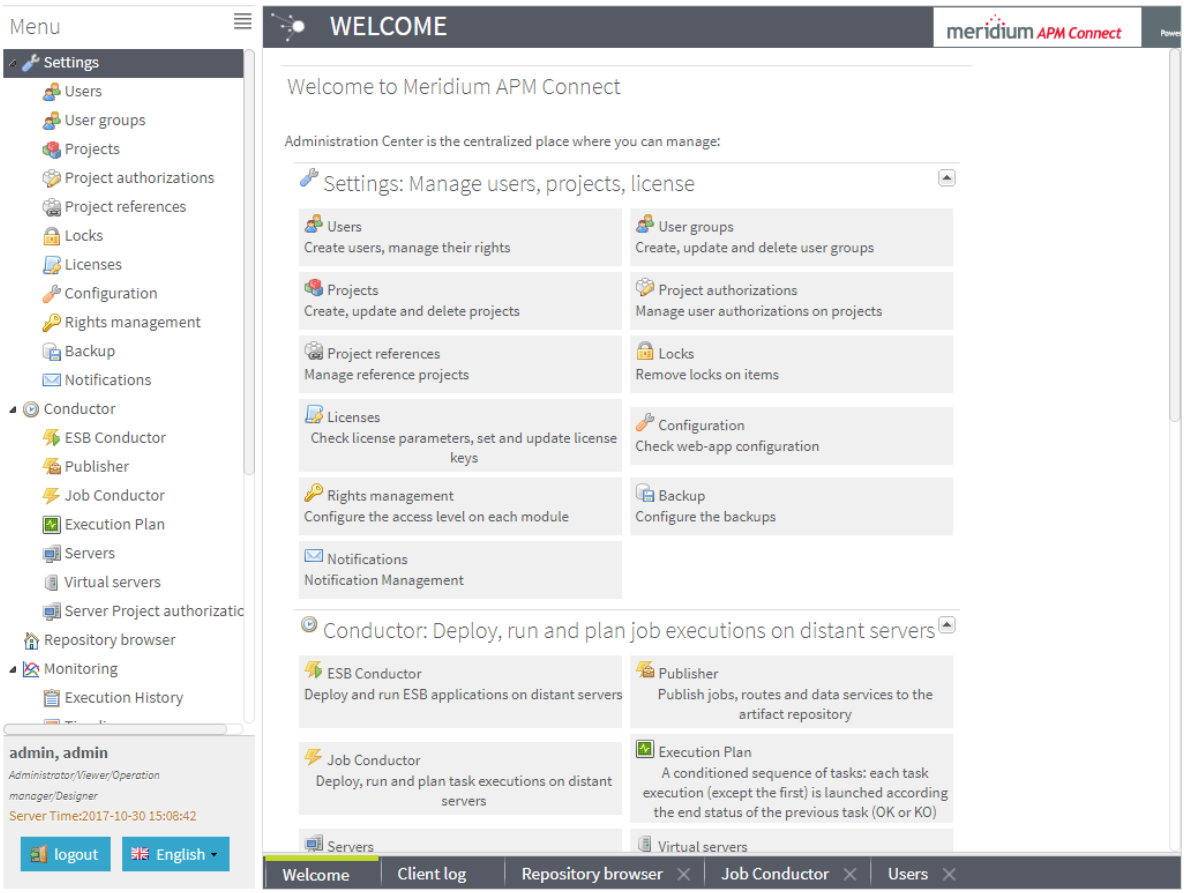
   The **Login** page appears.




5. In the **Login** window, enter the required information and then select **Login**.
   - In the **Login** box, enter the default username: `admin@company.com`.
   - In the **Password** box, enter the default password: admin.

**Results**

The APM Connect Administration Center is successfully deployed, and the APM Connect Administration Center **Welcome** page appears.




# Configure the APM Connect Administration Center

This topic describes how to configure the APM Connect Administration Center.

### About This Task

Depending on whether you are using the EAM Adapters or the Data Loaders, configuring the APM Connect Administration Center requires defining parameters for some or all of the following components: Commandline, Job conductor, Monitoring, and Log4j.

### Procedure

1. If you are not already in the APM Connect Administration Center, access it via http://localhost:8080/apmconnect/.
2. If prompted, log in to the APM Connect Administration Center.
3. In the **Menu** pane, in the **Settings** section, select the **Configuration** tab.

   The **Configuration** pane appears.
4. Select the **Job conductor (7 Parameters)** group to expand the workspace.
5. Using the following table as a guide, enter the recommended parameters.

   **Note:** You can accept the default values of parameters not listed in the table. Make sure that the folders already exist.

| Parameter | Description | Recommended or Default Value |
|---|---|---|
| Generated jobs folder | The path to the folder with the Job execution archives. | C:\APMConnect\Logs\generated_jobs |
| Tasks logs folder | The path to the folder with the Job execution logs. | C:\APMConnect\Logs\execution_logs |

6. Select the **Servers** group to expand the workspace.
7. In the workspace, select **Add**, and then select **Add Server**.
8. In the **Execution server** section, configure the server.
   a) Enter the name of the administrator host in the **Label:**, **Description:**, and **Host:** boxes.
   b) Select the **Meridium Runtime** check box.
   c) Select **Save**.
   The server configuration is saved.
   d) Select the server you just added to verify the configuration.
   All of the server indicators should be green.
9. Select the **Monitoring (2 Parameters)** group to expand the workspace.

   **Note:** Configuring this parameter is optional.
10. Select the **Log4j (4 Parameters)** group to expand the workspace.
11. Using the following table as a guide, enter the necessary parameters.

| Parameter | Description | Recommended or Default Value |
|---|---|---|
| Technical file appender | The path to the technical log file of the APM Connect Administration Center. | C:/APMConnect/Utilities/Tomcat/logs/technical.log |
| Technical log threshold | The level of logs you want to append. | WARN |
| Business log file path | The path to the business log file of the APM Connect Administration Center. | C:/APMConnect/Utilities/Tomcat/logs/business.log |
| Technical logstash appender | The host and port corresponding to the Logstash instance. | localhost:8050 |

**Results**

The APM Connect Administration Center parameters are configured.

# APM Connect Connection Records

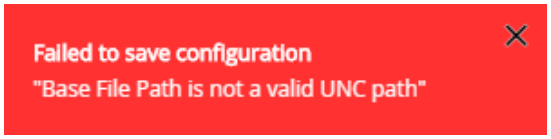
The APM Connect workspace stores information about connections used by APM Connect. Specifically, it manages the connection between GE Digital APM and APM Connect components. This topic provides an alphabetical list and description of the fields that exist in the APM Connect workspace. The information in the table reflects the baseline state and behavior of these fields.

### General Setting

| Field | Data Type | Description | Behavior and Usage |
|---|---|---|---|
| Application Server | String | The name of your GE Digital APM server. | Enter the name of your GE Digital APM Server to establish your connection to your APM Connect Server. |
| Connection String | String | The URL indicating the APM Connect server host and port used to connect GE Digital APM and the APM Connect sever. | This field is required.<br>The connection string is a combination of the APM Connect Connection parameters APM_CONNECT_HOST and APM_CONNECT_PORT as defined in the context file.<br>For example, if the host was apmconnect and the port was 8040, the connection string would be http://apmconnect:8040/.<br>**Note:** This string is used by the file `SAP_ConnectorService.jar`. |
| Integration Server | String | The location of the server where the Integration Service is installed. | This field is required. |
| Maximum Concurrent DL and EAM Jobs | Numeric | The number of Data Loading jobs or EAM jobs that can run at the same time. | This field is required. The default value is 1. This means that only one job can run at a time. The maximum value allowed is 5. When the number of concurrent jobs is low, data ingestion into GE Digital APM is faster and the system is less likely to become overloaded.<br>**Note:** Two Data Loaders of the same type are not allowed to run at the same time. For example, if you initiated two Taxonomy data loads at the same time, the second job would not begin loading until the first is complete regardless of the value in the field. |
| Password | String | The password for the APM Connect network. | This field is required only if you are using network authentication. |
| Password | String | The password of the proxy server. | This field is required only if you are using proxy server authentication. |
| Port | String | The port number of the PostgreSQL server. | The default value is 5432. This value must match the value specified for the IR_PORT parameter in the context file. |
| Proxy Server | String | The location of the proxy server. | This field is required only if you are using proxy server authentication. |
| Timeout (ms) | Numeric | The time in milliseconds before the connection between the APM Connect server and GE Digital APM will timeout. | The default value is 100,000 ms, and is populated automatically. |
| Use Authentication | Boolean | Indicates whether or not authorization will be used. | If the check box is selected, authentication will be used, and you must enter the network user name and password. |
| Use Proxy Server | Boolean | Indicates the whether or not to use a proxy server. | If the check box is selected, the proxy server will be used. |

| Field | Data Type | Description | Behavior and Usage |
|---|---|---|---|
| Use Proxy Server Authentication | Boolean | Indicates whether or not authentication will be used to the proxy server. | If the check box is selected, authentication will be used for the proxy server. |
| Username | String | The user name for the APM Connect network. | This field is required only if you are using network authentication. |
| Username | String | The user name for the proxy server. | This field is required only if you are using proxy server authentication. |

### Data Loader Settings

| Field | Data Type | Description | Behavior and Usage |
|---|---|---|---|
| Base File Path | String | The path to the file server. | This field is required.<br>An example of a valid server path is `\\hostserver\share\subfolder`. If an invalid server path is entered, an error message will appear.<br>  |
| Database Name | String | The database name of the Data Loader staging (IR) database. | None. |
| Host Name | String | The host name of the Data Loaders staging (IR) database. | None. |
| Logging Level | String | Determines the logging level for the data loader logs. | The following logging levels can be selected:<br>• **Debug**: The default logging level, and the highest level of logging. Selecting debug will return the most details and is helpful when trying to debug the application.<br>• **Info**: Returns information message indicating the progress of the application, and is the second highest level of logging.<br>• **Warn**: Returns warnings detected during the loading process.<br>• **Error**: The lowest level of logging returning errors only.<br>**Notes:**<br>• Logging levels are hierarchical. For example, if you select **Info**, you will see all warnings and errors. If you select **Error**, you will only see errors.<br>• If you are loading a large amount of data, you should use logging level Warn or Error to improve performance, unless debugging a problem. |

| Field | Data Type | Description | Behavior and Usage |
|---|---|---|---|
| Password | String | The Data Loader staging database (IR) password. | None. |
| Password | String | The password of the file server. | None. |
| Use File Path Authentication | Boolean | Indicates whether or not to use authentication when accessing the file server. | If selected, authentication will be used for the file path. |
| UserName | String | The Data Loader staging database (IR) user name. | None. |
| Username | String | The user name of the file server. | None. |

### EAM Settings

| Field | Data Type | Description | Behavior and Usage |
|---|---|---|---|
| Work Order Generation Schedule | Boolean | Stores the scheduling mechanism for transferring work orders to SAP. | To determine the schedule, you must schedule work orders. |

# Set User Permissions

To begin using the APM Connect Administration Center to run data extractions, or Jobs, you must first give the admin user all the user roles.

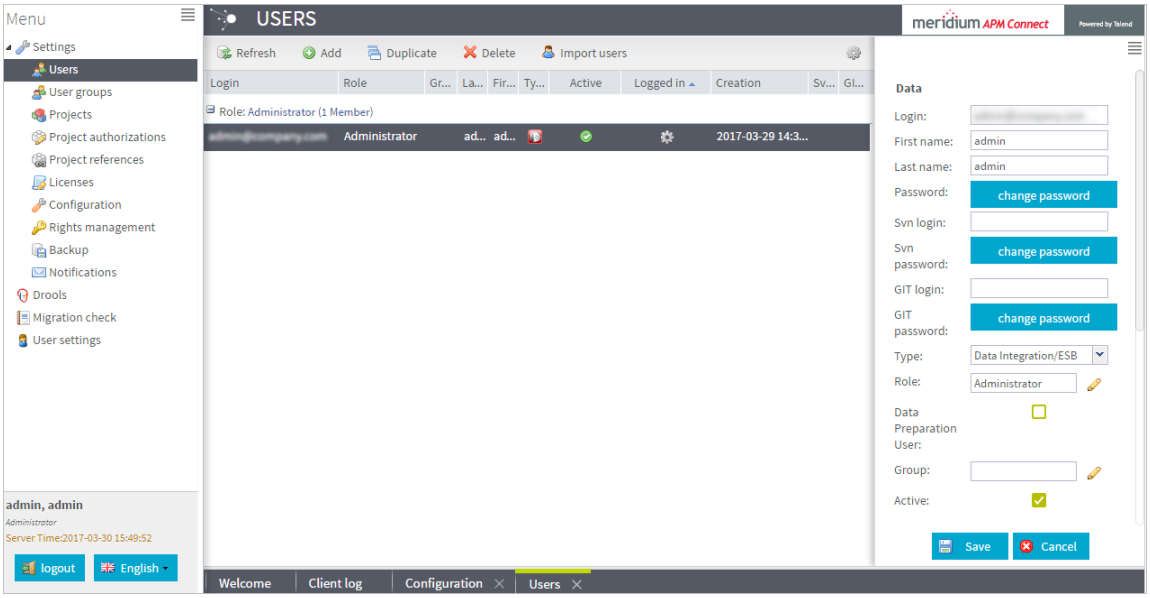
### Before You Begin

A user must be authorized for a project before they can view or change sections associated with a project.

### Procedure

1. In the **Menu** pane, in the **Settings** section, select the **Users** tab.
2. Select the user that you want to be the administrator.

   The **Data** section is activated.




3. In the **Data** section, next to the **Role:** box, select .
4. In the **Role Selection** window, select each check box to assign the user all roles, or select the box of the role(s) you want to assign the user, based on the following table:

   **Important:** To access the Job Conductor, you must designate at least one user the role of Operation Manager.

| Role | Read Permissions by Module | Write Permissions by Module |
|---|---|---|
| Administrator | None. | License, Configuration, Users, Projects, Rights Management, Backup, Notifications, Software Updates |
| Operations Manager | Projects, EBS Publisher, Service Activity Monitoring, Authorization, Service Registry, Studio, Repository Browser | Configuration, Lock, Notifications, Servers, Job Conductor, ESB Conductor, Execution Plan, Monitoring Audit BRMS (Drools), Service Locator |
| Designer | Configuration, Projects, Servers, Job Conductor, EBS Conductor, EBS Conductor, EBS Publisher, Execution Plan, Monitoring | Execution Plan, Audit, BRMS (Drools), Service Locator |
| Viewer | Servers, Job Conductor, Execution Plan, Audit, Studio, Repository | None. |

5. Select **Validate**, and then select **Save**.
6. Select .

### Results

The user permissions are set.

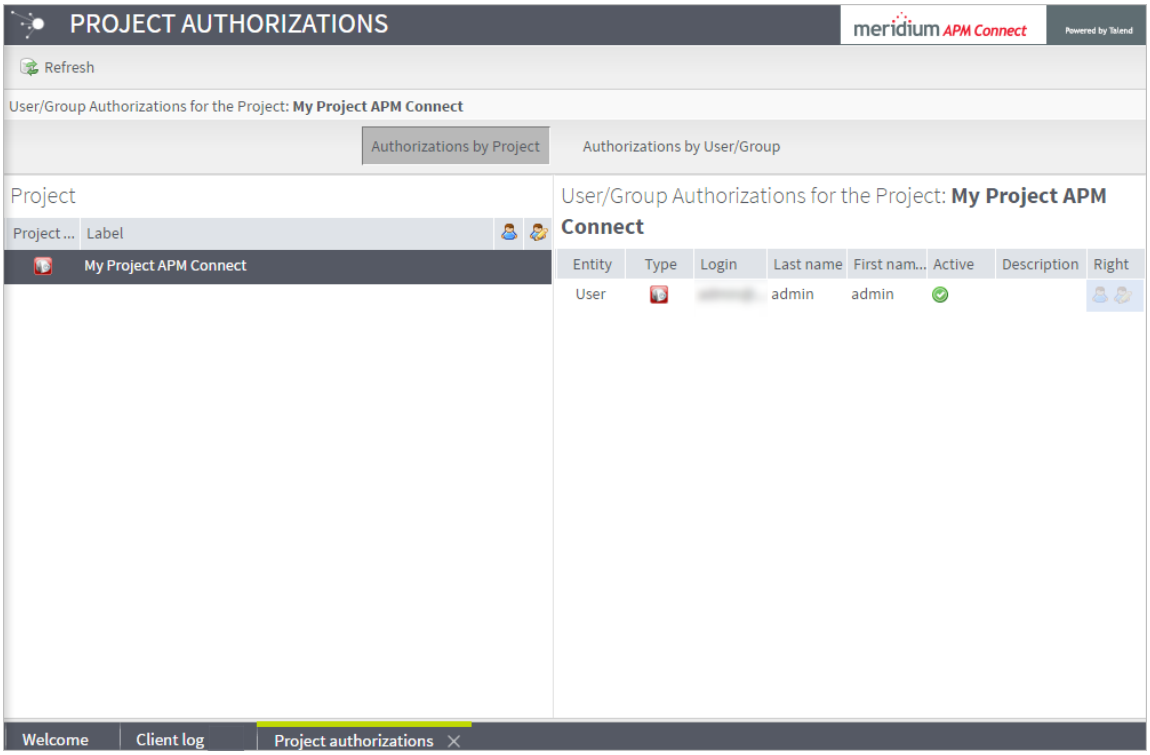
# Authorize Users for Projects

Before a user can begin work on a specific project, that user must be authorized to work on that project. Each project can have multiple users with differing roles. Users can also be authorized for multiple projects. This topic explains how to authorize a user for a project.

### Procedure

1. In the **Menu** pane, in the **Settings** section, select **Project authorizations**.

   The **Project Authorizations** workspace appears displaying the **Project** section which lists all the projects to which you can add users and the **User Authorizations for the Project: <name>** section which lists all users that can be added to the project.




2. From the **Project** list, select the project to which you want to add a user.
3. To give a user read permissions only, in the **Right** column in the row for that user, select the  button.
4. To give a user read and write permissions, in the **Right** column in the row for that user, select the  button.

   **Tip:** The icons in the **Right** column will be appear in a lighter color if the user is not authorized for a specific action, and be colored if the user has the required permissions.

   The user is now authorized for the project.

# Configure Logging

APM Connect uses log4j version 1.2 to log events and provides a default configuration for logging events. These steps describe how to modify this default configuration.

**Procedure**

1. On the APM Connect Server, navigate to the folder `C:\APMConnect\Config`.
2. Open the file `log4j.properties` in an application that you can use to modify a text file (for example, Notepad).
3. Modify the log4j.rootLogger statement to select the correct severity level and appender. Consider the following example of a modified statement:

   ```
   log4j.rootLogger=ERROR, fileout
   ```

   ...where the first value is the severity level and the second value is the appender to use. You can enter any of the following values as the severity level:

   - TRACE
   - DEBUG
   - INFO
   - WARN
   - ERROR
   - FATAL
   - OFF

   The severity level that you configure controls the messages written to the log. Each severity causes the system to filter messages above that type in the preceding list.

   **Note:** The appender value must be either fileout or consoleout.

   **Important:** To collect the most complete information, do not change the conversion pattern on any appender you use.
4. Modify the log4j.logger.org.apache.cd statement to log the Web Service request and response messages. The format is similar to that previously shown for log4j.rootlogger.
5. Modify the log4j.logger.org.apache.activemq statement to enable the logging levels for ActiveMQ messages. The format is similar to to that previously shown for log4j.rootlogger.
6. If you use the console appender, uncomment all statements containing consoleout and comment the statements containing fileout. Consider the following example:

   ```
   # consoleout is set to be a ConsoleAppender.
   log4j.appender.consoleout=org.apache.log4j.ConsoleAppender
   log4j.appender.consoleout.Threshold=DEBUG
   log4j.appender.consoleout.layout=org.apache.log4j.PatternLayout
   log4j.appender.consoleout.layout.ConversionPattern=[%-5p][%d{dd MMM
   yyyy HH:mm:ss}][%t][%c][%M] %x - %m%n
   #fileout uses fileAppender
   #log4j.appender.fileout=org.apache.log4j.RollingFileAppender
   #log4j.appender.fileout.Threshold=debug
   #log4j.appender.fileout.MaxFileSize=1MB
   #log4j.appender.fileout.MaxBackupIndex=2
   #log4j.appender.fileout.File=${LOG}/${LOG_FILE}
   #log4j.appender.fileout.Append=true
   #log4j.appender.fileout.layout=org.apache.log4j.PatternLayout
   ```

```
#log4j.appender.fileout.layout.ConversionPattern=[%-5p][%d{dd MMM
yyyy HH:mm:ss}][%t][%c][%M] %x - %m%n
```

**Note:** When configuring logging for SAP or SAP PI, you must specify the actual path to the log file as the value of log4j.appender.fileout.file.

7. If you use the file rolling appender:
   a. Modify the **log4j.appender.fileout.MaxFileSize** value to the appropriate size for your installation.
   b. Modify the **log4j.appender.fileout.MaxBackupIndex** value to the number of log files you want to keep.
8. Save the file.

   Event logging has been configured.

# Configure Source System Custom Field Mappings or Default Values

There may be times when you need to either map values from GE Digital APM to your source system or add a default value for a field in your source system from GE Digital APM. This topic describes how to achieve this goal.

### Before You Begin

To successfully perform this task, you must have the following:

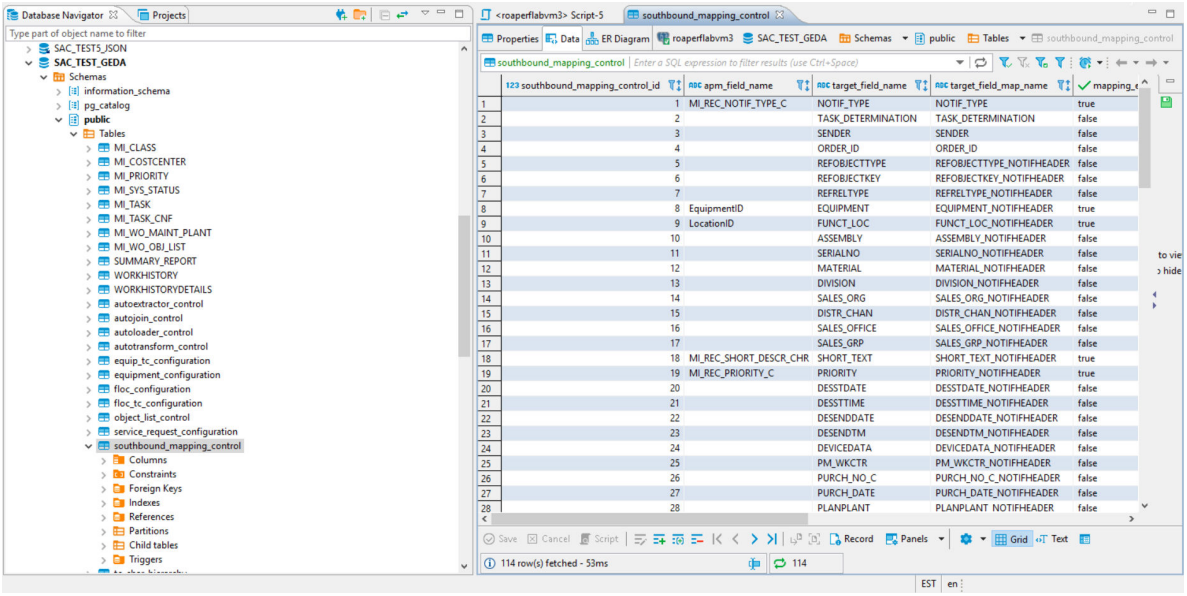
- Administrative rights to the APM Connect database from which you are retrieving the field values or setting the default values.
- A database tool, such as DBeaver or DBVisualizer.

