



GE VERNOVA

**Asset Performance Management**  
**On-Premises APM**  
**V5.0.7.0.0**

**Asset Hierarchy**

# Contents

|  |           |
|--|-----------|
| <b>Chapter 1: Overview of Asset Hierarchy</b>                    | <b>1</b>  |
| Overview of Assets   | 2         |
| About the Asset Hierarchy  | 2         |
| Access the Assets Page   | 3         |
| Filter Assets  | 4         |
| Search for an Asset  | 4         |
| <br>   |           |
| <b>Chapter 2: Overview of Asset Groups</b>                       | <b>5</b>  |
| About Asset Groups   | 6         |
| About Asset Groups Based on Queries                              | 6         |
| Create an Asset Group  | 6         |
| Create an Asset Group Based on a Query                           | 7         |
| Create a Static Asset Group from an Asset Group Based on a Query | 8         |
| Filter Asset Groups  | 8         |
| Search for an Asset Group  | 9         |
| Search for an Asset in an Asset Group                            | 9         |
| Modify an Asset Group  | 9         |
| Add Assets to an Asset Group                                     | 9         |
| Remove Assets from an Asset Group                                | 10        |
| Delete an Asset Group  | 10        |
| <br>   |           |
| <b>Chapter 3: Workflow</b>                                       | <b>12</b> |
| Core Analysis: Asset Event Analysis Workflow                     | 13        |
| Start  | 13        |
| Search Asset   | 13        |
| Review Event History   | 14        |
| Opportunity Exists?  | 14        |
| Manage Performance Recommendations                               | 14        |
| <br>   |           |
| <b>Chapter 4: Asset Hierarchy Configuration</b>                  | <b>15</b> |

|  |           |
|--|-----------|
| Asset Hierarchy Configuration  | 16        |
| Access the Asset Hierarchy Configuration Page                        | 17        |
| Modify the Asset Hierarchy Configuration                             | 17        |
| Schedule an Asset Hierarchy Rebuild                                  | 18        |
| <b>Chapter 5: Data Loader</b>  | <b>20</b> |
| About the Custom Asset Hierarchy Data Loader                         | 21        |
| About the Custom Asset Hierarchy Data Loader Requirements            | 21        |
| About the Custom Asset Hierarchy Data Loader Data Model              | 21        |
| About the Custom Asset Hierarchy General Loading Strategy            | 22        |
| About the Custom Asset Hierarchy Data Loader Workbook Layout and Use | 22        |
| About Populating Site Reference Data                                 | 31        |
| About the Custom Asset Hierarchy Data Loader Load Verification       | 32        |
| <b>Chapter 6: Troubleshooting</b>                                    | <b>33</b> |
| Troubleshooting Scenarios  | 34        |

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# Chapter 1

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## Overview of Asset Hierarchy

### Topics:

- [Overview of Assets](#)
- [About the Asset Hierarchy](#)
- [Access the Assets Page](#)
- [Filter Assets](#)
- [Search for an Asset](#)

## Overview of Assets

The **Assets** page in APM contains the Asset Hierarchy and [Asset Groups](#) that provide a dynamic way to interact with and view your assets.

Simply, the Asset Hierarchy displays records in the database and how they relate to one another. It provides a dynamic view of asset records, which are typically functional locations and equipment, and their associated analyses by navigating through the system based on the assets themselves.

## About the Asset Hierarchy

APM is built on the premise that within your company, assets are organized in a hierarchical fashion, with each asset (for example, equipment, RBI component, etc.) having a parent functional location (for example, unit), which in turn is part of a higher-level functional location (for example, site). These parent-child relationships create the Asset Hierarchy.



### Navigating the Asset Hierarchy

The Asset Hierarchy allows you to browse your assets from the top-level functional location through the hierarchical structure, for example:

- Company
- Site
- Area
- Unit
- Functional Location
- Equipment

Your selection in the Asset Hierarchy is used as the default asset when you open an application from the main navigation menu or from a hyperlink in the **<Asset Name>** workspace. Your selection is retained when you log out of APM, and it is used as the default asset the next time you log in, until you select a different asset in the Asset Hierarchy.

#### Tip:

- To navigate to a parent-level equipment or functional location of an asset that is selected in the hierarchy, select the corresponding breadcrumb link in the breadcrumb path.
- To expand or collapse the Asset Hierarchy panel, select  or , respectively.
- To resize the Asset Hierarchy panel, drag the border of the panel to the required width.

#### Note:

- As a standard practice, we assume that your equipment is installed in locations that exist on the lowest level of your location hierarchy.
- By default, the Asset Hierarchy displays:
  - A maximum of 500 top-level records in the hierarchy.
  - A maximum of 500 child equipment or functional locations for a parent functional location.

## About the Hierarchy Filter

The Asset Hierarchy filter has three levels. As standard practice, these filter levels correspond with the asset taxonomy:

- Taxonomy Category: A list of asset categories (for example, Electrical is a category of asset).
- Taxonomy Class: A list of asset classifications (for example, Capacitor is a class of electrical assets).
- Taxonomy Type: A list of types of asset (for example, Series Capacitor is a type of capacitor).

You can select one or more levels in the filter panel, and the Asset Hierarchy is filtered to show only assets that match your selection.

## About the <Asset Name> Workspace

As you navigate through the Asset Hierarchy, in the <Asset Name> workspace, you can access information about the Health, Reliability, Strategy, and Integrity for each level of equipment or functional location. The <Asset Name> workspace provides an overview of all the data available in APM related to the asset selected in the Asset Hierarchy. For each Health, Reliability, Strategy and Integrity item, a hyperlink is available, displaying the number and type of analysis performed against that asset. When selected, the hyperlinks open the analyses or inspections in a new tab while maintaining the selection in the Asset Hierarchy.

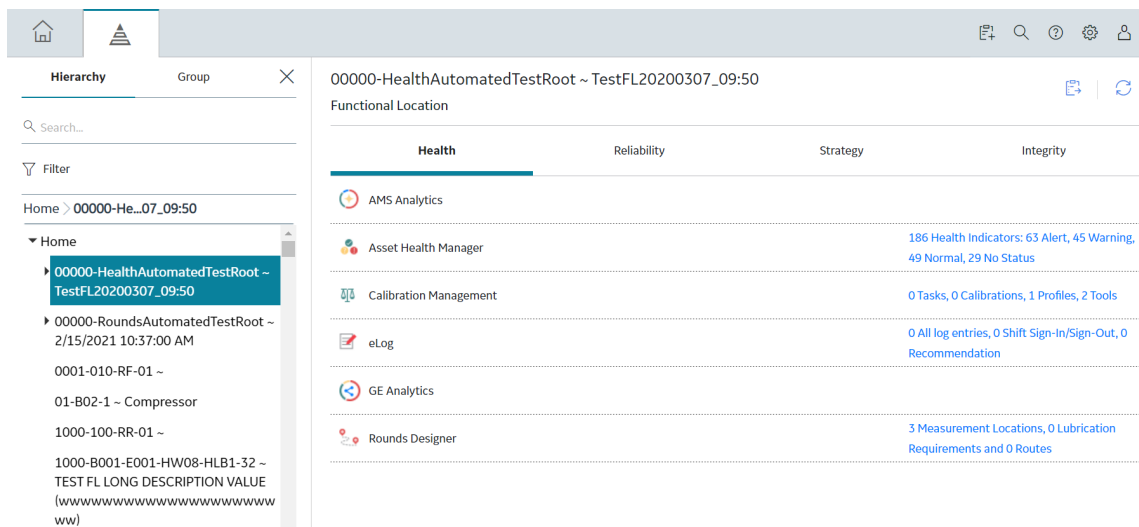
**Tip:** To refresh the <Asset Name> workspace, select .

# Access the Assets Page

## Procedure

In the top navigation bar, select .

The page displaying the Asset Hierarchy appears.