### About This Task

There are times when you need to have information that is stored in GE Digital APM displayed in your source system database. To achieve this goal, you need to modify tables used by GE Digital APM to send data to your source system.

The following procedure describes how to either configure a mapping between GE Digital APM and your source system or to set a default in your source system from GE Digital APM.

The following image is an example of the southbound_mapping_control table as displayed by a database tool.




**Note:** This feature is not available for creating work orders.

### Procedure

1. Using a database tool, navigate to the GE Digital APM database you want to configure.
2. In the database navigation, in the `Tables` folder, select **southbound_mapping_control**.
3. Navigate to the **target_field_name** and **target_field_map_name** column you want to configure.
4. Configure the field mapping or default value for your source system.

| Item to configure | How to configure |
|---|---|
| **Field mapping** | In the **apm_field_name** column, enter the name of the GE Digital APM field that contains the value to apply in the source system, and then set the value in the **mapping_enabled** column to `true`<br><br>For example, if you want to set the source system value of REPORTEDBY in map table REPORTEDBY_NOTIFHEADER from the GE Digital APM field CurrentUserID, the table would resemble the following when you complete your update.<br><br>31 STRMLFNDATE STRMLFNDATE_NOTIFHEADER false PRF-800<br>32 STRMLFNTIME STRMLFNTIME_NOTIFHEADER false PRF-800<br>33 CurrentUserID REPORTEDBY REPORTEDBY_NOTIFHEADER true PRF-800<br><br>**Important:** If, after configuring the mapping, you see a blank value for the field, make sure the value you entered in the **apm_field_name** column is correct. |
| **Default value** | In the **target_field_default** column, enter the value you want to be the default in your source system and set the value in the **mapping_enabled** column to `false`. |

### Results

Your source system mappings or default values are configured.

# Configure the APM Connect Administration Center for the Studio

### About This Task

**Important:** This step is required only if you have the APM Connect Studio license. If you are deploying APM Connect Base with a Basic or Plus License, skip this procedure.

### Procedure

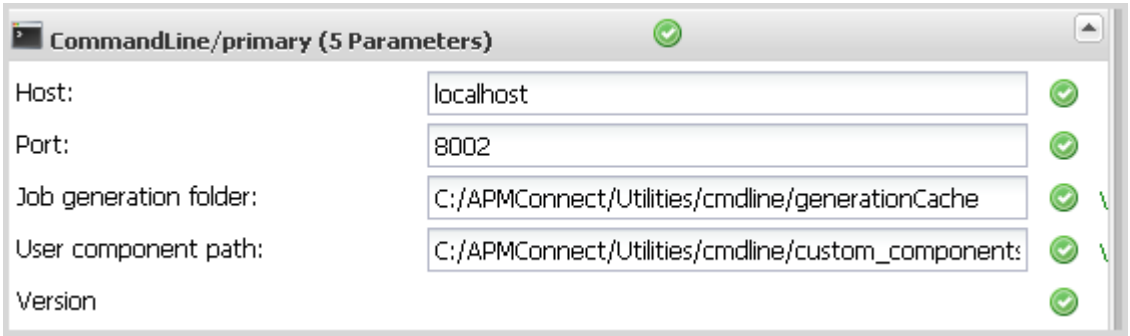
1. Open a web browser.

   **Tip:** APM Connect is most compatible with Google Chrome or Mozilla Firefox web browsers. It is not recommend using Internet Explorer to access the APM Connect Administration Center.
2. Enter the following URL into your web browser: http://localhost:8080/apmconnect/.
3. If prompted, log in to the APM Connect Administration Center.
4. In the **Menu** pane, in the **Settings** section, select the **Configuration** tab.

   The **Configuration** pane appears.
5. Select the **CommandLine/primary (5 Parameters)** group to expand the workspace.
6. According to recommendations in the information in the following table, enter the necessary parameters.

| Parameter | Description | Recommend or Default Value |
|---|---|---|
| Host | The IP address of the CommandLine. | localhost |
| Port | The port number on which the CommandLine is queried. | 8002 |
| Job generation folder | The path to the folder where Jobs are generated. | <root:>\APMConnect\Utilities\cmdline\generationCache |
| User component path | The path to the folder where user components are stored. | <root:>\APMConnect\Utilities\cmdline\custom_components |

The default parameters are configured as shown in the following image.



# Install the Studio

### About This Task

**Important:** This step is required only if you have the APM Connect Studio license. If you are deploying APM Connect Base with a Basic or Plus License, skip this procedure and proceed to the next step in the APM Connect Base deployment workflow.

### Procedure

1. On the machine on which you installed APM Connect, access the Talend Studio installation package.
2. Open the file `TalendStudioInstall.exe`.
3. In the **Setup-Talend Studio** window, select **Next**.

   The **License Agreement** window appears.
4. Read the entire license agreement, and then select one of the following options:
   - **I accept the agreement**: If you agree to the terms of the license agreement and want to continue. These instructions assume that you want to continue.
   - **I do not accept the agreement**: This option is selected by default. If you do not agree to the terms of the license agreement and do not want to continue, select **Cancel** to exit the installer.

   **Next** is enabled.
5. Select **Next**.

   The **Select Destination Location** screen appears.
6. Select **Next**.

   The **Select Components** screen appears.
7. Select the **Add Start Menu Entry** box, then select the **Add Desktop Icon** box, and then select **Next**.
8. Select **Next**.
9. In the **Select Start Menu Folder** window, select **Next**.
10. In the **Ready to Install** window, select **Install**.

    The **Installing** screen appears, displaying an installation progress bar.
11. When the installation completes, in the **Completing the Talend Studio Setup Wizard** window, select **Finish**.

### Results

The installation is complete, and Talend Studio desktop icon is available.

# Deploy Data Loaders or Adapters

After configuring APM Connect, you must deploy the adapters or data loaders you need.

The process for deploying and configuring the data loaders and the various adapters are described in the sections devoted to the APM Connect data loaders or the other adapters.

# Access APM Connect EAM Jobs

### Procedure

In the module navigation menu, select **Admin** > **Operations Manager** > **APM Connect EAM Jobs**.

The **APM Connect EAM Jobs** page appears.


# Access the Details of an EAM Job

### Procedure

1. In the module navigation menu, select **Admin** > **Operations Manager** > **APM Connect EAM Jobs**.
2. In the **Status and Log** column, view the status of each job.

**Tip:** If necessary, you can cancel an import job by selecting the button that appears in the **Status and Log** column. If you cancel a job, any changes that have already occurred are not removed, therefore, you may need to manually modify records to update or remove unnecessary data.

| Status | Description |
|---|---|
| Waiting | Initial state when job is created. The data import job is queued for pre-processing on the APM Connect Server. |
| Staging In Progress | The data import job is being prepared on the APM Connect Server. |
| Staging Failure | The data import job failed during preparation. |
| Staging Complete | The data import job was prepared successfully. |
| Dataloader Enqueued | The maximum number of data load jobs has been exceeded, as determined in the APM Connect Connection Records, or there is a job of the same type running. The data import will begin once the other jobs are complete. |

| Status | Description |
|---|---|
| Configuring Dataloader | The data import job is configuring the proper user roles and arranging data processing for most efficient execution flow. |
| In Progress | The data import job is loading data into the GE Digital APM Data Source. |
| Data Synchronization in Progress | The data import job is synchronizing the loaded data and relationships across the Data Source. |
| Job Cancelling | The data import job is in the process of being canceled. This occurs after you select . |
| Cancelled by User | The data import job was cancelled successfully.<br>**Note:** When a job is cancelled, the data imported prior to cancelling is not removed. |
| Errors | The data import is complete, but encountered one or more errors. You can download the log file to view detailed error messages. |
| Complete | Data has been imported into GE Digital APM.<br>**Note:** If the icon appears, the data was imported with warnings. You can download the log file to view detailed warning messages. |

3. In the **Status and Log** column, select on the row corresponding to the EAM job for which you want to access the log.

   The log file is downloaded.
4. To access the Interface Log record for a specific job, in the **Job ID** column select the job ID that you want to open.

   The **Record Manager** page appears, displaying the datasheet for the selected job.
5. To view the information contained in the **Log Text**, select the **Log Text**

   A window appears, displaying details about the job such as error messages, warnings concerning the data load, and general information regarding the data records that were loaded.

# Delete a Job

When upgrading in a cloud environment or an adapter, you have to delete the old adapter job before installing the new job.

### Procedure

1. Access the APM Connect Administration Center.
2. In the **Menu** pane, in the **Conductor** section, select **Job Conductor**.

   The **Job Conductor** workspace appears.
3. In the **Job Conductor** workspace, select the job you want to delete, and then, at the top of the workspace, select Delete.

### Results

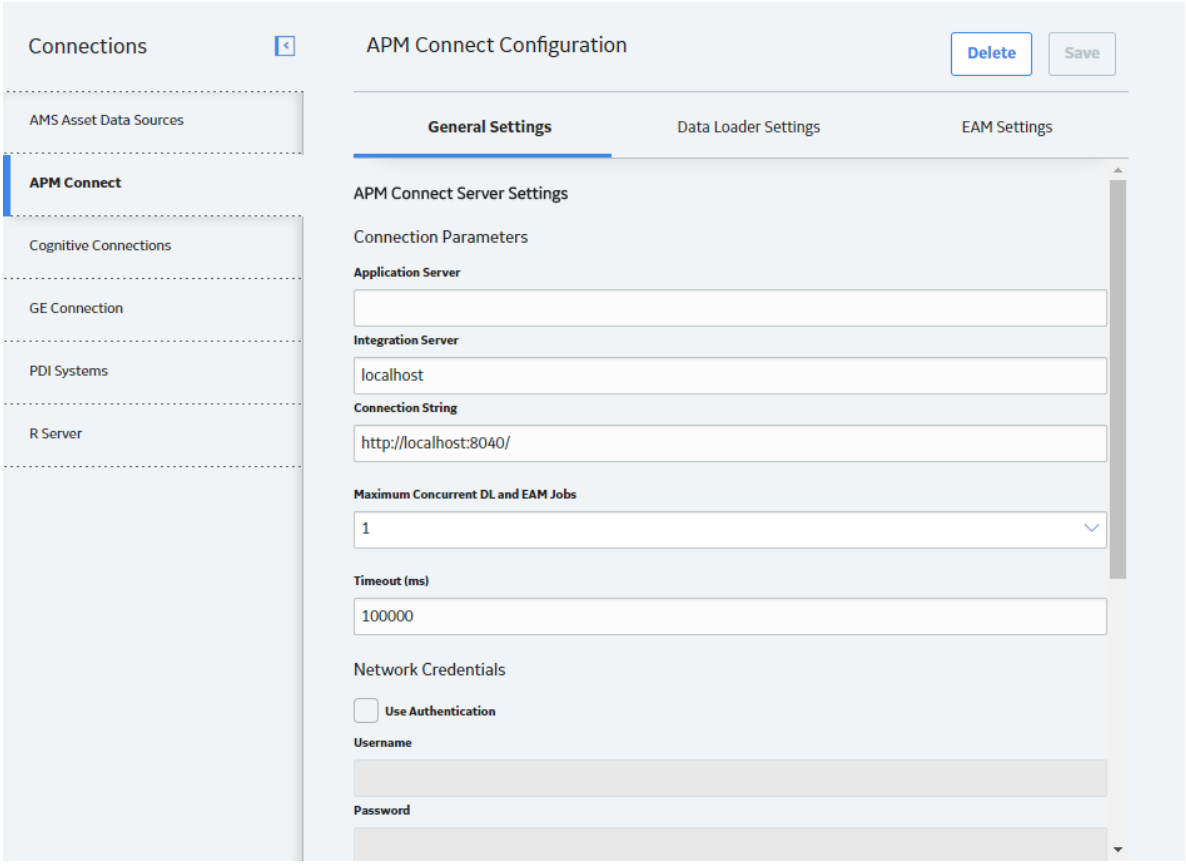
The job is deleted.

# Access the APM Connect Page

### Procedure

In the module navigation menu, select **Admin** > **Operations Manager** > **Connections**., and then select **APM Connect**.

The **APM Connect** workspace appears.




# Establish Connection from GE Digital APM

### About This Task

To load data into GE Digital APM using the APM Connect Data Loaders or the EAM Adapters. You must establish the connection between your APM Connect component and GE Digital APM.

### Procedure

1. Access the APM Connect page.

   The APM Connect **Configuration** workspace appears.

2. In the APM Connect **Configuration** workspace, configure the parameters on the APM Connect Connection record in the following sections.
   - **General Settings**: Established the connection between the APM Connect server and GE Digital APM.

     **Important:** The **General Settings** section must be configured if you are using either the Data Loaders or the EAM adapters.
   - **Data Loaders Settings**: Stores the staging database parameters and the remote file server settings.
   - **EAM Settings** : Used to schedule work orders, which determine how frequently work orders will be transferred to your SAP.

     **Note:** These settings are only required for the SAP adapters.
3. Select **Save**.

### Results

The connection between APM Connect and GE Digital APM is established.

# Determine Logging Level

### Procedure

1. Access the APM Connect page, and then select **Data Loaders** settings.

   The **Data Loaders Settings** workspace appears.
2. In the **Logging Level** box, use the drop-down to select one of the following logging levels:
   - **Debug**: The default logging level, and the highest level of logging. Selecting debug will return the most details and is helpful when trying to debug the application.
   - **Info**: Returns information message indicating the progress of the application, and is the second highest level of logging.
   - **Warn**: Returns warnings detected during the loading process.
   - **Error**: The lowest level of logging returning errors only.

   **Notes:**
   - Logging levels are hierarchical. For example, if you select **Info**, you will see all warnings and errors. If you select **Error**, you will only see errors.
   - If you are loading a large amount of data, you should use logging level Warn or Error to improve performance, unless debugging a problem.
3. Select **Save**.

   The record is saved.

### Results

Once the record is saved, subsequent data loads will return log files with the logging level you determined. The logging level will only apply to future data loads. Meaning if you change the level from **Error** to **Warn** historic log files will not be updated with more details. It will only apply to new data loads.

# Chapter 5

# Data Loaders

**Topics:**

# General Information

## Requirements for APM Connect Data Loaders

All APM Connect Data Loaders have the same mapping and security settings requirements.

### Security Settings

The Security User performing the data load operation must be associated with either the MI Data Loader User or MI Data Loader Admin Security Role.

### Mapping

The Data Loaders map the datasheet columns in the Excel workbook to fields in GE Digital APM families by field ID. The captions may be changed as needed, but do not change the field IDs.

## About Populating Site Reference Data

The APM Family Data Loader can be used to populate the Site Reference on Equipment and Functional Location records in GE Digital APM.

### About This Task

The APM Family Data Loader populates the **ENTY_KEY** system field and the **MI_SITE_KEY** system field associated with the Site Reference value to be populated. On asset records, the Site Reference is stored in the **MI_SITE_KEY** field, a system field in GE Digital APM. The APM Data Loader uses the Site Name (**MI_SITE_NAME**) to translate the value to the corresponding Site Key and populate the **MI_SITE_KEY** field; therefore, you do not need to know the key to be able to populate the site reference. This functionality is important because this value can change from one database to another.

### Procedure

1. On the data worksheet, add a column that contains **MI_SITE_NAME** in the column name.
   For example if you are working with a relationship, where a distinction needs to be made regarding which family is associated with each column, then the column name will be prefaced with the Family ID. As shown in the following image, the column name might take the form `MI_EQUIP000|MI_SITE_NAME`, where MI_EQUIP000 is the Family ID.

| C | D | E |
|---|---|---|
| Technical Number | CMMS System | Site Reference Name |
| )00\|MI_EQUIP000_EQUIP_TECH_NBR_C | MI_EQUIP000\|MI_EQUIP000_SAP_SYSTEM_C | MI_EQUIP000\|MI_SITE_NAME |
| DC-PMP-574000 | Houston, TX | Houston, TX |
| | | |

2. Enter the site name to designate the site by which the asset record, once loaded into GE Digital APM, will be filtered.
3. Continue populating the source workbook, and then run the data loader.

# APM Family Data Loader

## The APM Family Data Loader General Loading Strategy

This section describes any prerequisites to loading the data and the order in which the data will be loaded.

### Before You Begin

1. Determine Load Type: Single Family or Two Related Families.
   The APM Family Data Loader supports loading records into a single family, or you can load records into one family and records into another family and link the two records together. The type of data that you want to load will determine the sample template with which you will start.
2. Determine What Families and Relationships to Populate.
   You can determine which families are available and how families are related in Family Management. To access Family Management:

### Procedure

1. Determine if you want to load data into a single family or into two families that are related to each other.
2. Access a sample APM Family Data Loader source file based on the type of load determined in step 1 on page 65.
3. Determine what families and or relationships you want to populate using the APM Family Data Loader.
4. Export the metadata that reflects the metadata definition for the family or families into which you want to load data.
5. Populate the **Configuration** worksheet.
6. Populate the column headers of the **<Data>** worksheet using the exported metadata.
7. As needed, modify the worksheets to populate unit of measure to apply the correct unit of measure to any of the numeric fields.
8. As needed, modify the worksheets to populate time zones to convert any date or time fields to the correct time zone.

## About the APM Family Data Loader Workbook Layout and Use

This section provides a high-level overview and explanation of how the data loader workbook is constructed.

In order to import data using the APM Family Data Loader, GE Digital APM provides an Excel workbook that must be used to perform the data load.

The following table lists the worksheets that are included in the `APM Family.xlsx` workbook.

| Worksheet | Description |
|---|---|
| **Configuration** | The Configuration worksheet is needed to describe the type of data that you will be loading and how that data should be handled during the data load. |
| **<data>** | Where you specify the actual data to be loaded. |

Each worksheet in the APM Data Loader workbook contains field values that can be mapped to the appropriate APM Family Data Loader family/field.

### Configuration Worksheet

The Configuration worksheet tells the APM Family Data Loader what types of data are being loaded and how the data is to be loaded, and is standard for all data loads regardless of the type of data that you are loading. The following table outlines the options that are valid or the values that are expected in each of the columns on the Configuration worksheet.

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Load Data From Worksheet | LOAD_DATA_WORKSHEET | Boolean | Identifies if data from the corresponding worksheet identified in the **Data Worksheet ID** column will be loaded or not.<br>• True: The corresponding worksheet will be processed.<br>• False: The corresponding worksheet will not be processed. |
| Data Worksheet ID | DATA_WORKSHEET_ID | Character | This column contains the name of the **<data>** worksheet where the actual data is located. It needs to have the same name as the **<data>** worksheet in the data loader workbook. |
| Batch Size | BATCH_SIZE | Character | Modifying this field is required to determine the number of records processed in each batch. Enter the batch size you want, and the Data Loader will process that many records per batch.<br>For example, if you want to use a batch size of 100, enter 100, and the data loader will process 100 records per batch.<br>**Note:** The recommended batch size is 100. If the **Batch Size** column is removed from the source workbook, the data loader will default to a batch size of 100.<br>In addition to processing the data in batches, the log file reports progress by batch. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Primary Family ID | PRIMARY_FAMILY_ID | Character | Depending on the type of data that you are working with, this will contain the Relationship Family ID or the Entity Family ID. You can also allow the data in source file to determine the Family ID by encapsulating the Field ID that contains the Family ID data in brackets (<>).<br>For example if in the **<data>** worksheet there is a column with an ID of PRIMARY_FAMILY_ID, where each row contains the corresponding Family ID, then in this column you should put the value of <PRIMARY_FAMILY_ID>.<br>If the Family ID in the Meridium, Inc. metadata contains spaces, then you have to use this feature. |
| Primary Family Key Fields | PRIMARY_FAMILY_KEY_FIELDS | Character | This column contains the Field IDs associated with the Primary Family that are used to uniquely identify a record. If more than one field is to be used, then each Field ID needs to be separated by a \| (Pipe) character. In the case where you are loading data into a relationship, if no keys fields exist or are used, use the <none> constant.<br>If the Primary Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the <none> constant. |
| Family Type | FAMILY_TYPE | Character | The value is this column should be Entity or Relationship depending on the type of data that is being loaded. |
| Predecessor Family ID | PRED_FAMILY_ID | Character | When the Family Type is Relationship, this column will contain the value of the Entity Family ID that is the predecessor in the relationship. Otherwise, it should contain the <none> constant. You can also use the data in each of the rows to determine the Predecessor Family ID. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Predecessor Family Key Fields | PRED_FAMILY_KEY_FIELDS | Character | This column contains the Field ID or IDs associated with the Predecessor Family that are used to uniquely identify the predecessor record. If more than one field is to be used, then each Field ID needs to be separated by a \| (Pipe) character.<br>If the Predecessor Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the <none> constant. |
| Successor Family ID | SUCC_FAMILY_ID | Character | When the Family Type is Relationship, this column will contain the value of the Entity Family ID that is the successor in the relationship. Otherwise, it should contain the <none> constant. You can also use the data in each of the rows to determine the Successor Family ID. |
| Successor Family Key Fields | SUCC_FAMILY_KEY_FIELDS | Character | This column contains the Field ID or IDs associated with the Successor Family that are used to uniquely identify the successor record. If more than one field is to be used, then each Field ID needs to be separated by a \| (Pipe) character.<br>If the Successor Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the <none> constant. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Primary Action | PRIMARY_ACTION | Character | The value in this column will determine the action that will be applied to the Primary Family records. If the Family Type is Entity, then the possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE<br>• ACTION_PURGE<br>Deleting a record and purging a record will both delete the current record, the difference being that the purge action will delete the record and all of the links or relationships tied to that record. The delete action will simple attempt to delete the record, and if it is related to another record, the delete will fail. If The Family Type is Relationship, then the possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE |
| Predecessor Action | PRED_ACTION | Character | The value in this column will determine the action that will be applied to the Predecessor Family records. The possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE<br>• ACTION_PURGE<br>• ACTION_LOCATE<br>If The Family Type is Entity then the values needs to be<br>• ACTION_NONE |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Successor Action | SUCC_ACTION | Character | The value in this column will determine the action that will be applied to the Successor Family records. The possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE<br>• ACTION_PURGE<br>• ACTION_LOCATE<br>If The Family Type is Entity then the values needs to be<br>• ACTION_NONE |
| Insert with Null Values? | OPTION_INSERT_ON_NULL | Boolean | When setting field values on a new record, if a value coming across is NULL, the field values will be set to NULL if this option is set to True. |
| Update with Null Values? | OPTION_UPDATE_ON_NULL | Boolean | When setting field values on an existing record, if a value coming across is NULL, the field values will be set to NULL if this option is set to True. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Replace an Existing Link? | OPTION_REPLACE_EXISTING_LINK | Boolean | The Replace Existing Relationship option is used to determine how a relationship is to be maintained by its cardinality definition.<br><br>For example, the relationship Location Contains Asset that is defined in the Configuration Manager. It has a cardinality defined as Zero or One to Zero or One, has a Location LP-2300, and contains the Asset P-2300. If, in the data load, you assign the Asset P-5000 to be contained in the Location LP-2300, and you have set the Replace Existing Link property to True, then the data loader will link P-5000 to LP-2300 and unlink P-2300 from LP-2300. This assumes that P-5000 is not currently linked to another location. The same is true for a relationship that is defined as Zero or One to Zero or Many, or Zero or Many to Zero or One. |
| Allow Change of Family? | OPTION_ALLOW_CHANGE_OF_FAMILY | Boolean | Allows the data loader to move an entity from one family to another.<br><br>For example this would allow an entity that is currently assigned to the Centrifugal Pump family to be moved to the Reciprocating Pump family.<br><br>All relationships will be maintained as long as the family to which the entity is being moved allows the same relationships.<br><br>**Note:** Because of the extra processing required, by selecting this option, the interface performance will decrease. |

### <Data> Worksheet

There is no preexisting format that must be adhered to on the **<data>** worksheet, because the Data Loader operates on a flexible framework. Field captions and ID are determined based on the data that you want to load.