The screenshot shows the Asset Hierarchy workspace. On the left, there is a navigation pane with a search bar and a filter panel. The main area displays the asset hierarchy for '00000-HealthAutomatedTestRoot ~ TestFL20200307\_09:50'. The asset is selected, and the workspace shows a table of metrics for Health, Reliability, Strategy, and Integrity. The table has four columns: Health, Reliability, Strategy, and Integrity. The rows are: AMS Analytics, Asset Health Manager, Calibration Management, eLog, GE Analytics, and Rounds Designer. The Asset Health Manager row shows 186 Health Indicators: 63 Alert, 45 Warning, 49 Normal, 29 No Status. The Calibration Management row shows 0 Tasks, 0 Calibrations, 1 Profiles, 2 Tools. The eLog row shows 0 All log entries, 0 Shift Sign-In/Sign-Out, 0 Recommendation. The GE Analytics row shows 3 Measurement Locations, 0 Lubrication Requirements and 0 Routes.

| Health                 | Reliability | Strategy | Integrity  |
|------------------------|-------------|----------|--|
| AMS Analytics          |             |          |  |
| Asset Health Manager   |             |          | 186 Health Indicators: 63 Alert, 45 Warning, 49 Normal, 29 No Status |
| Calibration Management |             |          | 0 Tasks, 0 Calibrations, 1 Profiles, 2 Tools                         |
| eLog                   |             |          | 0 All log entries, 0 Shift Sign-In/Sign-Out, 0 Recommendation        |
| GE Analytics           |             |          |  |
| Rounds Designer        |             |          | 3 Measurement Locations, 0 Lubrication Requirements and 0 Routes     |

## Filter Assets

### Procedure


1. Access the **Assets** page.
2. In the left pane, in the **Hierarchy** section, select  .  
The **Filter** menu appears.
3. Optionally, in the **CATEGORY** drop-down list box, select a taxonomy category.
4. Optionally, in the **CLASS** drop-down list box, select a taxonomy class.
5. Optionally, in the **TYPE** drop-down list box, select a taxonomy type.
6. Select **Apply**.  
The hierarchy is filtered according to your selection.

## Search for an Asset

### Before You Begin

If you want to search for an asset in the filtered assets list, apply the filter before you search for an asset.

### Procedure

1. Access the **Assets** page.
2. In the left pane, select **Hierarchy**, select , and then, in the text box, enter at least two characters. For more information, refer to the Search section of the documentation.  
The search results appear in a list in the left pane.



# Chapter 2

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## Overview of Asset Groups

### Topics:

- [About Asset Groups](#)
- [About Asset Groups Based on Queries](#)
- [Create an Asset Group](#)
- [Create an Asset Group Based on a Query](#)
- [Create a Static Asset Group from an Asset Group Based on a Query](#)
- [Filter Asset Groups](#)
- [Search for an Asset Group](#)
- [Search for an Asset in an Asset Group](#)
- [Modify an Asset Group](#)
- [Add Assets to an Asset Group](#)
- [Remove Assets from an Asset Group](#)
- [Delete an Asset Group](#)

## About Asset Groups

Asset Groups are collections of assets, grouped together for analysis. Asset Groups, other than groups based on queries, can also be selected in the asset filter that appears in queries, dashboards, graphs, and maps.

You can create an Asset Group and add assets as needed in the **Asset Group** section, or use a query to define the assets in the group. Asset Groups are also created automatically when assets are selected in an analysis workflow. Asset Groups created in an analysis workflow are identified by the Relationship field.

An Asset Group can be saved and reused for different types of analyses. For example, if you wanted to perform an Asset Criticality analysis and a Risk Based Inspection analysis on the same 20 pieces of equipment, you can create an Asset Group containing those 20 equipment records and use the same group for each analysis.

## About Asset Groups Based on Queries

The ability to create an Asset Group based on a query allows a user to apply an analysis to a dynamic group of assets for example, equipment, functional locations, RBI components, etc. When a user bases a new Asset Group on a query, the Asset Group is dynamic in that it is subject to change as assets change with respect to the parameters of the query.

Every time you access an Asset Group that is based on a query, the query is freshly run. For example, the day you create an Asset Group using a query, the query it is based on may populate it with 10 assets. If you were to access the same Asset Group a month later, the query would run afresh and may populate the Asset Group with more or fewer than 10, depending on the number of assets that will meet the parameters of the query the second time around.

The base query that you specify for an Asset Group must contain the following columns:


- ENTY\_KEY
- ENTY\_ID
- FMLY\_KEY
- MI\_SITE\_KEY

When you apply an analysis to an Asset Group that is based on a query, the Asset Group is no longer dynamic. Instead, the assets returned by the base query at the time when you apply the analysis are the exact assets for which that analysis will always apply.

You cannot use an Asset Group that is based on a query as a filter in a module overview page or dashboard where asset filtering is available. You must convert the dynamic Asset Group to a static group to use it as a filter.

## Create an Asset Group

### Procedure

1. Access the **Assets** page.
2. In the left pane, select **Group**, and then select . The **New Asset Group** workspace appears.

3. In the **Group Name** box, enter a name for the new asset group.
4. In the **Group Description** box, enter a brief description for the group.
5. To add a Parent to the Asset Group, above the **Select a Parent** box, select **+**.  
The **Asset Finder** window appears.
6. In the **Asset Finder** window, select the Asset with which you want to associate the group, and then select **Done**.

**Note:** If you want to add a parent to the Asset Group, only child assets of the selected parent Asset can be added to the Asset Group.

The number of assets marked to be added to the group appears.

7. In the workspace heading, select **Save**.  
The group is saved, and appears in the **Asset Group** section.

**Note:** Relationships are determined while creating an Asset Group during an associated module workflow.

## Create an Asset Group Based on a Query

### Before You Begin

Before you can create an Asset Group based on a query, you must create a query on which you want to base your Asset Group, if it does not already exist. The query must conform with the requirements listed in the [About Asset Groups Based on Queries](#) on page 6 topic.

### Procedure

1. Access the **Assets** page.
2. In the left pane, select **Group**, and then select **+**.  
The **New Asset Group** workspace appears.
3. In the **Group Name** box, enter a name for the new asset group.  
If you do not specify a Group Name, the name of the Query that you select will be used as the name of the Asset Group.
4. In the **Group Description** box, enter a brief description for the group.  
If you do not specify a Group Description, the description of the Query that you select will be used as the description of the Asset Group.
5. To add a Parent to the Asset Group, above the **Select a Parent** box, select **+**.  
The **Asset Finder** window appears.
6. Above the **Select a Query** box, select **+**.  
The **Select a Query from the Catalog** window appears.
7. Navigate to the query on which you want to base the new Asset Group, and then select that query.  
The **Select a Query** box is populated with the query path.
8. Select **Save**.  
The group is saved, and appears in the **Asset Group** section.

# Create a Static Asset Group from an Asset Group Based on a Query

## Before You Begin

Before you can create a static Asset Group from an Asset Group based on a query, the system must contain an Asset Group that is based on a query.

## Procedure

1. Access the **Assets** page.
2. In the left pane, select **Group**, and then select the group that you want to copy.  
The properties for the selected group appear in the **<Group Name>** workspace, where **<Group Name>** is the name of the group.

3. Select **Save As a Static Group**.

The Save Asset Group dialog appears.

4. Select **OK**

The asset group copy is created, and assets are added to the group according to the current results of the base query.

**Note:** Depending on the number of assets in the group and the number of pending static asset group creation requests in the queue, it may take some time for the asset group copy to appear.



5. In the left pane, select the newly created group to view it in the **<Group Name>** workspace.

## Next Steps

- [Add Assets to the Asset Group](#).
- [Modify the Asset Group](#).


# Filter Asset Groups

## Procedure

1. Access the **Assets** page.
2. In the left pane, in the **Group** section, select .  
The **Group Filter** window appears.
3. Optionally, in the **Relationship** box, select a relationship by which to filter.
4. Optionally, select **Hierarchy Filter**.  
The **Hierarchy Finder** window appears.
5. In the Asset Hierarchy, in the row for each asset by which you want to filter groups, select .
6. Select **OK**.  
The list of applied filters appears on the **Group Filter** window.
7. Select **Done**.  
The Asset Groups are filtered according to your selection.

## Search for an Asset Group

### Procedure

1. Access the **Assets** page.
2. In the left pane, select **Group**.
3. Select , and then, in the text box, enter your search criteria. The search results appear in the list in the left pane.
4. Select a group to view the details.

**Tip:** When you select an Asset Group, the first 25 assets in the group are displayed in the **Add Assets** box. You can scroll down to view the remaining assets.

## Search for an Asset in an Asset Group

### Procedure

1. Access the **Assets** page.
2. In the left pane, select **Group**, and then select the group in which you want to search for an asset.
3. In the right pane, enter your search criteria in the **Search** box. The search results appear in the **Add Assets** box.

## Modify an Asset Group

### Procedure


1. Access the **Assets** page.
2. In the left pane, select **Group**, and then select the group that you want to modify. The selected group's properties appear in the **<Group Name>** workspace, where **<Group Name>** is the name of the group.
3. Modify the properties as needed.
4. Select **Save**. The changes are saved.