Use the metadata exported from GE Digital APM to construct the **<data>** worksheet, to populate the rows with the actual data that will be loaded.

**Important:** If a field is calculated in GE Digital APM, it cannot be populated through the data loader. If you attempt to load these fields, a warning will appear in the log.

Steps: Export Metadata

Get a copy of the metadata definitions for the family or families that you will be working with to load data.

1. Login to GE Digital APM.

2. On the left navigation menu, select **Admin**, then select **Configuration Manager**, and then select **Export**.
3. At the top of the page, in the **File Name** box, enter a file name and in the **File Type** box, select **Excel (.xlsx)**.
4. In the **Select metadata type** box, select **Families, Fields and Field Behaviors**.
5. Select the family or families that you want to export and move them to the **Selected Items** list.

   **Tip:** Be sure to order the families in the order in which you want the fields to appear in the export.
6. Select **Start Export**.

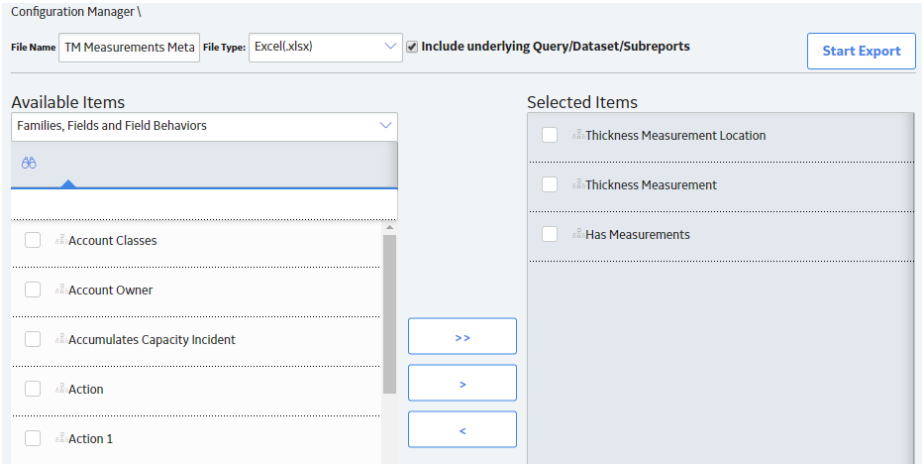
   The metadata is exported, and can be used to populate the **<data>** worksheet.
7. Save the metadata.

**Export Metadata to Load Thickness Measurements**

If you want to load Thickness Measurements into GE Digital APM, because Thickness Measurements needs to be related to a Thickness Measurement Location, you must also export that family along with the Has Measurements relationship family.

1. Log in to GE Digital APM.
2. On the left navigation menu, select **Admin**, then select **Configuration Manager**, and then select **Export**.
3. At the top of the page, in the **File Name** box, enter a file name (for example, `TM Measurements Metadata`).
4. In the **File Type** box, select **Excel (.xlsx)**.
5. In the **Select metadata type** box, select **Families, Fields, Fields Behaviors**, and then select the following families:
   - **Thickness Measurement Location**
   - **Thickness Measurement**
   - **Has Measurements.**

   **Tip:** Export the families in this order. This is how the fields appear in the export file.




6. Select **Start Export**.

   The metadata is exported, and can be used to populate the **<data>** worksheet.
7. Save the metadata.

   This exported metadata, is used to build source file template.

### Configure the Data Loader Source File to Use Units of Measure

Sometimes the data that is being loaded, is in a different unit of measure than the one associated with the corresponding field in GE Digital APM. When this is the case, the APM Family Data Loader allows for you to specify the unit of measure that is tied to a specific row and column. This is done by copying the column to which the unit of measure is tied, and then adding the suffix |UOM to the end of the Column ID. Then, in the data, specify the unit of measure ID for the data being loaded. This unit of measure ID needs to be a valid unit of measure as defined GE Digital APM, and a valid conversion needs to be specified for the unit of measure specified and the field's unit of measure. Please note that if a unit of measure is not specified, then it will use the field's unit of measure, as defined inGE Digital APM.

### Configure the Data Loader Source File to use Time Zones

Sometimes date and time data that is being loaded was collected in a different time zone than the time zone associated with the current user. When this is the case, the APM Family Data Loader allows you to specify the time zone that is tied to a specific row and column. This is done by copying the column to which the time zone is tied, and then adding the suffix |TZ to the end of the Column ID. Then, in the data, specify the time zone for the data being loaded. Please note that if a time zone is not specified, then it will use the time zone defined for the current user.

## Example APM Family Workbooks

In addition to the APM Family Data Loader workbook, you can access an example workbook Foundation_APM_Data_Loader-Health Indicators and Readings example.xlsx. This example workbook illustrates how you can use the APM Family Data Loader to load records into a defined GE Digital APM family and link records in one family to another. You can use the information in this example as a model to configure or define templates for loading data into any baseline or custom family.

The data loader in this example creates Health Indicator records in GE Digital APM, links the Health Indicator records to Equipment records, and then links the Health Indicator records to Health Indicator Mapping records. Finally, the data loader loads Readings for one of the Health Indicators. In addition, the example spreadsheet includes how you can use a reference worksheet to store list values and other reference information that users can use when populating the data loader template with data.

### Populate the Configuration Worksheet

The Configuration Worksheet tells the APM Family Data Loader what types of data are being loaded and how the data is to be loaded.

### Populate the HealthIndicators Worksheet

The HealthIndicators worksheet is populated with the actual Health Indicator records you want to load into GE Digital APM.

### Populate the HealthIndicatorsEquipment Worksheet

The HealthIndicatorsEquipment worksheet is populated with the key field values for the Equipment records to which the Health Indicators on the HealthIndicators worksheet will be linked once loaded into GE Digital APM.

### Populate the HealthIndicatorMappings Worksheet

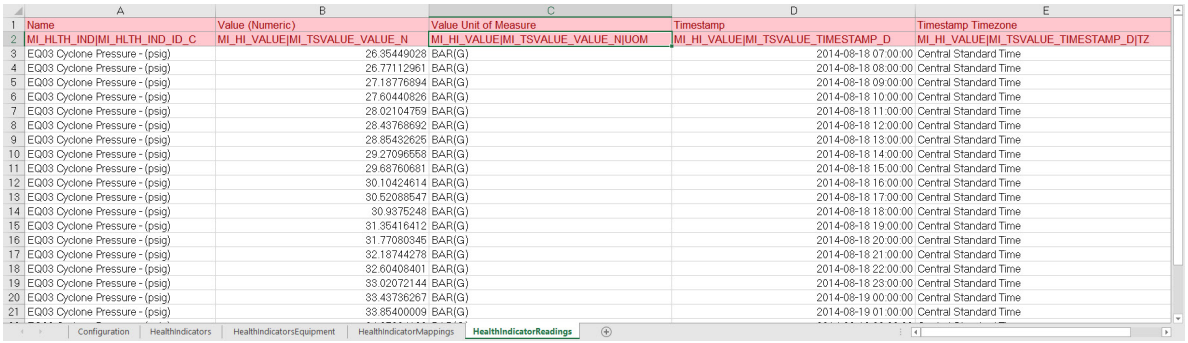
The HealthIndicatorMappings worksheet is populated with the Health Indicator Mappings to load into GE Digital APM.

### Populate the HealthIndicatorReadings Worksheet

The HealthIndicatorReadings worksheet is populated with the actual Health Indicators data you want to load into GE Digital APM.

On this worksheet, Column C illustrates a feature of the APM Family Data Loader where the unit of measure for a given field can be indicated, so that it can be converted to the baseline unit of measure if needed. Assume, for example, that the MI_TSVALUE_VALUE_N field was defined in GE Digital APM as being stored in PSIG, but the data in the spreadsheet was represented by BAR(G). As shown in the following image, you can add the UOM column to indicate to that the unit of measure for the source data is BAR(G). When this column is added, the APM Family Data Loader will convert the data from BAR(G) to PSIG (assuming that there is a unit of measure conversion defined for this in GE Digital APM).

**Tip:** For more information, refer to the units of measure documentation.

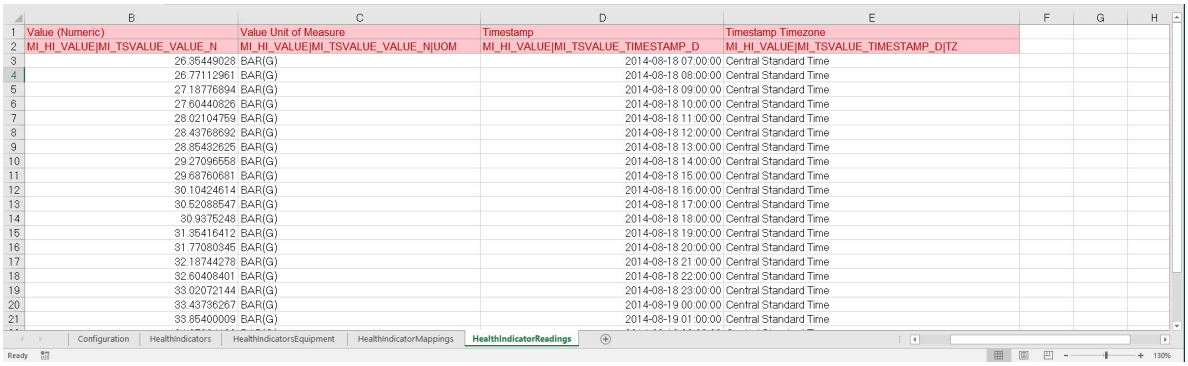


| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Name | Value (Numeric) | Value Unit of Measure | Timestamp | Timestamp Timezone |
| 2 | MI_HLTH_IND\|MI_HLTH_IND_ID_C | MI_HI_VALUE\|MI_TSVALUE_VALUE_N | MI_HI_VALUE\|MI_TSVALUE_VALUE_N\|UOM | MI_HI_VALUE\|MI_TSVALUE_TIMESTAMP_D | MI_HI_VALUE\|MI_TSVALUE_TIMESTAMP_D\|TZ |
| 3 | EQ03 Cyclone Pressure - (psig) | 26.35449028 | BAR(G) | 2014-08-18 07:00:00 | Central Standard Time |
| 4 | EQ03 Cyclone Pressure - (psig) | 26.77112961 | BAR(G) | 2014-08-18 08:00:00 | Central Standard Time |
| 5 | EQ03 Cyclone Pressure - (psig) | 27.18776894 | BAR(G) | 2014-08-18 09:00:00 | Central Standard Time |
| 6 | EQ03 Cyclone Pressure - (psig) | 27.60440826 | BAR(G) | 2014-08-18 10:00:00 | Central Standard Time |
| 7 | EQ03 Cyclone Pressure - (psig) | 28.02104759 | BAR(G) | 2014-08-18 11:00:00 | Central Standard Time |
| 8 | EQ03 Cyclone Pressure - (psig) | 28.43768692 | BAR(G) | 2014-08-18 12:00:00 | Central Standard Time |
| 9 | EQ03 Cyclone Pressure - (psig) | 28.85432625 | BAR(G) | 2014-08-18 13:00:00 | Central Standard Time |
| 10 | EQ03 Cyclone Pressure - (psig) | 29.27096558 | BAR(G) | 2014-08-18 14:00:00 | Central Standard Time |
| 11 | EQ03 Cyclone Pressure - (psig) | 29.68760681 | BAR(G) | 2014-08-18 15:00:00 | Central Standard Time |
| 12 | EQ03 Cyclone Pressure - (psig) | 30.10424614 | BAR(G) | 2014-08-18 16:00:00 | Central Standard Time |
| 13 | EQ03 Cyclone Pressure - (psig) | 30.52088547 | BAR(G) | 2014-08-18 17:00:00 | Central Standard Time |
| 14 | EQ03 Cyclone Pressure - (psig) | 30.9375248 | BAR(G) | 2014-08-18 18:00:00 | Central Standard Time |
| 15 | EQ03 Cyclone Pressure - (psig) | 31.35416412 | BAR(G) | 2014-08-18 19:00:00 | Central Standard Time |
| 16 | EQ03 Cyclone Pressure - (psig) | 31.77080345 | BAR(G) | 2014-08-18 20:00:00 | Central Standard Time |
| 17 | EQ03 Cyclone Pressure - (psig) | 32.18744278 | BAR(G) | 2014-08-18 21:00:00 | Central Standard Time |
| 18 | EQ03 Cyclone Pressure - (psig) | 32.60408401 | BAR(G) | 2014-08-18 22:00:00 | Central Standard Time |
| 19 | EQ03 Cyclone Pressure - (psig) | 33.02072144 | BAR(G) | 2014-08-18 23:00:00 | Central Standard Time |
| 20 | EQ03 Cyclone Pressure - (psig) | 33.43736267 | BAR(G) | 2014-08-19 00:00:00 | Central Standard Time |
| 21 | EQ03 Cyclone Pressure - (psig) | 33.85400009 | BAR(G) | 2014-08-19 01:00:00 | Central Standard Time |

Configuration | HealthIndicators | HealthIndicatorsEquipment | HealthIndicatorMappings | HealthIndicatorReadings

Additionally, column E of the HealthIndicatorReadings worksheet illustrates how time zones can be configured. Notice the appendage to the field name as shown in the following image. Adding a column where the Field ID is appended with a |TZ indicates the timezone of the source column data.

**Note:** If a timezone is not specified, any Date and Time field values are assumed to be in the same timezone as the user who is loading the data.



| | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|
| 1 | Value (Numeric) | Value Unit of Measure | Timestamp | Timestamp Timezone | | | |
| 2 | MI_HI_VALUE\|MI_TSVALUE_VALUE_N | MI_HI_VALUE\|MI_TSVALUE_VALUE_N\|UOM | MI_HI_VALUE\|MI_TSVALUE_TIMESTAMP_D | MI_HI_VALUE\|MI_TSVALUE_TIMESTAMP_D\|TZ | | | |
| 3 | 26.35449028 | BAR(G) | 2014-08-18 07:00:00 | Central Standard Time | | | |
| 4 | 26.77112961 | BAR(G) | 2014-08-18 08:00:00 | Central Standard Time | | | |
| 5 | 27.18776894 | BAR(G) | 2014-08-18 09:00:00 | Central Standard Time | | | |
| 6 | 27.60440826 | BAR(G) | 2014-08-18 10:00:00 | Central Standard Time | | | |
| 7 | 28.02104759 | BAR(G) | 2014-08-18 11:00:00 | Central Standard Time | | | |
| 8 | 28.43768692 | BAR(G) | 2014-08-18 12:00:00 | Central Standard Time | | | |
| 9 | 28.85432625 | BAR(G) | 2014-08-18 13:00:00 | Central Standard Time | | | |
| 10 | 29.27096558 | BAR(G) | 2014-08-18 14:00:00 | Central Standard Time | | | |
| 11 | 29.68760681 | BAR(G) | 2014-08-18 15:00:00 | Central Standard Time | | | |
| 12 | 30.10424614 | BAR(G) | 2014-08-18 16:00:00 | Central Standard Time | | | |
| 13 | 30.52088547 | BAR(G) | 2014-08-18 17:00:00 | Central Standard Time | | | |
| 14 | 30.9375248 | BAR(G) | 2014-08-18 18:00:00 | Central Standard Time | | | |
| 15 | 31.35416412 | BAR(G) | 2014-08-18 19:00:00 | Central Standard Time | | | |
| 16 | 31.77080345 | BAR(G) | 2014-08-18 20:00:00 | Central Standard Time | | | |
| 17 | 32.18744278 | BAR(G) | 2014-08-18 21:00:00 | Central Standard Time | | | |
| 18 | 32.60408401 | BAR(G) | 2014-08-18 22:00:00 | Central Standard Time | | | |
| 19 | 33.02072144 | BAR(G) | 2014-08-18 23:00:00 | Central Standard Time | | | |
| 20 | 33.43736267 | BAR(G) | 2014-08-19 00:00:00 | Central Standard Time | | | |
| 21 | 33.85400009 | BAR(G) | 2014-08-19 01:00:00 | Central Standard Time | | | |

Configuration | HealthIndicators | HealthIndicatorsEquipment | HealthIndicatorMappings | HealthIndicatorReadings

Ready

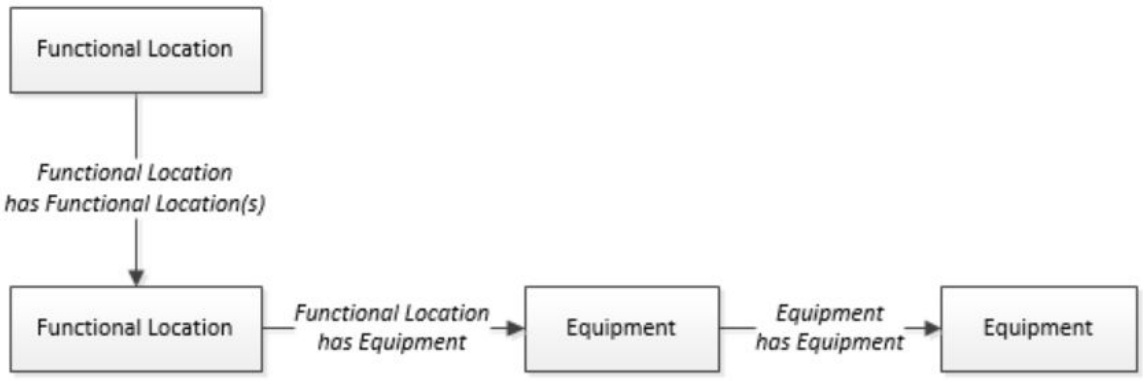
# Equipment and Functional Location Data Loader

## About the Equipment and Functional Location Data Loader

The Equipment and Functional Location Data Loader allows a user to import data from an Excel workbook. The user is able to build out the asset hierarchy based on structure defined in the Excel workbook.

## About the Equipment and Functional Location Data Loaders Data Model

The data for Equipment and Functional Location is loaded from a single Excel workbook containing multiple worksheets. This includes Functional Locations and Equipment.




The Functional Location can be linked to a parent Functional Location using the relationship Functional Location Has Functional Location(s).

## The Equipment and Functional Location Data Loader General Loading Strategy

This topic describes any prerequisites to loading the data and the order in which the data will be loaded for Equipment and Functional Location Data Loaders.

### Before You Begin

Equipment Taxonomy data must be present prior to loading Equipment and Functional Location data.

### About This Task

**Note:** Before reading this section, refer to the Data Model section.

The Equipment and Functional Location data load must be performed in a specific sequence to successfully populate fields, create records, and link them to the predecessor and/or successor records.

### Procedure

1. Create the Functional Location.
2. Create the Equipment.

   The Equipment and Functional Location Data Loaders have the listed limitations.

   - The Functional Location hierarchy can be constructed in the loader by assigning the parent Functional Location (superseding Functional Location) to the child record.
   - CMMS-ID is a required field that is intended to identify the original source of the data and part of the key value.
   - After loading Equipment records into GE Digital APM with a specific site reference, you cannot update the Equipment records to have global site references by reimporting the workbook with the site reference column updated to global on the Equipment worksheet. To update Equipment records to have global site references, you must update the predecessor Functional Locations with the site reference value *Global* on the worksheet.

In GE Digital APM, records inherit their site references from their predecessor records. Additionally, when the Equipment and Functional Location Data Loader is run, it loads Equipment records first, and then loads Functional Location records. Therefore, to change the equipment record's site reference to global, you would need to re-import the workbook with the Functional Location record indicating a *Global* site reference.

## About the Equipment and Functional Location Data Loaders Workbook Layout and Use

This section provides a high-level overview and explanation of how the data loader workbook is constructed.

In order to import data using the Equipment and Functional Location Data Loaders, GE Digital APM provides an Excel workbook, `Equipment and Functional Location.xlsx`, which supports baseline data loading of equipment and functional locations in GE Digital APM. This workbook must be used to perform the data load.

The master Excel workbook contains one worksheet for each node that will be populated in the data model.

The following table lists the worksheets that are included in the Equipment and Functional Location Data Loaders workbook.

**Note:** Worksheets in the workbook not being used may be left blank, but should not be deleted from the workbook.

| Worksheet | Description |
|---|---|
| Configuration | The Configuration worksheet is needed to describe the type of data that you will be loading and how that data should be handled during the data load. |
| Equipment | This worksheet is used to specify data for import to the Equipment family. |
| EquipmentToSuperiorEquipment | This worksheet is used to link Equipment to Superior Equipment records. |
| FunctionalLocations | This worksheet is used to specify data for import to the Functional Location family. |
| FuncLocsToEquipment | This worksheet is used to link existing Functional Location records to existing Equipment records. |
| FuncLocsToSuperiorFuncLocs | This worksheet is used to link existing Functional Locations to superior Functional Locations. |

### Configuration Worksheet

The Configuration worksheet tells the Data Loader what types of data are being loaded and how the data is to be loaded, and is standard for all data loads regardless of the type of data that you are loading. The following table outlines the options that are valid or the values that are expected in each of the columns on the Configuration worksheet.

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Load Data From Worksheet | LOAD_DATA_WORKSHEET | Boolean | Identifies if data from the corresponding worksheet identified in the **Data Worksheet ID** column will be loaded or not.<br>• True: The corresponding worksheet will be processed.<br>• False: The corresponding worksheet will not be processed. |
| Data Worksheet ID | DATA_WORKSHEET_ID | Character | This column contains the name of the **<data>** worksheet where the actual data is located. It needs to have the same name as the **<data>** worksheet in the data loader workbook. |
| Batch Size | BATCH_SIZE | Character | Modifying this field is required to determine the number of records processed in each batch. Enter the batch size you want, and the Data Loader will process that many records per batch.<br>For example, if you want to use a batch size of 100, enter 100, and the data loader will process 100 records per batch.<br>**Note:** The recommended batch size is 100. If the **Batch Size** column is removed from the source workbook, the data loader will default to a batch size of 100.<br>In addition to processing the data in batches, the log file reports progress by batch. |
| Primary Family ID | PRIMARY_FAMILY_ID | Character | Depending on the type of data that you are working with, this will contain the Relationship Family ID or the Entity Family ID. You can also allow the data in source file to determine the Family ID by encapsulating the Field ID that contains the Family ID data in brackets (<>).<br>For example if in the **<data>** worksheet there is a column with an ID of PRIMARY_FAMILY_ID, where each row contains the corresponding Family ID, then in this column you should put the value of <PRIMARY_FAMILY_ID>.<br>If the Family ID in the Meridium, Inc. metadata contains spaces, then you have to use this feature. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Primary Family Key Fields | PRIMARY_FAMILY_KEY_FIELDS | Character | This column contains the Field IDs associated with the Primary Family that are used to uniquely identify a record. If more than one field is to be used, then each Field ID needs to be separated by a \| (Pipe) character. In the case where you are loading data into a relationship, if no keys fields exist or are used, use the <none> constant.<br>If the Primary Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the <none> constant. |
| Family Type | FAMILY_TYPE | Character | The value is this column should be Entity or Relationship depending on the type of data that is being loaded. |
| Predecessor Family ID | PRED_FAMILY_ID | Character | When the Family Type is Relationship, this column will contain the value of the Entity Family ID that is the predecessor in the relationship. Otherwise, it should contain the <none> constant. You can also use the data in each of the rows to determine the Predecessor Family ID. |
| Predecessor Family Key Fields | PRED_FAMILY_KEY_FIELDS | Character | This column contains the Field ID or IDs associated with the Predecessor Family that are used to uniquely identify the predecessor record. If more than one field is to be used, then each Field ID needs to be separated by a \| (Pipe) character.<br>If the Predecessor Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the <none> constant. |
| Successor Family ID | SUCC_FAMILY_ID | Character | When the Family Type is Relationship, this column will contain the value of the Entity Family ID that is the successor in the relationship. Otherwise, it should contain the <none> constant. You can also use the data in each of the rows to determine the Successor Family ID. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Successor Family Key Fields | SUCC_FAMILY_KEY_FIELDS | Character | This column contains the Field ID or IDs associated with the Successor Family that are used to uniquely identify the successor record. If more than one field is to be used, then each Field ID needs to be separated by a \| (Pipe) character.<br>If the Successor Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the <none> constant. |
| Primary Action | PRIMARY_ACTION | Character | The value in this column will determine the action that will be applied to the Primary Family records. If the Family Type is Entity, then the possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE<br>• ACTION_PURGE<br>Deleting a record and purging a record will both delete the current record, the difference being that the purge action will delete the record and all of the links or relationships tied to that record. The delete action will simple attempt to delete the record, and if it is related to another record, the delete will fail. If The Family Type is Relationship, then the possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Predecessor Action | PRED_ACTION | Character | The value in this column will determine the action that will be applied to the Predecessor Family records. The possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE<br>• ACTION_PURGE<br>• ACTION_LOCATE<br>If The Family Type is Entity then the values needs to be<br>• ACTION_NONE |
| Successor Action | SUCC_ACTION | Character | The value in this column will determine the action that will be applied to the Successor Family records. The possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE<br>• ACTION_PURGE<br>• ACTION_LOCATE<br>If The Family Type is Entity then the values needs to be<br>• ACTION_NONE |
| Insert with Null Values? | OPTION_INSERT_ON_NULL | Boolean | When setting field values on a new record, if a value coming across is NULL, the field values will be set to NULL if this option is set to True. |
| Update with Null Values? | OPTION_UPDATE_ON_NULL | Boolean | When setting field values on an existing record, if a value coming across is NULL, the field values will be set to NULL if this option is set to True. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Replace an Existing Link? | OPTION_REPLACE_EXISTING_LINK | Boolean | The Replace Existing Relationship option is used to determine how a relationship is to be maintained by its cardinality definition.<br><br>For example, the relationship Location Contains Asset that is defined in the Configuration Manager. It has a cardinality defined as Zero or One to Zero or One, has a Location LP-2300, and contains the Asset P-2300. If, in the data load, you assign the Asset P-5000 to be contained in the Location LP-2300, and you have set the Replace Existing Link property to True, then the data loader will link P-5000 to LP-2300 and unlink P-2300 from LP-2300. This assumes that P-5000 is not currently linked to another location. The same is true for a relationship that is defined as Zero or One to Zero or Many, or Zero or Many to Zero or One. |
| Allow Change of Family? | OPTION_ALLOW_CHANGE_OF_FAMILY | Boolean | Allows the data loader to move an entity from one family to another.<br><br>For example this would allow an entity that is currently assigned to the Centrifugal Pump family to be moved to the Reciprocating Pump family.<br><br>All relationships will be maintained as long as the family to which the entity is being moved allows the same relationships.<br><br>**Note:** Because of the extra processing required, by selecting this option, the interface performance will decrease. |

### Equipment Worksheet

On the Equipment worksheet, you will specify Equipment that you want to load into GE Digital APM.

**Note:** Each row in this worksheet represents a unique asset. You should not include the same asset more than once.

| Field Caption | Field Column Name | Data Type (Length) | Comment |
|---|---|---|---|
| Maintenance Plant | MI_EQUIP000_MAINT_PLANT_C | Character (50) | This field is required, and is used to group or batch the equipment records. |
| Equipment ID | MI_EQUIP000_EQUIP_ID_C | Character (225) | This is a key field. |

| Field Caption | Field Column Name | Data Type (Length) | Comment |
|---|---|---|---|
| Equipment Technical Number | MI_EQUIP000_EQUIP_TECH_NBR_C | Character (255) | None |
| CMMS System | MI_EQUIP000_SAP_SYSTEM_C | Character (255) | This is a key field. |
| Site Reference Name | MI_SITE_NAME | Character (255) | **Important:** Site Reference records must preexist in GE Digital APM. The data loader does not create Site Reference records, but simply provides foreign key data in the asset records, as determined in the source workbook. If the site reference record does not preexist, then you will receive an error.<br>1. Enter the site name to designate which site the Equipment record, once loaded into GE Digital APM, will be filtered by.<br>-or-<br>1. Enter *Global* to indicate a that the site reference should be left global. Meaning that it will not be filtered by site in GE Digital APM.<br>**Note:** Only super users are permitted to update Site Reference records. |
| Equipment Short Description | MI_EQUIP000_EQUIP_SHRT_DESC_C | Character (255) | None |
| Equipment Long Description | MI_EQUIP000_EQUIP_LNG_DESC_T | Text | None |
| Object Type (Taxonomy Mapping Value) | MI_EQUIP000_OBJ_TYP_C | Character (50) | None |
| Equipment System Status | MI_EQUIP000_SYS_ST_C | Character (255) | None |
| Manufacturer | MI_EQUIP000_MFR_C | Character (255) | None |
| Model Number | MI_EQUIP000_MOD_NO_C | Character (255) | None |
| Equipment Serial Number | MI_EQUIP000_SN_C | Character (255) | None |

| Field Caption | Field Column Name | Data Type (Length) | Comment |
|---|---|---|---|
| Active | 'MI_EQUIP000_ACTIVE_F | Logical | None |
| Equipment uniquely identified by SAP System - Equipment ID | MI_EQUIP000_UNIQUE_ID_C | Character (550) | This field uniquely identifies the equipment using the format <CMMS System> - <Functional Location ID>. This value allows the Data Loader to associate records between the Meridium database and the Predix database.<br>**Note:** You should not use this field if you have an on-premises implementation of GE Digital APM. |

### FunctionalLocations Worksheet

On the FunctionalLocations worksheet, you enter information for Functional Locations and the Functional Location hierarchy.

**Note:** Each row in this worksheet represents a unique asset. You should not include the same asset more than once.

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Maintenance Plant | MI_FNCLOC00_MAINT_PLNT_C | Character (50) | None |
| Functional Location Internal ID | MI_FNCLOC00_INTERNAL_ID_C | Character (30) | This is a key field. |
| Functional Location | MI_FNCLOC00_FNC_LOC_C | Character (50) | None |
| CMMS System | MI_FNCLOC00_SAP_SYSTEM_C | Character (255) | This is a key field. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Site Reference Name | MI_SITE_NAME | Character (255) | **Important:** Site Reference records must preexist in GE Digital APM. The data loader does not create Site Reference records, but simply provides foreign key data in the asset records, as determined in the source workbook. If the site reference record does not preexist, then you will receive an error.<br>1. Enter the site name to designate the site by which the Functional Location record, once loaded into GE Digital APM, will be filtered.<br>-or-<br>1. Enter *Global* to indicate a that the site reference should be left global. Meaning that it will not be filtered by site in GE Digital APM.<br>**Note:** Only Super Users are permitted to update Site Reference records. |
| Functional Location Description | MI_FNCLOC00_FNC_LOC_DESC_C | Character (255) | None |
| Functional Location Long Description | MI_FNCLOC00_FNC_LOC_LNG_DESC_C | Text | None |
| Object Type (Taxonomy Mapping Value) | MI_FNCLOC00_OBJ_TYP_C | Character (50) | None |
| System Status | MI_FNCLOC00_SYS_STATUS_C | Character (255) | None |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Is a Process Unit? | SC_FNCLOC00_IS_A_PROCE_UNIT_L | Logical | None |
| Functional Location uniquely identified by SAP System - Functional Location Internal ID | MI_FNCLOC00_UNIQUE_ID_C | Character (550) | This field uniquely identifies the functional location using the format <CMMS System> - <Functional Location ID>. This value allows the Data Loader to associate records between the Meridium database and the Predix database.<br>**Note:** You should not use this field if you have an on-premises implementation of GE Digital APM. |

### FuncLocsToEquipment

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Maintenance Plant | MI_FNCLOC00_MAINT_PLNT_C | Character (50) | None |
| Functional Location Internal ID | MI_FNCLOC00_INTERNAL_ID_C | Character (30) | This is a key field. |
| Functional Location | MI_FNCLOC00\| MI_FNCLOC00_FNC_LOC_C | Character (50) | None |
| CMMS System | MI_FNCLOC00_SAP_SYSTEM_C | Character (255) | This is a key field. Functional Location CMMS System. |
| Functional Location uniquely identified by System - Functional Location ID | MI_FNCLOC00\| MI_FNCLOC00_UNIQUE_ID_C | Character (550) | This field uniquely identifies the functional location using the format <CMMS System> - <Functional Location ID>. This value allows the Data Loader to associate records between the Meridium database and the Predix database.<br>**Note:** You should not use this field if you have an on-premises implementation of GE Digital APM. |
| Equipment ID | MI_EQUIP000_EQUIP_ID_C | Character (225) | This is a key field. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| CMMS System | MI_EQUIP000_SAP_SYSTEM_C | Character (255) | This is a key field. Equipment CMMS System. |
| Equipment uniquely identified by System - Equipment ID | MI_EQUIP000\| MI_EQUIP000_UNIQUE_ID_C | Character (550) | This field uniquely identifies the equipment using the format <CMMS System> - <Equipment ID>. This value allows the Data Loader to associate records between the Meridium database and the Predix database.<br>**Note:** You should not use this field if you have an on-premises implementation of GE Digital APM. |

### FuncLocsToSuperiorFuncLocs

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Maintenance Plant | <PRED_FAMILY_ID>\| MI_FNCLOC00_MAINT_PLNT_C | Character (50) | None |
| Functional Location Internal ID | <PRED_FAMILY_ID>\| MI_FNCLOC00_INTERNAL_ID_C | Character (30) | This is a key field. |
| Functional Location | <PRED_FAMILY_ID>\| MI_FNCLOC00_FNC_LOC_C | Character (50) | None |
| CMMS System | <PRED_FAMILY_ID>\| MI_FNCLOC00_SAP_SYSTEM_C | Character (255) | This is a key field. Functional Location CMMS System. |
| Functional Location uniquely identified by System - Functional Location ID | <PRED_FAMILY_ID>\| MI_FNCLOC00_UNIQUE_ID_C | Character (550) | This field uniquely identifies the functional location using the format <CMMS System> - <Functional Location ID>. This value allows the Data Loader to associate records between the Meridium database and the Predix database.<br>**Note:** You should not use this field if you have an on-premises implementation of GE Digital APM. |
| Predecessor Family ID | PRED_FAMILY_ID | Character (255) | None |
| Functional Location Internal ID | <SUCC_FAMILY_ID>\| MI_FNCLOC00_INTERNAL_ID_C | Character (30) | This is a key field. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Functional Location | <SUCC_FAMILY_ID>\| MI_FNCLOC00_FNC_LOC_C | Character (50) | None |
| CMMS System | MI_EQUIP000_SAP_SYSTEM_C | Character (255) | This is a key field. Equipment CMMS System. |
| Functional Location uniquely identified by System - Functional Location ID | <SUCC_FAMILY_ID>\| MI_FNCLOC00_UNIQUE_ID_C | Character (550) | This field uniquely identifies the functional location using the format <CMMS System> - <Functional Location ID>. This value allows the Data Loader to associate records between the Meridium database and the Predix database.<br>**Note:** You should not use this field if you have an on-premises implementation of GE Digital APM. |
| Successor Family ID | SUCC_FAMILY_ID | Character (255) | This is a key field. |

### EquipmentToSuperiorEquipment Worksheet

On the EquipmentToSuperiorEquipment worksheet, you specify the hierarchy between an Equipment and its Superior Equipment. This generates the relationships between the entities in the database.

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Maintenance Plant | <PRED_FAMILY_ID>\| MI_EQUIP000_MAINT_PLANT_C | Character (50) | This value identifies the plant responsible for maintenance. This field is not required to contain a value, but entering a value is recommended as it could be useful for searches or data analysis. |
| CMMS System | <PRED_FAMILY_ID>\| MI_EQUIP000_SAP_SYSTEM_C | Character (255) | This value identifies the parent family and EAM system as defined in GE Digital APM. |
| Equipment ID | <PRED_FAMILY_ID>\| MI_EQUIP000_EQUIP_ID_C | Character (255) | This value identifies the parent family and equipment ID as defined in GE Digital APM. |
| Predecessor Equipment Unique ID | <PRED_FAMILY_ID>\| MI_EQUIP000_UNIQUE_ID_C | Character (550) | This field uniquely identifies the equipment using the format <CMMS System> - <Equipment ID>. |
| Predecessor Family ID | PRED_FAMILY_ID | Character (255) | This value identifies the parent family as defined in GE Digital APM. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| CMMS System | <SUCC_FAMILY_ID>\| MI_EQUIP000_SAP_SYSTEM_C | Character (255) | This value identifies the child family and EAM system as defined in GE Digital APM. |
| Equipment ID | <SUCC_FAMILY_ID>\| MI_EQUIP000_EQUIP_ID_C | Character (255) | This value identifies the child family and equipment ID as defined in GE Digital APM. |
| Successor Equipment Unique ID | <SUCC_FAMILY_ID>\| MI_EQUIP000_UNIQUE_ID_C | Character (550) | This field uniquely identifies the equipment using the format <CMMS System> - <Equipment ID>. |
| Successor Family ID | SUCC_FAMILY_ID | Character (255) | This value identifies the child family as defined in GE Digital APM.<br>This is a key field. |

The value of this field has the format YYYY-MO-DDTHH:MN:SS.ttt+OOOO, where:

- YYYY is the 4-digit year.
- MO is the 2-digit month.
- DD is the 2-digit day.
- HH is the 2-digit hour in 24-hour time.
- MN is the 2-digit minute.
- SS is the 2-digit second.
- ttt is the 3 digit thousandths of a second.
- OOOO is the 4-digit offset from UTC.

The Configuration worksheet is needed to describe the type of data that you will be loading and how that data should be handled during the data load.

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Load Data From Worksheet | LOAD_DATA_WORKSHEET | Boolean | Identifies if data from the corresponding worksheet identified in the **Data Worksheet ID** column will be loaded or not.<br>• True: the corresponding worksheet will be processed.<br>• False: The corresponding worksheet will not be loaded into the Meridium database. |
| Data Worksheet ID | DATA_WORKSHEET_ID | Character | This column contains the name of the **<data>** worksheet where the actual data is located. It needs to have the same name as the **<data>** worksheet in the data loader workbook. |
| Batch Size | BATCH_SIZE | Character | Modifying this field is required to determine the number of records processed in each batch. Enter the batch size you want, and the Data Loader will process that many records per batch.<br>For example, if you want to use a batch size of 100, enter 100, and the data loader will process 100 records per batch.<br>**Note:** The recommended batch size is 100. If the **Batch Size** column is removed from the source workbook, the data loader will default to a batch size of 100.<br>In addition to processing the data in batches, the log file reports progress by batch. |

# Tags to Assets Relationship Data Loader

## The Tags to Assets Relationship Data Loader General Loading Strategy

The Tags to Assets Relationship Data Loader manages relationships between existing GE Digital APM records including: Tag records, Equipment records, and Functional Location records.

### Before You Begin

You must have existing Tag records and existing Equipment records and/or Functional Location records in your GE Digital APM system so that they can be linked together.

### About This Task

Unlike other APM Connect Data Loaders, which are used to input new data into GE Digital APM, the Tags to Assets Relationship Data Loader manages relationships between existing records. Specifically, you can use the data loader to manage the relationships between asset records (Equipment records and Functional Location records) and the following tag records:

- GE Tag Records: Stores values that are transferred from the GE System data source.
- AMS Asset Records: Store values that are transferred from the AMS Analytics data source.
- OPC Tag Records: Stores values that are transferred from OPC systems.

You can use the data loader to accomplish different objectives:

- Link tags to Equipment records.
- Link tags to Functional Location records.
- Unlink tags from Equipment records.
- Unlink tags from Functional Location records.
- Link Custom Equipment or Functional Location Families.

### Procedure

- Link Assets and Tags: Equipment Records
  1. On the TagRelationship worksheet, populate the tag fields **M2M System ID**, **Tag ID**, and **Tag Family ID**.
  2. Populate the Equipment fields **Equipment ID**, **Equipment CMMS System**, and Equipment Family ID.
- Link Assets and Tags: Functional Location Records
  1. On the TagRelationship worksheet, populate the tag fields **M2M System ID**, **Tag ID**, and **Tag Family ID**.
  2. Populate the Functional Location fields **Functional Location Internal ID, Functional Location CMMS System**, and the **Functional Location Family ID**.
- Unlink Assets and Tags: Equipment Records
  1. On the TagRelationship worksheet, populate the tag fields **M2M System ID**, **Tag ID**, and **Tag Family ID**.
  2. Clear the Equipment fields **Equipment ID** and **Equipment CMMS System ID**.
  3. Populate the **Equipment Family ID** field.
- Unlink Assets and Tags: Functional Location Records
  1. On the TagRelationship worksheet, populate the tag fields **M2M System ID**, **Tag ID**, and **Tag Family ID**.

2. Clear the Functional Location fields **Functional Location Internal ID** and **Functional Location CMMS System ID**.
3. Populate the **Functional Location Family** field.

- Link Custom Equipment or Functional Location Families

  The following fields can be modified on the worksheet to accommodate linking and unlinking tags and assets in custom equipment or functional location families:

  - MI_TAG_ID_C
  - MI_EQUIP000_SAP_SYSTEM_C
  - MI_EQUIP000_EQUIP_ID_C
  - MI_FNCLOC00_SAP_SYSTEM_C
  - MI_FNCLOC00_INTERNAL_ID_C

  1. After the original ID, add a pipe character (|) followed by your custom ID.

     For example, if you are loading data into a custom asset family with an ID of MC_ASSET and using the custom asset ID field is MC_ASSET_ID_C, then you can modify the standard MI_EQUIP000_EQUIP_ID_C field to `MI_EQUIP000_EQUIP_ID_C|MC_ASSET_ID_C`. You will also want to make sure that the custom family ID is the Equipment Family ID field.

## About the Tags to Assets Relationship Data Loader Layout and Use

This topic provides a high-level overview and explanation of how the Tags to Assets Relationship Data Loader workbook is constructed.

In order to manage asset and tags relationships GE Digital APM provides an Excel workbook, `Tags to Assets Relationship.xlsx`, which supports linking and unlinking tag records to Equipment and Functional Location records.

The following table lists the worksheets that are included in Tags to Assets Relationship Data Loader workbook.

| Worksheet | Description |
|---|---|
| TagRelationships | The only worksheet used by the Asset and Tag Data Loader. It is used to determine which tags to link/unlink to which Equipment or Functional Location records. |

### TagRelationship Worksheet

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| M2M System ID | MI_TAG_SYSTEM_ID_C | Character | Logical grouping of tags within a plant. The user will need to set a unique system ID for this field to use. This value corresponds to the Parent System Id field in the GE Digital APM database. |
| Tag ID | MI_TAG_ID_C | Character | The ID of the tag to be linked. |
| Tag Family ID | TAG_FAMILY_ID | Character | Family to which the tag belongs. The default value for AMS Assets is MI_APTAG. |
| Equipment CMMS System | MI_EQUIP000_SAP_SYSTEM_C | Character | None |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Equipment Internal ID | MI_EQUIP000_EQUIP_ID_C | Character | None |
| Equipment Family ID | EQUIP_FAMILY_ID | Character | The Default value is MI_ EQUIP000. |
| Functional Location CMMS System | MI_FNCLOC00_SAP_SYSTEM_C | Character | None |
| Functional Location Internal ID | MI_FNCLOC00_INTERNAL_ID_C | Character | None |
| Functional Location Family ID | FUNC_LOC_FAMILY_ID | Character | The default value is MI_FNCLOC00. |

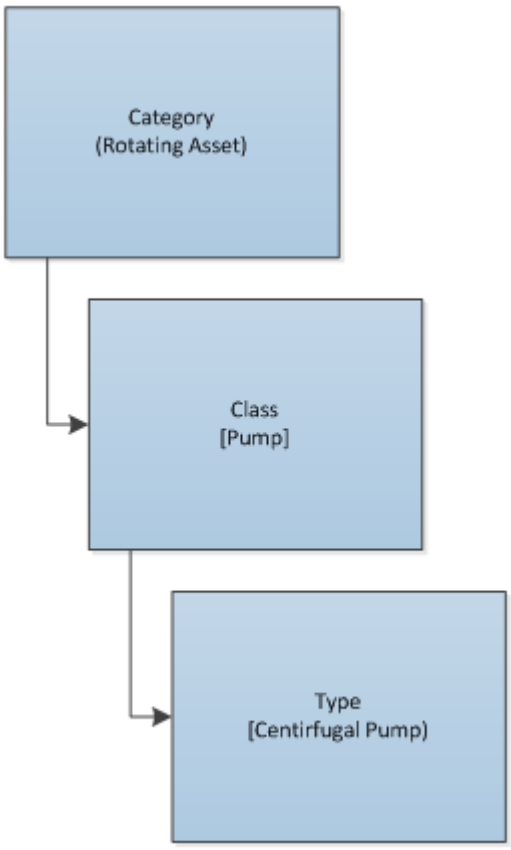
# Taxonomy Data Loader

## About the Taxonomy Data Loader

The Taxonomy Data Loader loads data from a standard Excel workbook into the Taxonomy data model. The data loader will create or update Taxonomy Categories, Classes, and Types based on the data in the Excel workbook.