## Add Assets to an Asset Group

### About This Task

You can add assets to any Asset Group that is not based on a query.

### Procedure

1. Access the **Assets** page.
2. In the left pane, select **Group**, and then select the group to which you want to add assets.
3. In the **Add Assets** box, select .

- The **Asset Finder** window appears.
4. Select the assets that you want to add to the group.
- Tip:**
- If you toggle the **Select Children** option, all the child assets of the next asset you select will be added to the group.
  - You can select the **Show Selected Only** check box to view the list of currently selected assets.
5. Select **Done**.  
The number of assets marked to be added to the Group appears.
  6. Select **Save**.  
The assets are added to the group.

## Remove Assets from an Asset Group

### About This Task

You can remove assets from any Asset Group that is not based on a query.

### Procedure

1. Access the **Assets** page.
2. In the left pane, select **Group**, and then select the group from which you want to remove assets.
3. In the list of assets in the group, select to remove an asset from the group. Or, if you want to search or filter assets, in the **Add Assets** box:
  - a) Select **+**.  
The **Asset Finder** window appears.
  - b) Clear the check boxes for the assets that you want to remove from the group.
4. Select **Done**.  
The number of assets marked for removal appears.
5. Select **Save**.  
The assets are removed from the group.

## Delete an Asset Group

### About This Task

You cannot delete an Asset Group that is linked to an analysis.

### Procedure

1. Access the **Assets** page.
2. In the left pane, select **Group**, and then select the group that you want to delete.
3. Select **Delete**.  
If the Asset Group is linked to an analysis, a message appears, displaying the list of linked analyses. You must unlink the Asset Group from all the analyses before deleting it.  
  
If the Asset Group is not linked to an analysis, a message appears, asking you to confirm that you want to delete the Asset Group.

4. Select **Yes**.  
The Asset Group is deleted.

# Chapter 3

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## Workflow

### Topics:

- [Core Analysis: Asset Event Analysis Workflow](#)
- [Start](#)
- [Search Asset](#)
- [Review Event History](#)
- [Opportunity Exists?](#)
- [Manage Performance Recommendations](#)