## About the Taxonomy Data Loader Data Model

The data for a Taxonomy location is loaded from a single Excel workbook containing a single worksheet.




## The Taxonomy Data Loader General Loading Strategy

This section describes any prerequisites to loading the data and the order in which the data will be loaded.

### Before You Begin

As the taxonomy structure is a foundation for analysis and reporting, users should clearly understand the usage and data model for Taxonomy related records prior to implementing the Taxonomy structure.

### About This Task

**Note:** Before reading this section, refer to the Data Model section.

The Taxonomy data load must be performed in a specific sequence to successfully populate fields, create records, and link them to the predecessor and/or successor records.

### Procedure

1. Load Taxonomy Category.
2. Load Taxonomy Class.
3. Load Taxonomy Type.

4. Load Taxonomy Mapping Values.

## About the Taxonomy Data Loader Workbook Layout and Use

This section provides a high-level overview and explanation of how the data loader workbook is constructed.

In order to import data using the Taxonomy Data Loader, GE Digital provides an Excel workbook, `Taxonomy.xlsx`, which supports baseline data loading of Taxonomy in GE Digital APM. This workbook must be used to perform the data load. On the Taxonomy worksheets, you will enter the information to load a taxonomy structure that will be assigned to assets within GE Digital APM.

The baseline file is organized such that each row is capable of creating one node in the data model when all columns contain the appropriate values.

The following table lists the worksheets that are included in the Taxonomy Data Loader workbook.

**Note:** Worksheets in the workbook not being used may be left blank, but should not be deleted from the workbook.

| Worksheet | Description |
|---|---|
| Configuration | The **Configuration** worksheet is needed to describe the type of data that you will be loading and how that data should be handled during the data load. |
| TaxonomyCategory | This worksheet is used to link Taxonomy Category data and Taxonomy Class data. |
| TaxonomyClass | This worksheet is used to link Taxonomy Class data and Taxonomy Type data. |
| TaxonomyMapping | This worksheet is used to link Taxonomy Type data and Taxonomy Mapping data. |

### Configuration Worksheet

The **Configuration** worksheet tells the data loader what types of data are being loaded and how the data is to be loaded, and is standard for all data loads regardless of the type of data that you are loading. The following table outlines the options that are valid or the values that are expected in each of the columns on the **Configuration** worksheet.

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Load Data From Worksheet | LOAD_DATA_WORKSHEET | Boolean | Identifies if data from the corresponding worksheet identified in the **Data Worksheet ID** column will be loaded or not.<br>• True: The corresponding worksheet will be processed.<br>• False: The corresponding worksheet will not be processed. |
| Data Worksheet ID | DATA_WORKSHEET_ID | Character | This column contains the name of the **<data>**worksheet where the actual data is located. It needs to have the same name as the **<data>** worksheet in the data loader workbook. |
| Batch Size | BATCH_SIZE | Character | Modifying this field is required to determine the number of records processed in each batch. Enter the batch size you want, and the Data Loader will process that many records per batch.<br>For example, if you want to use a batch size of 100, enter 100, and the data loader will process 100 records per batch.<br>**Note:** The recommended batch size is 100. If the **Batch Size** column is removed from the source workbook, the data loader will default to a batch size of 100.<br>In addition to processing the data in batches, the log file reports progress by batch. |
| Primary Family ID | PRIMARY_FAMILY_ID | Character | Depending on the type of data that you are working with, this will contain the Relationship Family ID or the Entity Family ID. You can also allow the data in source file to determine the Family ID by encapsulating the Field ID that contains the Family ID data in brackets (<>).<br>For example if in the **<data>** worksheet there is a column with an ID of PRIMARY_FAMILY_ID, where each row contains the corresponding Family ID, then in this column you should put the value of `<PRIMARY_FAMILY_ID>`.<br>If the Family ID in the Meridium, Inc. metadata contains spaces, then you have to use this feature. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Primary Family Key Fields | PRIMARY_FAMILY_KEY_FIELDS | Character | This column contains the Field IDs associated with the Primary Family that are used to uniquely identify a record. If more than one field is to be used, then each Field ID needs to be separated by a \| (Pipe) character. In the case where you are loading data into a relationship, if no keys fields exist or are used, use the <none> constant.<br>If the Primary Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the <none> constant. |
| Family Type | FAMILY_TYPE | | The value is this column should be `Entity` or `Relationship` depending on the type of data that is being loaded. |
| Predecessor Family ID | PRED_FAMILY_ID | Character | When the Family Type is Relationship, this column will contain the value of the Entity Family ID that is the predecessor in the relationship. Otherwise, it should contain the <none> constant. You can also use the data in each of the rows to determine the Predecessor Family ID. |
| Predecessor Family Key Fields | PRED_FAMILY_KEY_FIELDS | Character | This column contains the Field ID or IDs associated with the Predecessor Family that are used to uniquely identify the predecessor record. If more than one field is to be used, then each Field ID needs to be separated by a \| (Pipe) character.<br>If the Predecessor Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the <none> constant. |
| Successor Family ID | SUCC_FAMILY_ID | Character | When the Family Type is Relationship, this column will contain the value of the Entity Family ID that is the successor in the relationship. Otherwise, it should contain the <none> constant. You can also use the data in each of the rows to determine the Successor Family ID. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Successor Family Key Fields | SUCC_FAMILY_KEY_FIELDS | Character | This column contains the Field ID or IDs associated with the Successor Family that are used to uniquely identify the successor record. If more than one field is to be used, then each Field ID needs to be separated by a \| (Pipe) character.<br>If the Successor Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the <none> constant. |
| Primary Action | PRIMARY_ACTION | Character | The value in this column will determine the action that will be applied to the Primary Family records. If the Family Type is Entity, then the possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE<br>• ACTION_PURGE<br>Deleting a record and purging a record will both delete the current record, the difference being that the purge action will delete the record and all of the links or relationships tied to that record. The delete action will simple attempt to delete the record, and if it is related to another record, the delete will fail. If The Family Type is *Relationship*, then the possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE |
| Predecessor Action | PRED_ACTION | Character | The value in this column will determine the action that will be applied to the Predecessor Family records. The possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE<br>• ACTION_PURGE<br>• ACTION_LOCATE<br>If The Family Type is Entity then the value needs to be ACTION_NONE<br>. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Successor Action | SUCC_ACTION | Character | The value in this column will determine the action that will be applied to the Successor Family records. The possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE<br>• ACTION_PURGE<br>• ACTION_LOCATE<br>If The Family Type is *Entity*then the value needs to be ACTION_NONE. |
| Insert with Null Values? | OPTION_INSERT_ON_NULL | Boolean | When setting field values on a new record, if a value coming across is NULL, the field values will be set to NULL if this option is set to True. |
| Update with Null Values? | OPTION_UPDATE_ON_NULL | Boolean | When setting field values on an existing record, if a value coming across is NULL, the field values will be set to NULL if this option is set to True. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Replace an Existing Link? | OPTION_REPLACE_EXISTING_LINK | Boolean | The Replace Existing Relationship option is used to determine how a relationship is to be maintained by its cardinality definition.<br><br>For example, the relationship Location Contains Asset that is defined in the Configuration Manager. It has a cardinality defined as Zero or One to Zero or One, has a Location LP-2300, and contains the Asset P-2300. If, in the data load, you assign the Asset P-5000 to be contained in the Location LP-2300, and you have set the Replace Existing Link property to True, then the data loader will link P-5000 to LP-2300 and unlink P-2300 from LP-2300. This assumes that P-5000 is not currently linked to another location. The same is true for a relationship that is defined as Zero or One to Zero or Many, or Zero or Many to Zero or One. |
| Allow Change of Family? | OPTION_ALLOW_CHANGE_OF_FAMILY | Boolean | Allows the data loader to move an entity from one family to another.<br><br>For example this would allow an entity that is currently assigned to the Centrifugal Pump family to be moved to the Reciprocating Pump family.<br><br>All relationships will be maintained as long as the family to which the entity is being moved allows the same relationships.<br><br>**Note:** Because of the extra processing required, by selecting this option, the interface performance will decrease. |

### TaxonomyCategory

**Note:** Each row in this worksheet represents a single asset. You should not include the same asset more than once.

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Taxonomy Category | SC_TAXOCATG_TAX_CATEG_C | Character (50) | This column is used for batching. |
| Taxonomy Category Description | SC_TAXOCATG_TAX_CATEG_DESC_C | Character (255) | None |

### TaxonomyClass

**Note:** Each row in this worksheet represents a single asset. You should not include the same asset more than once.

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Taxonomy Category | SC_TAXOCATG_TAX_CATEG_C | Character (50) | This column is used for batching. |
| Taxonomy Class | SC_TAXOCLAS_TAX_CLASS_C | Character (50) | This is a key field. |
| Taxonomy Class Description | 'SC_TAXOCLAS_TAX_CLASS_DESC_C | Character (255) | None |

**TaxonomyType**

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Taxonomy Category | SC_TAXOCATG_TAX_CATEG_C | Character (50) | This column is used for batching. |
| Taxonomy Class | SC_TAXOCLAS_TAX_CLASS_C | Character (50) | This is a key field. |
| Taxonomy Type | SC_TAXOTYPE_TAX_TYPE_C | Character (50) | This is a key field. |
| Taxonomy Type Description | SC_TAXOTYPE_TAX_TYPE_DESC_C | Character (255) | None |

**TaxonomyMapping Worksheet**

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Taxonomy Mapping Category | SC_TAXOMAPP_TAX_CATEG_C | Character (50) | This column is used for batching. |
| Taxonomy Mapping Class | SC_TAXOMAPP_TAX_CLASS_C | Character (50) | This is a key field. |
| Taxonomy Mapping Type | SC_TAXOMAPP_TAX_TYPE_C | Character (50) | This is a key field. |
| Taxonomy Mapping Value | SC_TAXOMAPP_TAX_MAPPI_VALUE_C | Character (255) | This is a key field. |

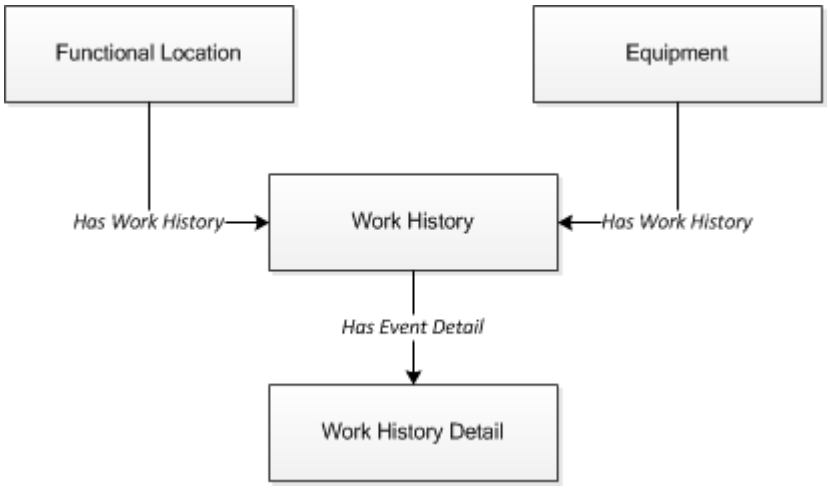
# Work History Data Loader

## About the Work History Data Loader

The Work History Data Loader allows a user to load historical work order data from an Excel workbook. The loader will create the necessary work history and work history detail records and link them to the corresponding equipment or functional location records as defined in the Excel workbook.

## About the Work History Data Loader Data Model

The data for Work History and Work History detail families is loaded from a single Excel workbook containing a single worksheet. This includes Work History and Work History Detail.




Relationships:

- The Work History records are linked to Equipment and/or Functional Location records via the relationship Has Work History [MIR_HSWKHST].
- The Work History Detail records will be related to the appropriate Work History records via the relationship family Has Event Detail [MIR_EVNTDET].

## The Work History Data Loader General Loading Strategy

This section describes any prerequisites to loading the data and the order in which the data will be loaded.

### About This Task

**Note:** Before reading this section, refer to the Data Model section.

The Work History and Work History Detail data load must be performed in a specific sequence to successfully populate fields, create records, and link them to the predecessor and/or successor records.

### Procedure

1. Create or Update the Work History record.
2. Link the Work History record to the Asset ID (Equipment or Functional Location).
3. Create or Update the Work History Detail record.
4. Link the Work History Detail record to the associated Work History record.

   **Note:** There can be multiple Work History Detail records for each Work History record.

## Work History Data Loader Load Verification

Use this query in any GE Digital APM database to populate an Excel format with the required data fields.

### Work History Data Query

```
SELECT 'Customer Event Id' "Customer Event Id",
```

```
[MI_EVWKHIST].[MI_EVENT_ID]
            "Event ID", [MI_EQUIP000].[MI_EQUIP000_EQUIP_ID_C]
"Equipment ID",
            [MI_EQUIP000].[MI_EQUIP000_EQUIP_TECH_NBR_C] "Equipment
Technical Number",
            [MI_FNCLOC00].[MI_FNCLOC00_FNC_LOC_C] "Functional
Location",
            [MI_EVWKHIST].[MI_EVWKHIST_SAP_SYSTEM_C] "CMMS System",
            [MI_EVWKHIST].[MI_EVWKHIST_ACTIV_CAUSE_C] "Activity
Cause",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_PM_ACT_DESC_C] "Activity
Type Description",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_PM_ACT_C] "Activity Type",
            [MI_EVWKHIST].[MI_EVWKHIST_BRKDN_IND_F] "Breakdown
Indicator",
            [MI_EVWKHIST].[MI_EVWKHIST_DETCT_MTHD_CD_C] "Detection
Method Code",
            [MI_EVWKHIST].[MI_EVWKHIST_DETCT_MTHD_DESC_C] "Detection
Method Description",
            [MI_EVWKHIST].[MI_EVWKHIST_EFFCT_CD_C] "Effect Code",
            [MI_EVWKHIST].[MI_EVWKHIST_EFFCT_DESC_C] "Effect
Description",
            [MI_EVWKHIST].[MI_EVWKHIST_EVENT_DATE_DESC_C] "Event Date
Description",
            [MI_EVWKHIST].[MI_EVENT_LNG_DSC_TX] "Event Long
Description",
            [MI_EVWKHIST].[MI_EVENT_SHRT_DSC_CHR] "Event Short
Description",
            [MI_EVWKHIST].[MI_EVENT_STRT_DT] "Event Start Date",
            [MI_EVWKHIST].[MI_EVWKHIST_STATUS_C] "Event Status",
            [MI_EVWKHIST].[MI_EVENT_TYP_CHR] "Event Type",
            [MI_EVWKHIST].[MI_EVWKHIST_FAILR_MODE_CD_C] "Failure Mode
Code",
            [MI_EVWKHIST].[MI_EVWKHIST_FAILR_MODE_DESC_C] "Failure
Mode Description",
            [MI_EVWKHIST].[MI_EVWKHIST_FAILURE_REM_T] "Failure
Remarks",
            [MI_EVWKHIST].[MI_EVWKHIST_FNCTNL_LOSS_CD_C] "Functional
Loss Code",
            [MI_EVWKHIST].[MI_EVWKHIST_FNCTNL_LOSS_DESC_C] "Functional
Loss Description",
            [MI_EVWKHIST].[MI_EVWKHIST_MAINT_COMPL_D] "Maintenance
Completion Date",
            [MI_EVWKHIST].[MI_EVWKHIST_MAINT_CST_UOM_C] "Maintenance
Cost UOM",
            [MI_EVWKHIST].[MI_EVWKHIST_MAINT_CST_N] "Maintenance
Cost",
            [MI_EVWKHIST].[MI_EVWKHIST_MAINT_START_D] "Maintenance
Start Date",
            [MI_EVWKHIST].[MI_EVWKHIST_MECH_DWN_TIME_N] "Mechanical
Down Time",
            [MI_EVWKHIST].[MI_EVWKHIST_MECH_AVAIL_D] "Mechanically
Available Date",
            [MI_EVWKHIST].[MI_EVWKHIST_MECH_UNAVL_D] "Mechanically
Unavailable Da",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_CRT_DT_D] "Order Creation
Date",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_DESC_C] "Order
Description",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_ID_C] "Order ID",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_MAINT_PLAN_C] "Order
```

```
Maintenance Plan",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_PRTY_DESC_C] "Order
Priority Description",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_PRTY_C] "Order Priority",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_REF_DT_D] "Order Reference
Date",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_SYS_CND_DES_C] "Order
System Condition Desc",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_SYS_COND_C] "Order System
Condition",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_SYS_STAT_C] "Order System
Status",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_TYP_CD_C] "Order Type
Code",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_TYP_DESC_C] "Order Type
Description",
            [MI_EVWKHIST].[MI_EVWKHIST_ORDR_USER_STAT_C] "Order User
Status",
            [MI_EVWKHIST].[MI_EVWKHIST_PM_NBR_C] "PM Number",
            [MI_EVWKHIST].[MI_EVWKHIST_PRDN_CST_N] "Production Cost",
            [MI_EVWKHIST].[MI_EVWKHIST_RQST_ID_C] "Request ID",
            [MI_EVWKHIST].[MI_EVWKHIST_RQST_CRT_DT_D] "Request
Creation Date",
            [MI_EVWKHIST].[MI_EVWKHIST_RQST_DESC_C] "Request
Description",
            [MI_EVWKHIST].[MI_EVWKHIST_RQST_PRTY_DESC_C] "Request
Priority Descriptio",
            [MI_EVWKHIST].[MI_EVWKHIST_RQST_PRTY_C] "Request
Priority",
            [MI_EVWKHIST].[MI_EVWKHIST_RQST_SYS_STAT_C] "Request
System Status",
            [MI_EVWKHIST].[MI_EVWKHIST_RQST_TYP_CD_C] "Request Type
Code",
            [MI_EVWKHIST].[MI_EVWKHIST_RQST_TYP_DESC_C] "Request Type
Description",
            [MI_EVWKHIST].[MI_EVWKHIST_RQST_USER_STAT_C] "Request User
Status",
            [MI_EVWKHIST].[MI_EVWKHIST_SCHED_COMPL_D] "Scheduled
Completion Date",
            [MI_EVWKHIST].[MI_EVWKHIST_SCHED_START_D] "Scheduled Start
Date",
            [MI_EVWKHIST].[MI_EVWKHIST_TARGET_COMPL_D] "Target
Completion Date",
            [MI_EVWKHIST].[MI_EVWKHIST_TARGET_START_D] "Target Start
Date",
            [MI_EVWKHIST].[MI_EVWKHIST_TIME_TO_REPR_N] "Time To Repair
(TTR)",
            [MI_EVWKHIST].[MI_EVWKHIST_TOTL_CST_N] "Total Cost",
            [MI_EVWKHIST].[MI_EVWKHIST_WORK_HIST_TYPE_C] "Work History
Type",
            [MI_EVWKHIST].[MI_EVWKHIST_WO_PRIORTY_N] "Work Order
Priority",
            'WHD_Customer WHD ID' "WHD_Customer WHD ID", [MI_DTWKHIST].
[MI_DTWKHIST_EVNT_DTL_ID_C]
            "WHD_Work History Detail ID", [MI_DTWKHIST].
[MI_DTWKHIST_EVNT_DTL_DESC_C]
            "WHD_Work Hist Detail Desc", [MI_DTWKHIST].
[MI_DTWKHIST_ORDR_ID_C]
            "WHD_Order ID", [MI_DTWKHIST].[MI_DTWKHIST_RQST_ID_C]
"WHD_Request ID",
            [MI_DTWKHIST].[MI_DTWKHIST_CAUSE_CD_C] "WHD_Cause Code",
```

```
            [MI_DTWKHIST].[MI_DTWKHIST_CAUSE_DESC_C] "WHD_Cause
Description",
            [MI_DTWKHIST].[MI_DTWKHIST_CNDTN_CD_C] "WHD_Condition
Code",
            [MI_DTWKHIST].[MI_DTWKHIST_CNDTN_DESC_C] "WHD_Condition
Description",
            [MI_DTWKHIST].[MI_DTWKHIST_DTL_NARTV_T] "WHD_Detail
Narrative",
            [MI_DTWKHIST].[MI_DTWKHIST_MAINT_ITEM_CD_C]
"WHD_Maintainable Item Code",
            [MI_DTWKHIST].[MI_DTWKHIST_MAINT_ITEM_DESC_C]
"WHD_Maintainable Item Desc",
            [MI_DTWKHIST].[MI_DTWKHIST_MAINT_ACTN_CD_C]
"WHD_Maintenance Action Code",
            [MI_DTWKHIST].[MI_DTWKHIST_MAINT_ACTN_DESC_C]
"WHD_Maintenance Action Desc"
            FROM [MI_EVWKHIST] JOIN_PRED [MI_EQUIP000] JOIN_PRED
[MI_FNCLOC00]
            ON {MIR_FLHSEQ} ON {MIR_HSWKHST} JOIN_SUCC [MI_DTWKHIST]
ON {MIR_EVNTDET}
```

## About the Work History Data Loader Workbook Layout and Use

This section provides a high-level overview and explanation of how the data loader workbook is constructed.

To import data using the Work History Data Loader, GE Digital APM provides an Excel workbook, `Work History.xlsx`, which supports baseline data loading of work history and work history detail records in GE Digital APM. This workbook must be used to perform the data load.

**Note:** Worksheets in the workbook not being used may be left blank, but should not be deleted from the workbook.

The following table lists the worksheets that are included in the Foundation Work History Data Loader workbook.

| Worksheet | Description |
|---|---|
| Configuration | The **Configuration** worksheet is needed to describe the type of data that you will be loading and how that data should be handled during the data load. |
| WorkHistory | This worksheet is used to specify data for import to the Work History family. |
| WorkHistoryToWHDetails | This worksheet is used to specify data for import to the Work History Detail family. |
| WorkHistoryToEquipment | This worksheet is used to link Work History to Equipment records. |
| WorkHistoryToFLOCs | This worksheet is used to link Work History to Functional Location records. |

### Configuration Worksheet

The **Configuration** worksheet tells the Data Loader what types of data are being loaded and how the data is to be loaded, and is standard for all data loads regardless of the type of data that you are loading.

The following table outlines the options that are valid or the values that are expected in each of the columns on the **Configuration** worksheet

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Load Data From Worksheet | LOAD_DATA_WORKSHEET | Boolean | Identifies if data from the corresponding worksheet identified in the **Data Worksheet ID** column will be loaded or not.<br>• True: The corresponding worksheet will be processed.<br>• False: The corresponding worksheet will not be processed. |
| Data Worksheet ID | DATA_WORKSHEET_ID | Character | This column contains the name of the **<data>** worksheet where the actual data is located. It needs to have the same name as the **<data>** worksheet in the data loader workbook. |
| Batch Size | BATCH_SIZE | Character | Modifying this field is required to determine the number of records processed in each batch. Enter the batch size you want, and the Data Loader will process that many records per batch.<br>For example, if you want to use a batch size of 100, enter 100, and the data loader will process 100 records per batch.<br>**Note:** The recommended batch size is 100. If the **Batch Size** column is removed from the source workbook, the data loader will default to a batch size of 100.<br>In addition to processing the data in batches, the log file reports progress by batch. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Primary Family ID | PRIMARY_FAMILY_ID | Character | Depending on the type of data that you are working with, this will contain the Relationship Family ID or the Entity Family ID. You can also allow the data in source file to determine the Family ID by encapsulating the Field ID that contains the Family ID data in brackets (<>).<br>For example if in the **<data>** worksheet there is a column with an ID of PRIMARY_FAMILY_ID, where each row contains the corresponding Family ID, then in this column you should put the value of <PRIMARY_FAMILY_ID>.<br>If the Family ID in the Meridium, Inc. metadata contains spaces, then you have to use this feature. |
| Primary Family Key Fields | PRIMARY_FAMILY_KEY_FIELDS | Character | This column contains the Field IDs associated with the Primary Family that are used to uniquely identify a record. If more than one field is to be used, then each Field ID needs to be separated by a \| (Pipe) character. In the case where you are loading data into a relationship, if no keys fields exist or are used, use the <none> constant.<br>If the Primary Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the <none> constant. |
| Family Type | FAMILY_TYPE | Character | The value is this column should be Entity or Relationship depending on the type of data that is being loaded. |
| Predecessor Family ID | PRED_FAMILY_ID | Character | When the Family Type is Relationship, this column will contain the value of the Entity Family ID that is the predecessor in the relationship. Otherwise, it should contain the <none> constant. You can also use the data in each of the rows to determine the Predecessor Family ID. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Predecessor Family Key Fields | PRED_FAMILY_KEY_FIELDS | Character | This column contains the Field ID or IDs associated with the Predecessor Family that are used to uniquely identify the predecessor record. If more than one field is to be used, then each Field ID needs to be separated by a \| (Pipe) character.<br>If the Predecessor Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the <none> constant. |
| Successor Family ID | SUCC_FAMILY_ID | Character | When the Family Type is Relationship, this column will contain the value of the Entity Family ID that is the successor in the relationship. Otherwise, it should contain the <none> constant. You can also use the data in each of the rows to determine the Successor Family ID. |
| Successor Family Key Fields | SUCC_FAMILY_KEY_FIELDS | Character | This column contains the Field ID or IDs associated with the Successor Family that are used to uniquely identify the successor record. If more than one field is to be used, then each Field ID needs to be separated by a \| (Pipe) character.<br>If the Successor Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the <none> constant. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Primary Action | PRIMARY_ACTION | Character | The value in this column will determine the action that will be applied to the Primary Family records. If the Family Type is Entity, then the possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE<br>• ACTION_PURGE<br>Deleting a record and purging a record will both delete the current record, the difference being that the purge action will delete the record and all of the links or relationships tied to that record. The delete action will simple attempt to delete the record, and if it is related to another record, the delete will fail. If The Family Type is Relationship, then the possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE |
| Predecessor Action | PRED_ACTION | Character | The value in this column will determine the action that will be applied to the Predecessor Family records. The possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE<br>• ACTION_PURGE<br>• ACTION_LOCATE<br>If The Family Type is Entity then the values needs to be<br>• ACTION_NONE |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Successor Action | SUCC_ACTION | Character | The value in this column will determine the action that will be applied to the Successor Family records. The possible values are:<br>• ACTION_INSERTONLY<br>• ACTION_INSERTUPDATE<br>• ACTION_UPDATEONLY<br>• ACTION_DELETE<br>• ACTION_PURGE<br>• ACTION_LOCATE<br>If The Family Type is Entity then the values needs to be<br>• ACTION_NONE |
| Insert with Null Values? | OPTION_INSERT_ON_NULL | Boolean | When setting field values on a new record, if a value coming across is NULL, the field values will be set to NULL if this option is set to True. |
| Update with Null Values? | OPTION_UPDATE_ON_NULL | Boolean | When setting field values on an existing record, if a value coming across is NULL, the field values will be set to NULL if this option is set to True. |

| Field Caption | Field ID | Data Type (Length) | Comments |
|---|---|---|---|
| Replace an Existing Link? | OPTION_REPLACE_EXISTING_LINK | Boolean | The Replace Existing Relationship option is used to determine how a relationship is to be maintained by its cardinality definition.<br><br>For example, the relationship Location Contains Asset that is defined in the Configuration Manager. It has a cardinality defined as Zero or One to Zero or One, has a Location LP-2300, and contains the Asset P-2300. If, in the data load, you assign the Asset P-5000 to be contained in the Location LP-2300, and you have set the Replace Existing Link property to True, then the data loader will link P-5000 to LP-2300 and unlink P-2300 from LP-2300. This assumes that P-5000 is not currently linked to another location. The same is true for a relationship that is defined as Zero or One to Zero or Many, or Zero or Many to Zero or One. |
| Allow Change of Family? | OPTION_ALLOW_CHANGE_OF_FAMILY | Boolean | Allows the data loader to move an entity from one family to another.<br><br>For example this would allow an entity that is currently assigned to the Centrifugal Pump family to be moved to the Reciprocating Pump family.<br><br>All relationships will be maintained as long as the family to which the entity is being moved allows the same relationships.<br><br>**Note:** Because of the extra processing required, by selecting this option, the interface performance will decrease. |

### WorkHistory

| Field ID | Filed Caption | Data Type (Length) | Comments |
|---|---|---|---|
| Event ID | MI_EVENT_ID | Character (255) | Generated by the system, and is not loaded. |
| CMMS System | MI_EVWKHIST_SAP_SYSTEM_C | Character (50) | None |
| Equipment ID | MI_EVENT_ASST_ID_CHR | Character (255) | Used as unique key to find equipment. |
| Asset Tech ID | MI_EVWKHIST_ASST_TECH_ID_C | Character (255) | None |

| Field ID | Filed Caption | Data Type (Length) | Comments |
|---|---|---|---|
| Location ID | MI_EVENT_LOC_ID_CHR | Character (255) | Is a key field, and is used to find Functional Location. |
| Activity Cause | MI_EVWKHIST_ACTIV_CAUSE_C | Character (255) | None |
| Activity Cause Description | MI_EVWKHIST_ACTIV_CAUSE_DESC_C | Character (255) | None |
| Activity Type | MI_EVWKHIST_ORDR_PM_ACT_C | Character (50) | None |
| Activity Type Description | MI_EVWKHIST_ORDR_PM_ACT_DESC_C | Character (255) | None |
| Breakdown Indicator | MI_EVWKHIST_BRKDN_IND_F | Boolean | None |
| Detection Method Code | MI_EVWKHIST_DETCT_MTHD_CD_C | Character (50) | None |
| Detection Method Description | MI_EVWKHIST_DETCT_MTHD_DESC_C | Character (255) | None |
| Effect Code | MI_EVWKHIST_EFFCT_CD_C | Character (50) | None |
| Effect Description | MI_EVWKHIST_EFFCT_DESC_C | Character (50) | None |
| Event Date Description | MI_EVWKHIST_EVENT_DATE_DESC_C | Character (255) | None |
| Event Long Description | MI_EVENT_LNG_DSC_TX | Text | None |
| Event Short Description | MI_EVENT_SHRT_DSC_CHR | Character (255) | None |
| Event Start Date | MI_EVENT_STRT_DT | Date | None |
| Event Status | MI_EVWKHIST_STATUS_C | Character (50) | None |
| Event Type | MI_EVENT_TYP_CHR | Character (255) | None |
| Failure Mode Code | MI_EVWKHIST_FAILR_MODE_CD_C | Character (50) | None |
| Failure Mode Description | MI_EVWKHIST_FAILR_MODE_DESC_C | Character (255) | None |
| Failure Remarks | MI_EVWKHIST_FAILURE_REM_T | Text | None |
| Functional Loss Code | MI_EVWKHIST_FNCTNL_LOSS_CD_C | Character (50) | None |
| Functional Loss Description | MI_EVWKHIST_FNCTNL_LOSS_DESC_C | Character (50) | None |
| Maintenance Completion Date | MI_EVWKHIST_MAINT_COMPL_D | Date | None |
| Maintenance Cost UOM | MI_EVWKHIST_MAINT_CST_UOM_C | Character (10) | None |
| Maintenance Cost | MI_EVWKHIST_MAINT_CST_N | Numeric | None |
| Maintenance Start Date | MI_EVWKHIST_MAINT_START_D | Date | None |
| Mechanical Down Time | MI_EVWKHIST_MECH_DWN_TIME_N | Numeric | Calculated by system. |
| Mechanically Available Date | MI_EVWKHIST_MECH_AVAIL_D | Date | None |

| Field ID | Filed Caption | Data Type (Length) | Comments |
|---|---|---|---|
| Mechanically Unavailable Date | MI_EVWKHIST_MECH_UNAVL_D | Date | None |
| Order Creation Date | MI_EVWKHIST_ORDR_CRT_DT_D | Date | None |
| Order Description | MI_EVWKHIST_ORDR_DESC_C | Character (255) | None |
| Order ID | MI_EVWKHIST_ORDR_ID_C | Character (50) | None |
| Order Maintenance Plan | MI_EVWKHIST_ORDR_MAINT_PLAN_C | Character (50) | None |
| Order Priority | MI_EVWKHIST_ORDR_PRTY_C | Character (50) | None |
| Order Priority Description | MI_EVWKHIST_ORDR_PRTY_DESC_C | Character (255) | None |
| Order Reference Date | MI_EVWKHIST_ORDR_REF_DT_D | Date | None |
| Order System Condition | MI_EVWKHIST_ORDR_SYS_COND_C | Character (50) | None |
| Order System Condition Description | MI_EVWKHIST_ORDR_SYS_CND_DES_C | Character (255) | None |
| Order System Status | MI_EVWKHIST_ORDR_SYS_STAT_C | Character (255) | None |
| Order Type Code | MI_EVWKHIST_ORDR_TYP_CD_C | Character (50) | None |
| Order Type Description | MI_EVWKHIST_ORDR_TYP_DESC_C | Character (50) | None |
| Order User Status | MI_EVWKHIST_ORDR_USER_STAT_C | Character (255) | None |
| PM Number | MI_EVWKHIST_PM_NBR_C | Character (255) | None |
| Production Cost | MI_EVWKHIST_PRDN_CST_N | Numeric | None |
| Request ID | MI_EVWKHIST_RQST_ID_C | Character (50) | None |
| Request Creation Date | MI_EVWKHIST_RQST_CRT_DT_D | Date | None |
| Request Description | MI_EVWKHIST_RQST_DESC_C | Character (255) | None |
| Request Priority | MI_EVWKHIST_RQST_PRTY_C | Character (50) | None |
| Request Priority Description | MI_EVWKHIST_RQST_PRTY_DESC_C | Character (255) | None |
| Request System Status | MI_EVWKHIST_RQST_SYS_STAT_C | Character (255) | None |
| Request Type Code | MI_EVWKHIST_RQST_TYP_CD_C | Character (50) | None |
| Request Type Description | MI_EVWKHIST_RQST_TYP_DESC_C | Character (255) | None |
| Request User Status | MI_EVWKHIST_RQST_USER_STAT_C | Character (255) | None |
| Scheduled Completion Date | MI_EVWKHIST_SCHED_COMPL_D | Date | None |
| Scheduled Start Date | MI_EVWKHIST_SCHED_START_D | Date | None |
| Target Completion Date | MI_EVWKHIST_TARGET_COMPL_D | Date | None |
| Target Start Date | MI_EVWKHIST_TARGET_START_D | Date | None |

| Field ID | Filed Caption | Data Type (Length) | Comments |
|---|---|---|---|
| Work History Type | MI_EVWKHIST_WORK_HIST_TYPE_C | Character (50) | None |
| Work Order Priority | MI_EVWKHIST_WO_PRIORTY_N | Numeric | None |
| Site Reference Name | MI_SITE_NAME | Character (50) | None |

### WorkHistoryToWHDetails Worksheet

On the WorkHistoryToWHDetails worksheet, you will find work history and work history detail fields.

**Note:** Each row in this worksheet represents a unique record. You should not include the same asset more than once.

| Field ID | Field Caption | Data Type (Length) | Comments |
|---|---|---|---|
| Event ID | MI_EVWKHIST\|MI_EVENT_ID | Character (255) | Generated by the system, and is not loaded. |
| CMMS System | MI_EVWKHIST\|MI_EVWKHIST_SAP_SYSTEM_C | Character (50) | None |
| Work Detail History ID | MI_DTWKHIST\|MI_DTWKHIST_EVNT_DTL_ID_C | Character (50) | None |
| CMMS System | 'MI_DTWKHIST\|MI_DTWKHIST_SAP_SYSTEM_C | Character (50) | None |
| Work History ID | MI_DTWKHIST\|MI_DTWKHIST_WRK_HISTRY_ID_C | Character (50) | None |
| Work History Detail Description | MI_DTWKHIST\|MI_DTWKHIST_EVNT_DTL_DESC_C | Character (255) | None |
| Order ID | MI_DTWKHIST\|MI_DTWKHIST_ORDR_ID_C | Character (50) | None |
| Request ID | MI_DTWKHIST\|MI_DTWKHIST_RQST_ID_C | Character (50) | Request ID from the associated order ID on the WH record, if not work order. |
| Cause Code | MI_DTWKHIST\|MI_DTWKHIST_CAUSE_CD_C | Character (50) | None |
| Cause Description | 'MI_DTWKHIST\|MI_DTWKHIST_CAUSE_DESC_C | Character (255) | None |
| Condition Code | MI_DTWKHIST\|MI_DTWKHIST_CNDTN_CD_C | Character (20) | None |
| Condition Description | MI_DTWKHIST\|MI_DTWKHIST_CNDTN_DESC_C | Character (255) | None |
| Detail Narrative | MI_DTWKHIST\|MI_DTWKHIST_DTL_NARTV_T | Text | None |
| Maintainable Item Code | MI_DTWKHIST\|MI_DTWKHIST_MAINT_ITEM_CD_C | Character (50) | None |

| Field ID | Field Caption | Data Type (Length) | Comments |
|---|---|---|---|
| Maintainable Item Description | MI_DTWKHIST\|MI_DTWKHIST_MAINT_ITEM_DESC_C | Character (255) | None |
| Maintenance Action Code | MI_DTWKHIST\|MI_DTWKHIST_MAINT_ACTN_CD_C | Character (50) | None |
| Maintenance Action Description | MI_DTWKHIST\|MI_DTWKHIST_MAINT_ACTN_DESC_C | Character (255) | None |
| Equipment ID | MI_DTWKHIST\|MI_DTWKHIST_ASST_ID_C | Character (50) | None |
| Functional Location ID | MI_DTWKHIST\|MI_DTWKHIST_LOC_ID_C | Character (50) | None |
| Site Reference Name | MI_DTWKHIST\|MI_SITE_NAME | Character (50) | None |
| Sub Object Number | MI_DTWKHIST\|MI_DTWKHIST_SUB_OBJECT_NUM_C | Character (50) | None. |

### WorkHistoryToEquipment Worksheet

| Field ID | Filed Caption | Data Type (Length) | Comments |
|---|---|---|---|
| Event ID | MI_EVWKHIST\|MI_EVENT_ID | Character (255) | None |
| CMMS System | 'MI_EVWKHIST\|MI_EVWKHIST_SAP_SYSTEM_C | Character (50) | None |
| Equipment ID | 'MI_EQUIP000\|MI_EQUIP000_EQUIP_ID_C | Character (50) | None |
| CMMS System | 'MI_EQUIP000\|MI_EQUIP000_SAP_SYSTEM_C | Character (50) | None |

### WorkHistoryToFLOCs Worksheet

| Field ID | Filed Caption | Data Type (Length) | Comments |
|---|---|---|---|
| Event ID | MI_EVWKHIST\|MI_EVENT_ID | Character (255) | None |
| CMMS System | 'MI_EVWKHIST\|MI_EVWKHIST_SAP_SYSTEM_C | Character (50) | None |
| Functional Location Internal | 'MI_FNCLOC00\|MI_FNCLOC00_INTERNAL_ID_C | Character (50) | None |
| CMMS System | 'MI_FNCLOC00\|MI_FNCLOC00_SAP_SYSTEM_C | Character (50) | None |

# Automatic Data Loader

## About the Automatic Data Loader Job

The Automatic Data Loader can load Excel workbooks or `.zip` files into the system from an on-premises installation of APM Connect.

GE Digital APM provides a method to automatically load data into the system from correctly formatted Excel workbooks or a `.zip` file containing correctly formatted `.csv` files. You must place your data loader workbook in the correct directory for a successful data load.

The job monitors a configured load directory for the presence of a file in a subdirectory and stages the contents of the file into the system. Multiple files moved into the directory are processed in descending order according to the last modified time stamp on each file. The order that the directories are processed is defined in the .csv file, `AutomaticDataLoaderOrder.csv`.

The system logs the staging progress and archives files it has successfully staged in an archive directory. If data fails to stage, a message is written to the log indicating the reason for failure, and the source files remain in the scan directory.

A service then retrieves the staged workbooks, and, using an administrative account, the service invokes the appropriate data loader to load the data contained in the workbooks.

**Note:** For cloud deployment, the archiving of files occurs before staging the data for upload to the cloud server.

# Deploy Data Loaders

## Upgrade APM Connect Data Loaders to UDLP V2.7.0

This topic outlines the steps that you must complete to upgrade this module to UDLP V2.7.0.

### About This Task

These tasks may be completed by multiple people in your organization. We recommend, however, that the tasks be completed in the order in which they are listed.

### Procedure

Complete the steps to deploy the data loaders for the first time.

## Deploy the Data Loaders for the First Time

These are the steps that you must complete to deploy and configure this module for the first time. These instructions assume that you have completed the steps for deploying the basic GE Digital APM system architecture.

### Before You Begin

The APM Connect Base must already be deployed.

### About This Task

These tasks may be completed by multiple people in your organization. We recommend, however, that the tasks be completed in the order in which they are presented.

### Configure SSL

If you want to use SSL for connections from APM Connect, this step is required.

### About This Task

If you want to use SSL when moving data through the system, you must import security certificates from the secured application into a truststore file accessible to APM Connect. This procedure describes the process for a single application. You can import multiple certificates into a single truststore file by repeating this procedure for each application requiring SSL.

**Important:** When copying the certificates, make sure that you only log in to the application requiring SSL access to APM Connect.

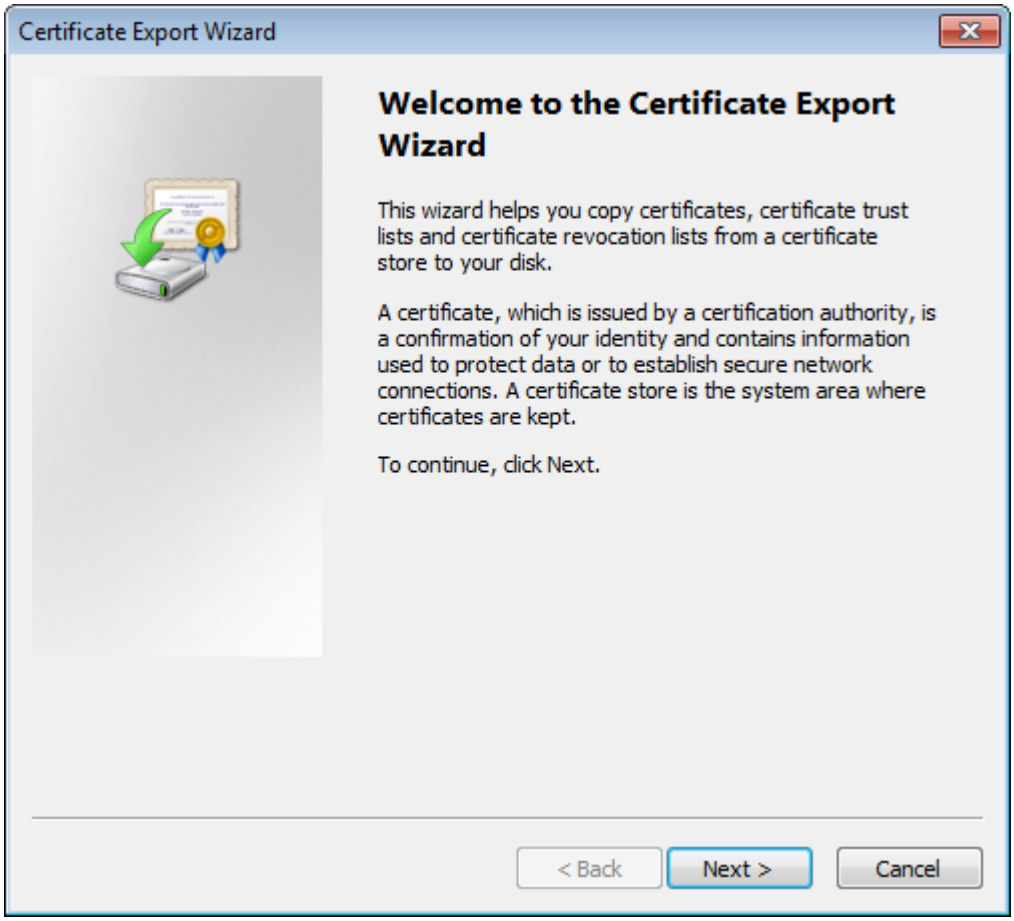
**Note:** If you want to use SSL with GE Digital APM web services, contact GE Global Support.