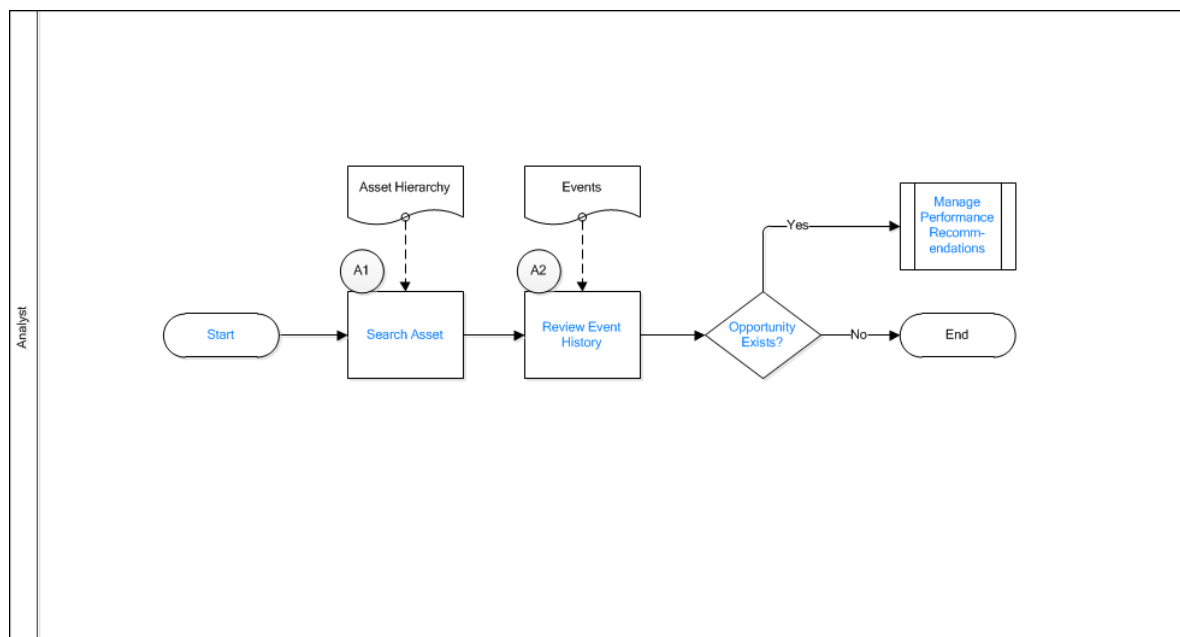


## Core Analysis: Asset Event Analysis Workflow

Core Analysis processes leverage APM data to identify opportunities for business improvement. When the process identifies such an opportunity, a Performance Recommendation is raised to communicate the need and track the required work. You can use the Asset Event Analysis Workflow process to identify opportunities or needs for improvement based on unexpected or undesirable events related to specific assets.

In the following workflow diagram, the blue text in a shape indicates that the corresponding description has been provided in the sections that follow the diagram. For more information, refer to the [Interpreting the Workflow Diagrams](#) topic in the [APM Product Workflows](#) documentation.

**Note:** For information on the personas associated with a APM module, refer to the [APM Product Workflows](#) documentation.



### Start

Persona: Analyst

To satisfy a specific business problem, a APM User initiates a core analysis that applies standard data analysis techniques.

### Search Asset

Persona: Analyst

Search for a specific asset (Functional Location or Equipment) for which Event records are required.

## **Review Event History**

Persona: Analyst

Review individual Event records for the selected asset. Identify unexpected or undesirable events that may require further analysis for elimination. Consult other forms of APM data in the analysis of Event records.

## **Opportunity Exists?**

Persona: Analyst

If a APM User identifies an opportunity or need for improvement, then a Performance Recommendation is raised to communicate the need and track the required work. Otherwise, the workflow ends.

## **Manage Performance Recommendations**

Persona: Analyst

If a APM User identifies an opportunity or need for improvement, then a Performance Recommendation is raised to communicate the need and track the required work.

# Chapter 4

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## Asset Hierarchy Configuration

### Topics:

- [Asset Hierarchy Configuration](#)
- [Access the Asset Hierarchy Configuration Page](#)
- [Modify the Asset Hierarchy Configuration](#)
- [Schedule an Asset Hierarchy Rebuild](#)

## Asset Hierarchy Configuration

APM is built on the premise that, within your company, there are multiple records that can be organized into a hierarchy. This organization relies on the parent-child relationship between records to represent the fact some records can belong to other records.

The Hierarchy can be modified to reflect a custom family. However, the baseline configuration relies on the Functional Location family and the fields in each Functional Location record to define which location each represents. Because there is only one Functional Location family, it is used to store data about all of your locations, where the values in each Functional Location record identify which type of location it is.

The baseline configuration assumes that Functional Locations have Functional Locations and that Equipment is found at the lowest levels of Functional Locations. For example, three pieces of equipment might belong to the same Functional Location, meaning the Functional Location resides on a higher level of the hierarchy than the Equipment.

### More Details: Baseline Configuration

In the baseline configuration, there are two levels reflected in the Asset Hierarchy: the **Root** and a secondary level. The primary level of the Hierarchy, the **Root**, reflects the Functional Location relationships. The second level of the hierarchy reflects Equipment related to Functional Locations. The hierarchy first displays the **Root** Functional Location, and drills down to child Functional Locations based on your selections. The hierarchy will continue to do so until there are no child relationships for the selected Functional Location. Then, using the criteria defined in the second level, the hierarchy will display Equipment records related to the selected Functional Location.

The baseline configuration is as follows:

- **Root:** The primary level of the hierarchy.
  - **Parent Family:** Functional Location
  - **Relationship:** Functional Location Has Functional Location(s)
  - **Child Family:** Functional Location
  - **Parent Priority:** 0
  - **Display Field:** ENTY\_ID
  - **Taxonomy Category:** Taxonomy Category
  - **Taxonomy Class:** Taxonomy Class
  - **Taxonomy Type:** Taxonomy Type
- **Secondary Level:** The second level of the hierarchy.
  - **Parent Family:** Functional Location
  - **Relationship:** Functional Location Has Equipment
  - **Child Family:** Equipment
  - **Parent Priority:** 0
  - **Display Field:** ENTY\_ID
  - **Taxonomy Category:** Taxonomy Category
  - **Taxonomy Class:** Taxonomy Class
  - **Taxonomy Type:** Taxonomy Type

**Important:** Equipment or Functional Location records with multiple parent records are not supported in Asset Hierarchy, except when both the following conditions are satisfied:

- The link to each parent uses a different relationship family.
- A priority has been defined for each relationship family in the Asset Hierarchy configuration.