### Procedure

1. Log in to your application, and then access the certificate information from your browser.

   **Note:** Typically, you can access certificate information by selecting the lock icon in the address bar.

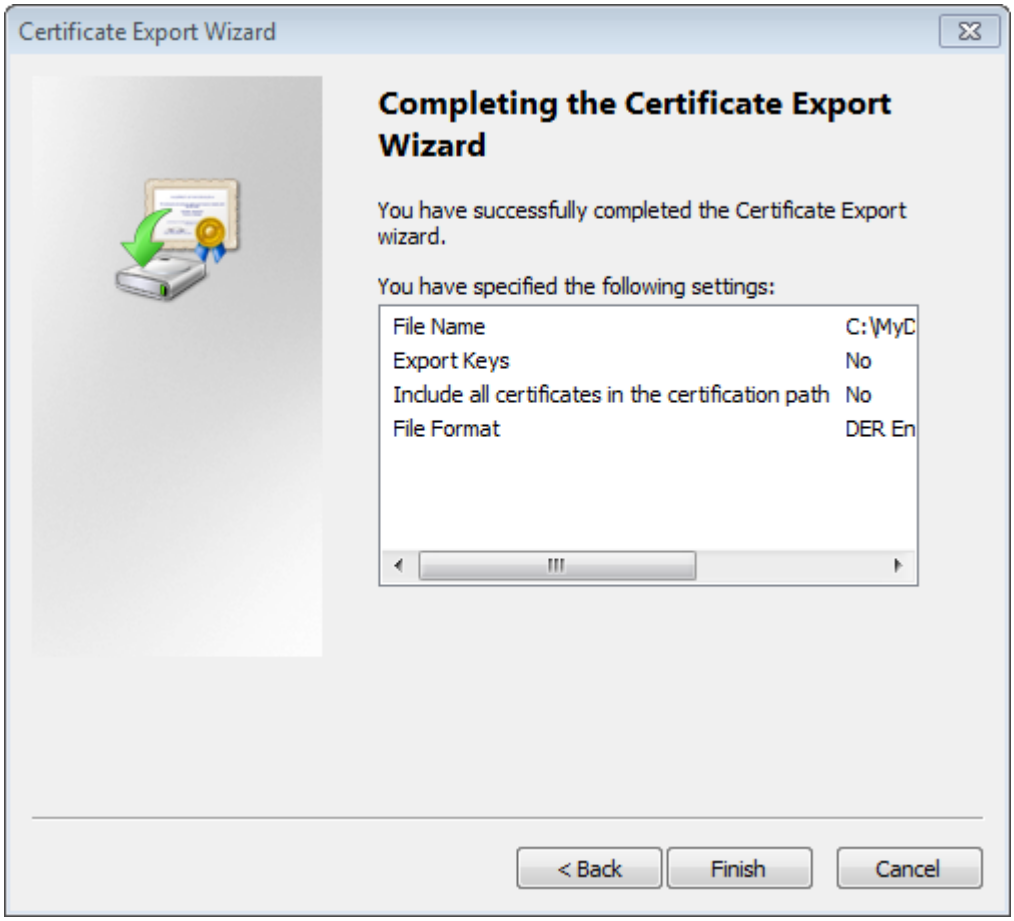
   The **Certificate** window appears.
2. Select **Details**, and then select **Copy to File...**.
   The **Certificate Export Wizard** window appears.




3. Select **Next**.
4. In the **Export File Format** window, select **DER encoded binary X.509 (.cer)**, and then select **Next**.
5. In the **File to Export** window, select **Browse...**.

   The **Save As** window appears.
6. Save the file to your Desktop under the name `certificate.cer`.
7. Select **Next**.
8. Select **Finish**.

   The **Certificate Export Wizard** window appears.




9. Select **OK**.
10. Copy the `certificate.cer` file, and then paste it into the folder that contains the Java files for your machine.

    **Tip:** For example, if your Java files are located at C:\Program Files\Java\jre7\bin, copy the certificate.cer file to that bin folder.
11. On the APM Connect server, access the Command Prompt window as an Administrator, and then navigate to the location of the Java files on your machine.
12. Enter `keytool`.
    Commands for the Key and Certificate Management Tool appear in the Command Prompt.
13. In the last line, `C:\Program Files\Java\jre7\bin>`, enter `keytool -importcert -alias test -file certificate.cer -keystore publickey.store`.
14. Enter a password, and confirm the password by reentering it.
    In the Command Prompt window, you are asked if you want to trust the certificate.
15. For yes, enter `y`.
    The keystore file is created.
16. For the Karaf service, navigate to the location of the Karaf JDK, and then repeat steps 12 on page 118 through 15 on page 118 using the path and password for the Karaf service JDK.
    - For the value of the keystore argument, use the file path of the Karaf JDK, (for example, `C:\Program Files\Java\<JDK version>\jre\lib\security\cacerts`).
    - The default password for keytool is changeit. Enter your unique value.
17. Access the context file, and then enter the following values for the corresponding parameters:
    - **TRUSTSTORE_FILE**: The location of the truststore file you created.

- **TRUSTSTORE_PASSWORD**: The password you entered in the Command Prompt window when you installed the certificate.
- **USE_SSL**: true.
- **APM_API_USE_SSL**: true, if you are using SSL on the GE Digital APM Server.

### Results

SSL is now enabled for the applications for which you imported the certificates.

### Set Permissions for APM Connect Directory

This topic describes the steps for setting up the permissions required to enable the file share.

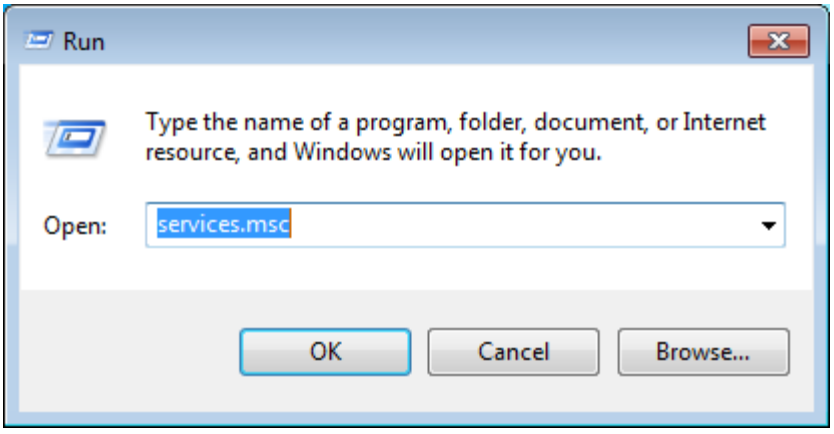
### About This Task

Before you begin importing data into GE Digital APM using the Excel source files, you must set up a network folder share. The data is passed from the APM Server to the APM Connect server through a file share, a situation in which a folder on the network is shared and accessible to both servers.

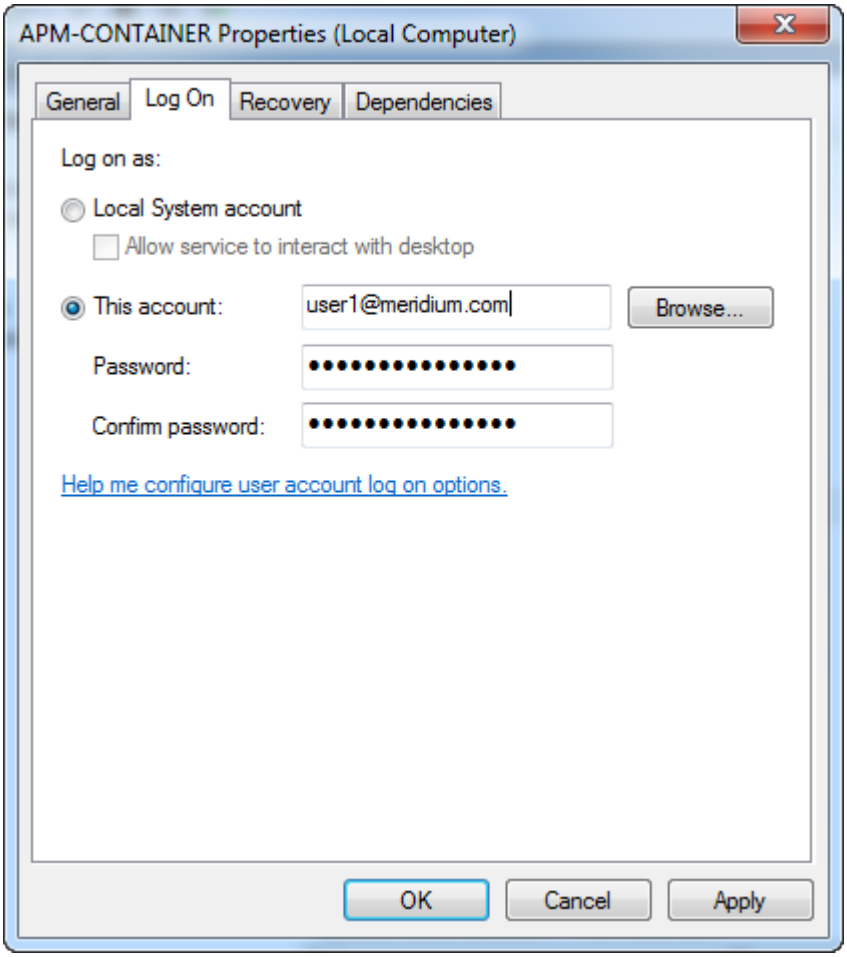
### Procedure

- To create a domain user for the APM Container:

1. On the machine on which you installed APM Connect, from your desktop, select the Windows Start button to open the Windows Start Menu.
2. In the **Search programs and files** box, search for Run.
   **Run** appears in the **Programs** list.
3. Open **Run**.
   The **Run** window appears.
4. In the **Open** box, enter: `services.msc`.




5. Select **OK**.
   The **Services** window appears.
6. Right-click **APM-CONTAINER**, and then select **Properties**.
   The **APM-CONTAINER Properties** window appears.
7. Select the **Log On** tab, and then select **This account**.
8. Enter the credentials for a user within your network, designated to run APM Connect services.
   `user1@meridium.com`




9. Select **Apply**, and then select **OK**.
10. Repeat Steps 6 on page 119-8 on page 119 for the service Apache Tomcat 7.0 APMConnect_Tomcat.
    A domain user has been assigned to run the APM Container service and the Tomcat service.

- To create a Data Loaders file share:

  **Important:** If you are employing a load-balancing setup using multiple servers, before you proceed, you must first configure the APM Server file share. If you are employing a standalone server, you may proceed with the following steps.

  1. On your APM Connect Server, navigate to the APM Connect directory at the following file path: `<root:>\APMConnect\`.
  2. In the directory window, select **New folder**, and then name the folder with the recommended name: `DataLoaderFiles`.
  3. Right-click the folder `DataLoaderFiles`.
  4. Point to **Share with**, and then select **Specific people...**.
  5. In the **File Sharing** window, select the domain user that you indicated in Step 8 on page 119.
  6. In the **Permission Level** column for that user, select the drop-down arrow, and then select **Read/Write**, and then select **Share**.

     **Note:** Users running the APM-CONTAINER service and the APM Server must have Read/Write access to this folder.

- Grant Read/Write Access to the APMConnect folder:

1. Navigate to the **APMConnect** folder.
   If you installed APM Connect in the default location the folder is `C:/APMConnect`.
2. Right-click on the folder `APMConnect`, and then select **Properties**.
3. In the **APMConnet Properties** window, select the **Security** tab, and then select **Edit**.
4. In the **Permissions for APMConnect** window, select **Add...**.
   The appears.
5. In the **Select Users, Computers, Service Accounts, or Groups** window, in the **Enter the object names to select(examples)**: box, enter the name of the APM Connect user that you indicated in Step 8 on page 119, and then select**Check Names**.
   The APMConnect user's name is validated.
6. Select **OK**.
   The APM Connect user is populated in the **Group or user names** box.
7. Select the APM Connect user.
8. In the **Permissions for <Username>** box, on the **Full Control** row, select **Allow**, and then select **Ok**.
9. In the **APMConnect Properties** window, select **OK**.

### Results

The APM Connect service user has access to the APM Connect folder.

### Access Localized Data Loader Workbooks

### About This Task

The localized Data Loader workbooks are stored on the GE Digital APM Server.

### Procedure

1. On your GE Digital APM Server, navigate to the folder where the localized workbooks are stored. If you had installed GE Digital APM in the default location, navigate to `C:\Program Files\Meridium\Templates\DataLoaders`.

   The DataLoaders folder appears.
2. Select the folder containing the workbook in the language you want according to the following table:

| Folder | Language |
|---|---|
| de | German |
| Default | English |
| es | Spanish |
| fr | French |
| it | Italian |
| ja | Japanese |
| nl | Dutch |
| pl | Polish |
| pt-BR | Portuguese (Brazilian) |
| ru | Russian |
| zh-CHS | Chinese (Simplified) |

### Results

You can access and use the localized workbooks to load data into GE Digital APM. Optionally, you can import the localized workbooks into GE Digital APM so that they can be accessed from the **Data Loaders** page.

### Deploy and Configure Data Loader Files

This topic describes how to access and configure parameters in the context file.

### About This Task

**Note:** The APM Connect installer automatically deletes the file `StageDataLoaderService.cfg` from the location `C:\APMConnect\Utilities\runtime\deploy`, if it exists there. You must complete the remaining steps in this topic manually.

### Procedure

1. Access the APM Connect installation package, and then copy the file `StageDataLoaderService.cfg`.
2. Navigate to `<root>\APMConnect\Utilities\runtime\etc`, and then paste the copied file in that location.
3. Open the file to edit, and then configure the following parameters:

| Parameter | Description | Default or Recommended Value |
|---|---|---|
| context | Defines what Talend context environment is used. | Default. |
| TRUSTSTORE_FILE | The directory path to the dinoloader SSL configuration file. | Value is unique to the user. |
| TRUSTSTORE_PASSWORD | The password for the keystore files. | Value is unique to the user. |
| USE_SSL | Determines if SSL is used. | • true: will use SSL.<br>• false: will not use SSL. |
| IR_HOST | Intermediary Repository host name. | Value is unique to the user. |
| IR_DATABASE | Database for the dinoloader job. | Value is unique to the user. |
| IR_USERID | Intermediary Repository username. | Value is unique to the user. |
| IR_PASSWORD | Intermediary Repository password. | Value is unique to the user. |
| IR_SCHEMA | The schema in which the IR database will be created. | The default value is public. |
| IR_PORT | Intermediate Repository port. | Default value is 5432. |
| LOG4J_CONFIG_FILE | Log4j directory path. | C:/APMConnect/Config/log4j.properties |
| IS_LINUX | Indicates if the machine on which the Data Loaders are deployed is a POSIX-compliant operating system (for example, Linux, UNIX, AIX, HPUX etc.) or another operating system. | • true: Enter true if you are deploying the Data Loaders on a POSIX-compliant operating system.<br>• false: Enter false if you are not deploying the Data Loaders on a POSIX-compliant operating system. |

| Parameter | Description | Default or Recommended Value |
|---|---|---|
| LINUX_BASE_PATH | The directory path where the data loader file share is mounted. | This parameter is required only if you are deploying the Data Loaders on a Linux machine.<br>This path is defined by system administrator for the Linux machine, and the value is unique to the user. |
| ROW_LEVEL_LOGGING | Used for debugging, specifies whether or not data rows are written to the log. | The default is false.<br>true: Writes data rows to the log.<br>false: Suppresses data rows from the log. |
| org.apache.karaf.features.configKey | Karaf web console configuration tie-in is used to associate this configuration file with the RunDataLoaderRoute class. | StageDataLoaderService.talendcontext.Default<br>**Important:** Do not modify this parameter. |

4. Save the file.
5. In the installation package, copy the file `StageDataLoaderService.jar`.
6. On your APM Connect server, navigate to `<root>\APMConnect\Utilities\runtime\deploy`, and then paste the copied file in that location.

   **Note:** If new configuration is not automatically applied, restart the APM_CONTAINER service. This will force the changes to be applied.

### Deploy and Configure the APM_UPDATE_LOGIC Webservice

The APM_UPDATE_LOGIC webservice manages the temporary tables GE Digital APM uses to load the database. Correct configuration is required for the system to operate correctly.

### Procedure

1. Access the APM Connect installation package, and then copy the file `APM_UPDATE_LOGIC.cfg`.
2. Navigate to `<root>\APMConnect\Utilities\runtime\etc`, and then paste the copied file in that location.
3. Open the file to edit, and then configure the following parameters:

| Parameter | Description | Default or Recommended Value |
|---|---|---|
| context | Defines what Talend context environment is used. | Default. Do not change. |
| CONFIG_FILE_PATH | The directory path to the context file used for extractions. | C:/APMConnect/Config/ContextFile.xml |
| LOG4J_CONFIG_FILE | The directory path to the log4j.properties file used for extractions. | C:/APMConnect/Config/log4j.properties |
| SAP_CLOUD_ENABLED | Specifies whether the installation is in the cloud or on premises. | • *true*: the installation is in the cloud.<br>• *false*: the installation is on premises. |

   **Note:** All file paths must use / in this configuration as a directory separator or errors will occur.
4. Save the file.
5. In the installation package, copy the file `APM_UPDATE_LOGIC.jar`.
6. On your APM Connect server, navigate to `<root>\APMConnect\Utilities\runtime\deploy`, and then paste the copied file in that location.

   **Note:** If new configuration is not automatically applied, restart the APM_CONTAINER service. This will force the changes to be applied.

### Create the Intermediate Repository Database

This topic describes how to set up a repository in preparation to run your first job.

### Before You Begin

**Important:** If you are using both the Data Loaders and an EAM Adapter, you need only one Intermediate Repository Database.

- Before you can prepare and deploy the repository, you must import the CreateIntermediateRepository job.
- If you are using the Data Loaders and the EAM Adapters, you must deploy and run the CreateIntermediateRepository job for each set of adapters.
- For SAP adapters, you must first run the Static Data job.
- For multiple EAM systems, the context file parameter values for a specific type of system must be identical except for the value of CMMS_ID.
- For multiple EAM systems, the Intermediate Repository Connection parameters have the same values for all adapters connected to this GE Digital APM system.

**Important:** Each time you run the CreateIntermediateRepository you recreate the GE Digital APM database to the baseline settings, removing any previous configuration. When you run the addSourceSystem job, the job will add new source systems based on the CMMS_ID and the SOURCE_SYSTEM_TYPE. If the job is run an additional time with the same configuration, it will reset the control values of an existing source system.

### Procedure

1. Log in to the APM Connect Administration Center web application.

   **Note:** The user logging in must have access to the Job Conductor by being designated the Operations Manager role. By default, users designated as administrators do not have Job Conductor permissions.
2. In the **Job Conductor** workspace, in the appropriate project, select the CreateIntermediateRepository job.

   **Note:** For ServiceMax, this job is called CreateIntermediateRepository_ServiceMax.
3. Select **Context parameters**.

   The **Context parameters** section appears.
4. Configure the following parameter.

| Context Parameter | Description |
|---|---|
| CONFIG_FILE_PATH | The file path to context files for the jobs.<br>**Important:**<br>• You must change the default value to reflect the actual path to your configuration file.<br>• CMMS_ID and SOURCE_SYSTEM_TYPE must be set in the context file. |

5. Select **Run**.

   If you are configuring a single system, you have completed your configuration.

   The intermediate repository database is created for the project.

If you are configuring multiple EAM systems, perform the remaining steps in this topic.

6. In the **Job Conductor** workspace, in the appropriate project, select the addSourceSystem job.
7. Configure the following parameter.

| Context Parameter | Description |
|---|---|
| CONFIG_FILE_PATH | The file path to context files for the jobs.<br>**Important:**<br>• You must change the default value to reflect the actual path to your configuration file.<br>• CMMS_ID and SOURCE_SYSTEM_TYPE must be set in the context file. |

8. Select **Run**.
9. Repeat steps 6 on page 124 through 8 on page 125 for all adapters.

# Deploy the Automatic Data Loader Job

## Set up the Automatic Data Loader Job

### Before You Begin

APM Connect must be installed.

### Procedure

1. Access the APM Connect Administration Center.
2. In the **Menu** pane, in the **Conductor** section, select **Job Conductor**.
3. In the **Job Conductor** toolbar, select **Add**.

   The **Execution task** pane is enabled.
4. In the **Execution task** pane, in the **Label** box, enter a label for the job.
5. In the **Description** box, enter a description for the job.
6. Select the **Active** check box.
7. In the **Job** section, select  .

   The **Import generated code** window appears.
8. Select **Browse...**, and then navigate to the folder containing the updated jobs package.
9. Select the job **dinokeeper.zip**, and then select **Launch upload**.

   The job is imported into the **Job Conductor**.
10. Configure the context file to identify the location of the load directory, the archive directory, and the log file.
11. Modify the `<Context_File_PATH>` value in the job conductor context parameters to point to the context file for the job.
12. **Optional:** If needed, edit the file `AutomaticDataLoaderOrder.csv` to change the directory processing order.
13. Run the job.

### Results

The job conductor indicates that the job ran successfully, and the automatic data loader directories will be created if they do not already exist.

You can now place workbooks in the appropriate data loader directory.

# Configure the Context File

### Before You Begin

The context file provides the automatic data loader job with the information it needs to locate the directories and log the file it requires.

You should have imported the automatic data loader job.

### Procedure

1. Navigate to the following folder: **C:\APMConnect\Config\<system>**
2. Modify the file **ContextFile.xml** to indicate the values for your system.

| Parameter | Description | Default or recommended value |
|---|---|---|
| CONFIG_FILE_PATH | The path to the context file used for extraction. | Enter your unique value (for example, C:\APMConnect\Config \ContextFile.xml). |
| SCAN_DIR | The directory that contains the directories from which the job retrieves workbooks to load data. | Enter your unique value (for example, C:\APMConnect \Dinokeeper).<br>**Important:** Because this job runs with administrative authority, you must control user access to this directory. |
| ARCHIVE_DIR | The directory that the facility uses to archive workbooks. | Enter your unique value (for example, C:\APMConnect \Archives). |
| LOG_BASE_DIR | The path that the facility uses to store the generated log files. | Enter your unique value (for example, C:\APMConnect\Log). |
| LOG4J_CONFIG_FILE | The path to the log4j configuration file. | Enter your unique value (for example, C:\APMConnect\Config \log4j.properties).<br>**Note:** This can be the same log4j configuration file that you use for your Adapters. If you want to use log4j settings that are different from the EAM job, then you must configure the context file with different log4j properties. |

# Change Automatic Data Loader Processing Order

The default Automatic Data Loader directory processing order may not meet your requirements. Use this procedure to change the processing order.

### Before You Begin

You must deploy the Automatic Data Loader.

### About This Task

Besides changing the order, you can keep the Automatic Data Loader from scanning any directories that you are not using. To achieve this goal, you can determine your optimal order before starting the job the first time.

### Procedure

1. Determine the directories you need and the order in which you need those directories processed.
2. Navigate to the `AutomaticDataLoaderOrder.csv` file.

   During deployment, the file is created in the directory defined in the SCAN_DIR parameter in the Automatic Data Loader context file.
3. Using a text editor, edit the file `AutomaticDataLoaderOrder.csv` to achieve one of the following outcomes:

| Desired outcome | How to edit the file |
|---|---|
| **Remove directory from processing.** | a. Delete the directory row from the file.<br>b. Update the order number of the remaining directories. |
| **Change the processing order of the directories.** | Change the order number in the file. |

**Important:** Do not remove the first row from the file.

The default content of the file `AutomaticDataLoaderOrder.csv` is as follows.

```
Order,LoaderID
1,ManageTaxonomy
2,ManageEquipmentAndFunctionalLocation
3,AssetIngestionLoader
4,Custom Asset Hierarchy Loader
5,ACADataLoader
6,ManageAPM
7,ManageWorkHistory
8,ManageTMLGroup
9,ManageTMLGroupFL
10,ManageInspectionsFL
11,ManageInspections
12,Load RBI Corrosion Loop
13,ManageRBI580
14,ManageRBI581
15,Rounds Allowable Value
16,Rounds Route
17,Rounds MLTG
18,Rounds Readings
19,ManageFMEAAssetTemplate
20,ManageFMEAAnalysisTemplate
21,ManageAssetStrategyTemplate
22,Manage RCA
23,ManageRCM
24,ManageRCMFMEA
25,ManageASM
26,ManageTagLinks
27,Calibration Loader
28,Hazards Loader
29,RoleDataLoader
30,GISDataLoader
31,GAA GADS Amplification Code
32,GAA GADS Cause Code
33,Load PLA
```

# Use the Automatic Data Loader

Use the Automatic Data Loader job to manually or programmatically load asset data to GE Digital APM.

### About This Task

By default, the Automatic Data Loader job processes the files in the directories based on the alphanumeric directory name and then the time stamp of the files from oldest to most recent. However, you can change the order in which the Automatic Data Loader job processes the directories by editing the file `AutomaticDataLoaderOrder.csv`.

### Procedure

1. Identify the directory that corresponds to the data loader you are using.
2. Move the data loader files (either a correctly formatted Excel workbook or a `.zip` file that contains correctly formatted `.csv` files) into the identified directory.

# Chapter 6

# Reference

**Topics:**

# APM Connect System Requirements

### License Requirements

APM Connect has a three-tier license system that enables the APM Connect Framework. One of the following license types is required to take advantage of the APM Connect functionality:

- APM Connect Basic
- APM Connect Plus
- APM Connect Studio

  **Note:** APM Connect Studio contains numerous libraries that integrate with third-party products, such as GeoRaster. Questions regarding linking these libraries with GE Digital APM should be directed to a member of the GE Digital APM Professional Services department on an individual basis. Specific requirements of third-party products is outside the scope of APM Connect Studio support.

### Additional Licensing

The following additional licenses are required to take advantage of the SAP Adapters:

**SAP Integration Interfaces:**

Enables the SAP Equipment, Functional Location, Work History, and Notification Creation Adapters.

**SAP Technical Characteristics:**

Enables the SAP Technical Characteristics Adapter.

**SAP Work Management:**

Enables the SAP Work Management Adapter.

The following additional license is required to take advantage of the SAP PI Adapters:

**SAP Process Integration:**

Enables the SAP PI Adapters.

The following additional license is required to take advantage of the Maximo Adapters:

**Maximo Interfaces:**

Enables the Maximo Equipment, Functional Location, Work History, Service Request, and Work Order Generation Adapters.

**Note:** There is no additional license required to take advantage of the APM Connect Data Loader functionality.

### UDLP Versions

Beginning with the Sept. 21, 2018 release, GE Digital APM will maintain compatibility with the APM Connect client-side jobs one version prior to the newly released version.

To prevent processing failures, you must upgrade your on-premises, client-side jobs within two months of a GE Digital APM release to the most current version of the APM Connect client jobs. For example, if the GE Digital APM tenant has installed the Dec. 14, 2018 release, you must upgrade the on-premises, client-side jobs to UDLP V2.5.0 or V2.5.1 by Feb. 14, 2019, otherwise the next release of the GE Digital APM tenant may not process your data correctly.

The following UDLP versions are currently supported in GE Digital APM:

- V2.8.0

### Additional Components Required for APM Connect

In addition to the basic GE Digital APM system architecture, your system must also contain the following components:

### Minimum Software Requirements

- Windows Server 2008 R2
- Windows Server 2012
- Windows Server 2016
- Java SE 8 Update 131 or higher

### Recommended Software for APM Connect Server

- Windows Server 2012 R2
- Windows 7 64-bit OS

### Browser Requirements for APM Connect Server

| Web Browser | Recommended or Supported |
|---|---|
| Google Chrome | Recommended |
| Microsoft Internet Explorer 10 | Supported |
| Microsoft Internet Explorer 11 | Supported |

### Minimum Hardware Requirements for APM Connect Server

- Four Processor Core, 2.0GHz
- 8 GB RAM
- 100 GB Free Disk
- 100 MB Network Interface

### Recommended Hardware for APM Connect Server

- I5 Processor, 2.0 + GHz
- 32 GB RAM
- 300 GB Free Disk
- 1 GB Network Interface

**Tip:** APM Connect is input and output intensive, and requires a large amount of storage space. Faster storage is the best way to improve the performance of APM Connect.

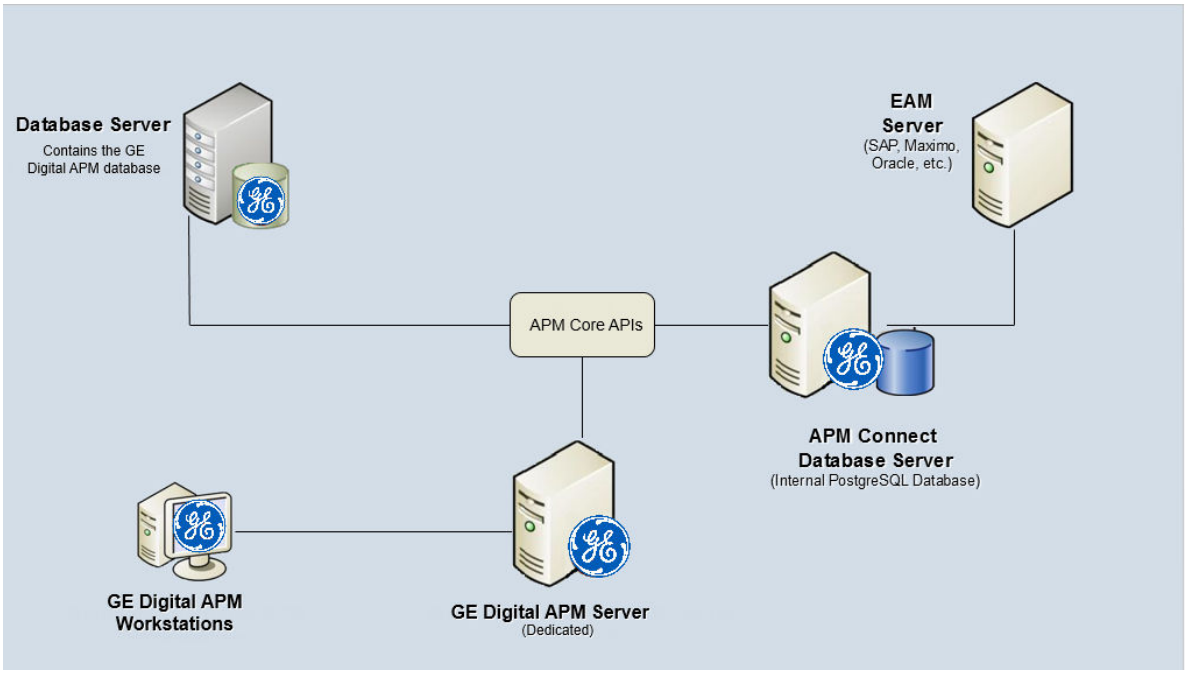
Depending on how your system is configured, these requirements may not be sufficient. Parameters that affect the hardware requirements include the number of users, modules purchased, database size, and other factors that can vary from one customer to another. For help refining your specific system requirements, contact GE Digital

### System Architecture for EAM Adapters

**Figure 3: Single Server Configuration (Recommended)**

The single server configuration is the simplest way to configure APM Connect. However, it does include an embedded database. The following image depicts this configuration.

**Note:** Only one EAM system is supported for each APM tenant or database.




Many organizations choose to separate their databases. It is possible to install the intermediate repository database on an external server, and to keep the APM Connect Systems database on a different server. The following image depicts this configuration.

**Note:** The external configuration will affect performance. The single server configuration results in faster performance.

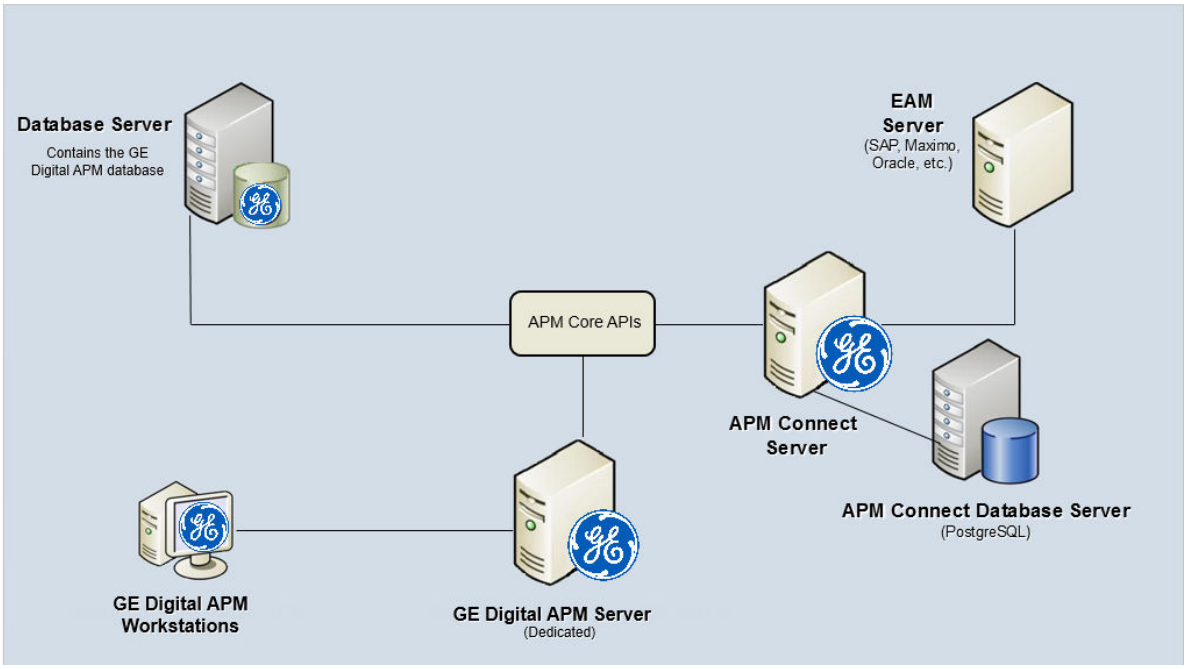



**Figure 4: External Database Configuration**

### Deploying APM Connect

After you have installed and configured the basic GE Digital APM system architecture, you will need to perform some configuration steps specifically for APM Connect.

**Note:** You need to perform this process only if you are using an EAM Adapter or a Field Service system Adapter.

### Supported Features in APM Now

In the APM Now environment, the following features are unavailable:

- ACA for SAP
- ASI for SAP
- Maximo Integration
- SAP PI

All other APM Connect features are available.

# Required Server Ports

To provide communication between APM Connect and other systems, make sure the listed ports are open.

| Port Numbers | Description |
|---|---|
| 80, 9080, 8879, 9043, 9044, 9060, 9061, 9430, 9443, 139, 50000, 50005, 3300 | Used for SAP and Maximo Interfaces. |
| 8080, 5432, 8000, 8001, 8888, 3690, 8040 | Used for GE Digital APM Interfaces. |
| • 6220 - Dedicated<br>• 7220 - RAC | Used for the Oracle client. |

# APM Connect Version Compatibility Table

This topic provides the installation files that are required for an APM Connect installation, and the version structure for APM Connect.

### Version Structure

| Example: | EAM | SAP | V1 | 5 | 2 |
|---|---|---|---|---|---|
| **Description:** | Area of APM Connect (that is, Data Loaders, EAM, M2M) | EAM System released against (that is, SAP, SAP PI, Maximo) | Architecture Release | Major Release | Maintenance or Patch Release |

The following are examples of how to interpret the versions.

- EAM SAP V1.5.0 is the fifth major release on the APM Connect V1.x architecture; it can be applied to the EAM system SAP.
- EAM SAP V1.5.1 is a maintenance release that can be applied to EAM SAP V1.5.0.
- DL V1.4.0 is the fourth major release on the APM Connect V1.x architecture.

### APM Compatibility Table

This table includes only the GE Digital APM versions for which a corresponding APM Connect version was released.

| GE Digital APM Framework Version | APM Connect Base | Data Loader | EAM Maximo | EAM SAP | EAM SAP Cloud | EAM SAP PI |
|---|---|---|---|---|---|---|
| V4.4.0.0 (April 28, 2020) | APM Connect Base V2.0.0 | UDLP V2.8.0, V2.7.0, or V2.7.1 | | | | |
| V4.3.1.0.1 (October 29, 2019) | APM Connect Base V2.0.0 | UDLP V2.7.0, V2.7.1, V2.6.0, or V2.6.1<br>**Note:** UDLP V2.7.0 and V2.7.1 are identical for Cloud Server revision only. | | | | |
| V4.3.1.0.0 (September 17, 2019) | APM Connect Base V2.0.0 | UDLP V2.6.0 or V2.6.1 and V2.7.0 | | | | |
| V4.3.0.7.5 (June 19, 2019) | APM Connect Base V2.0.0 | UDLP V2.5.0 or V2.5.1 and V2.6.0 or V2.6.1 | | | | |
| V4.3.0.7.0 (March 29, 2019) | APM Connect Base V2.0.0 | UDLP V2.5.0 or V2.5.1 and V2.6.0 | | | | |
| V4.3.0.6.5 (December 7, 2018 | APM Connect Base V2.0.0 | UDLP V2.4.0 and V2.5.0 or V2.5.1 | | | | |
| V4.3.0.6.0 (September 21, 2018) | APM Connect Base V2.0.0 | UDLP V2.4.0 and V2.5.0 | | | | |
| V4.3.0.5.0 (June 22, 2018) | APM Connect Base V2.0.0 | UDLP V2.4.0 | | | | |
| V4.3.0.4.0 (April 25, 2018) | APM Connect Base V2.0.0 | UDLP V2.3.0 | | | | |
| V4.3.0.3.0 (December 11, 2017) | APM Connect Base V2.0.0 | UDLP V2.2.0 | | | | EAM SAP PI V2.0.0 |
| V4.3.0.2.0 (September 22, 2017) | APM Connect Base V2.00 | UDLP V2.1.0 | EAM MAX V2.0.0 | UDLP V2.1.0 | | EAM SAP PI V2.0.0 |
| V4.3.0.1.0 (August 16, 2017) | APM Connect Base V2.00 | DL V2.0.1 | EAM MAX V2.0.0 | EAM SAP V2.0.0 | EAM SAP Cloud V1.0.1 | EAM SAP PI V2.0.0 |
| V4.3.0.0.0 (June 30, 2017) | APM Connect Base V2.00 | DL V2.0.0 | EAM MAX V2.0.0 | EAM SAP V2.0.0 | EAM SAP Cloud V1.0.1 | EAM SAP PI V2.0.0 |
| V4.2.0.6.0 (March 21, 2017) | APM Connect Base V1.0.3 | DL V1.6.3 | EAM MAX V1.1.2 | EAM SAP V1.6.3 | EAM SAP Cloud V1.0.1 | EAM SAP PI V1.1.2 |

| GE Digital APM Framework Version | APM Connect Base | Data Loader | EAM Maximo | EAM SAP | EAM SAP Cloud | EAM SAP PI |
|---|---|---|---|---|---|---|
| V4.2.0.4.0 (December 13, 2016) | APM Connect Base V1.0.3 | DL V1.6.3 | EAM MAX V1.1.2 | EAM SAP V1.6.3 | EAM SAP Cloud V1.0.1 | EAM SAP PI V1.1.1 |
| V4.2.0.3.0 (November 15, 2016) | APM Connect Base V1.0.3 | DL V1.6.3 | EAM MAX V1.1.0 | EAM SAP V1.6.3 | EAM SAP Cloud V1.0.1 | EAM SAP V1.1.1 |
| V4.2.0.2.0 (October 17, 2016) | APM Connect Base V1.0.3 | DL V1.6.2 | EAM MAX V1.1.0 | EAM SAP V1.6.2 | EAM SAP Cloud V1.0.1 | EAM SAP V1.1.1 |
| V4.2.0.1.0 (September 21, 2016) | APM Connect Base V1.0.3 | DL V1.6.2 | EAM MAX V1.1.0 | EAM SAP V1.6.1 | EAM SAP Cloud V1.0.0 | EAM SAP V1.1.1 |
| V4.2.0.0 (July 27, 2016) | APM Connect Base V1.0.3 | DL V1.6.1 | EAM MAX V1.1.0 | EAM SAP V1.6.1 | EAM SAP Cloud V1.0.0 | EAM SAP PI V1.1.1 |
| V4.1.7.0 (June 6, 2016) | APM Connect Base V1.0.2 | DL V1.6.0 | EAM MAX V1.1.0 | EAM SAP V1.6.0 | N/A | EAM SAP PI V1.1.0 |
| V4.1.6.3 (June 20, 2016) | APM Connect Base V1.0.2 | DL V1.5.6 | EAM MAX V1.0.0 | EAM SAP V1.5.5 | N/A | EAM SAP PI V1.0.1 |
| V4.1.6.2 (May 20, 2016) | APM Connect Base V1.0.2 | DL V1.5.5 | EAM MAX V1.0.0 | EAM SAP V1.5.5 | N/A | EAM SAP PI V1.0.1 |
| V4.1.6.0 (March 28, 2016) | APM Connect Base V1.0.2 | DL V1.5.4 | EAM MAX V1.0.0 | EAM SAP V1.5.5 | N/A | EAM SAP PI V1.0.1 |
| V4.1.5.1 (March 11, 2016) | APM Connect Base V1.0.2 | DL V1.5.3 | EAM MAX V1.0.0 | EAM SAP V1.5.3 | N/A | EAM SAP PI V1.0.0 |
| V4.1.5.0 (February 9, 2016) | APM Connect Base V1.0.2 | DL V1.5.2 | EAM MAX V1.0.0 | EAM SAP V1.5.3 | N/A | EAM SAP PI V1.0.0 |
| V4.1.1.1 (December 15, 2015) | APM Connect Base V1.0.2 | DLV1.5.1 | N/A | EAM SAP V1.5.2 | N/A | EAM SAP PI V1.0.0 |
| V4.1.1.0 (November 23, 2015) | APM Connect Base V1.0.2 | DL V1.5.0 | N/A | EAM SAP V1.5.2 | N/A | EAM SAP PI V1.0.0 |
| V4.1.0.3 (March 7, 2016) | APM Connect Base V1.0.2 | DL V1.4.1 | N/A | EAM SAP V1.5.1 | N/A | EAM SAP PI V1.0.0 |
| V4.1.0.0 (October 12, 2015) | APM Connect Base V1.0.2 | DL V1.4.0 | N/A | EAM SAP V1.5.1 | N/A | EAM SAP PI V1.0.0 |
| V4.0.0.0 (July 23, 2015) | APM Connect Base V1.0.2 | WPA V1.2.1 | N/A | EAM SAP V1.5.0 | N/A | EAM SAP PI V1.0.0 |

# The Automatic Data Loader Directories

The automatic data loader job uses directories within the directory identified in the SCAN_DIR parameter to identify the data loader to use for a particular workbook.

### Data Loaders and Directories

The following table lists the directories that are created when the job starts that correspond to the various data loaders.

| Data Loader Name | Directory Name |
|---|---|
| APM Family | ManageAPM |
| Asset Criticality Analysis (ACA) | ACADataLoader |
| Asset Ingestion Loader | AssetIngestionLoader |
| Asset Strategy Management (ASM) | ManageASM |
| Asset Strategy Management (ASM) Templates | ManageAssetStrategyTemplate |
| Calibration | Calibration Loader |
| Custom Asset Hierarchy | Custom Asset Hierarchy Loader |
| Equipment and Functional Location | ManageEquipmentAndFunctional Location |
| Failure Modes and Effects Analysis (FMEA) | ManageRCMFMEA |
| Failure Modes and Effects Analysis (FMEA) Analysis Templates | ManageFMEAAnalysisTemplate |
| Failure Modes and Effects Analysis (FMEA) Asset Templates | ManageFMEAAssetTemplate |
| Generation Availability Analysis (GAA) Amplification Codes | GAA GADS Amplification Code |
| Generation Availability Analysis (GAA) Cause Code | GAA GADS Cause Code |
| Geographic Information System (GIS) | GISDataLoader |
| Hazards | Hazards Loader |
| Inspection Management (IM) Assets | ManageInspections |
| Inspection Management (IM) Functional Location | ManageInspectionsFL |
| Production Loss Analysis (PLA) | Load PLA |
| Reliability Centered Maintenance (RCM) | ManageRCM |
| Risk Based Inspection (RBI) 580 | ManageRBI580 |
| Risk Based Inspection (RBI) 581 | ManageRBI581 |

| Data Loader Name | Directory Name |
|---|---|
| Risk Based Inspection (RBI) Corrosion Loop | `Load RBI Corrosion Loop` |
| Role | `RoleDataLoader` |
| Root Cause Analysis (RCA) | `Manage RCA` |
| Rounds Allowable Values | `Rounds Allowable Value` |
| Rounds Readings | `Rounds Readings` |
| Rounds Routes | `Rounds Route` |
| Rounds Templates | `Rounds MLTG` |
| Tags to Assets Relationship | `ManageTagLinks` |
| Taxonomy | `ManageTaxonomy` |
| Thickness Monitoring (TM) Equipment | `ManageTMLGroup` |
| Thickness Monitoring (TM) Functional Location | `ManageTMLGroupFL` |
| Work History | `ManageWorkHistory` |