To find the duplicate keys, run the below query in APM:

```
SELECT MV_AST_HRCY_DUP.parent_enty_key
, PAR_FMLY.FMLY_CAPTION_TX "PARENT_FMLY"
, MV_AST_HRCY_DUP.enty_key "CHILD_ENTY_KEY"
, CHILD_FMLY.FMLY_CAPTION_TX "CHILD_FMLY"
, MV_AST_HRCY_DUP.enty_id "CHILD_ENTY_ID"
, MV_AST_HRCY_DUP.the_level
, MV_AST_HRCY_DUP.path
FROM MIV_MI_AST_HRCY_DUP MV_AST_HRCY_DUP
JOIN MI_FAMILIES PAR_FMLY ON PAR_FMLY.FMLY_KEY =
MV_AST_HRCY_DUP.parent_fmly_key
JOIN MI_FAMILIES CHILD_FMLY ON CHILD_FMLY.FMLY_KEY =
MV_AST_HRCY_DUP.fmly_key
ORDER BY MV_AST_HRCY_DUP.enty_key Asc
```

## Access the Asset Hierarchy Configuration Page

### Procedure

Access the **Operations Manager** page, and then select **Asset Hierarchy Configuration**. The **Asset Hierarchy Configuration** page appears, displaying the Asset Hierarchy configuration.

## Modify the Asset Hierarchy Configuration

### About This Task

**Note:** You only need to modify the Asset Hierarchy if you want to change the baseline configuration.

### Procedure

1. Access the **Asset Hierarchy Configuration** page.
2. For the section you want to use as the primary level of the hierarchy, select **Root**.
3. In the **Root** section, select a value for the following as necessary:
  - **Parent Family:** The list of all entity families in the database.
  - **Relationship:** The list of relationship families in the database for the selected parent family.
  - **Child Family:** The list of entity families in the database that are linked to the selected parent family through the selected relationship family.
  - **Parent Priority:** The number that defines which relationship is used to determine the parent record that is displayed in the Asset Hierarchy for a child record with multiple parent records.

For example, suppose an Equipment record satisfies the following conditions:




- It is a child to a Functional Location record using the Functional Location Has Equipment relationship family.

- It is a child to another Equipment record using the Equipment Has Equipment relationship family.

In this case, if the Equipment Has Equipment relationship family has the highest Parent Priority in the Asset Hierarchy configuration, the Equipment record will be displayed as the child to the parent Equipment record, but not as a child to the Functional Location record.

- **Display Field:** The list of fields from child families.
- **Taxonomy Category:** A list of equipment categories (for example, electrical is a category of equipment).
- **Taxonomy Class:** A list of types of equipment classifications (for example, capacitor is a class of electrical equipment).
- **Taxonomy Type:** A list of types of equipment (for example, series capacitor is a type of capacitor).

**Tip:** In APM, taxonomy refers to the classification systems used for identifying equipment. Equipment taxonomy is broken down into three sections: Category, Class, and Type.

4. If you want to add another level, select .
5. To save the changes (but not apply them), select . The changes are saved.
6. To apply the changes, select , and then select **Build Hierarchy**. The changes are applied and are reflected on the **Assets** page.


## Schedule an Asset Hierarchy Rebuild

### About This Task

You can schedule an Asset Hierarchy rebuild to occur on a one-time or recurring basis. When you schedule the rebuild, the Asset Hierarchy is rebuilt based on the schedule. If you have scheduled jobs to import asset data from an external system, we recommend that you schedule the rebuild. Otherwise, the Asset Hierarchy will be updated every time a record in an entity or relationship family in the Asset Hierarchy is created, updated, or deleted.

For information on scheduling a job, refer to [Schedule a Job](#).

### Procedure

1. In the **Applications** menu, navigate to **ADMIN > Operations Manager > Asset Hierarchy Configuration**.
2. Select the **Enable Schedule** check box.  
A message appears, stating that the schedule configuration is not found.
3. Select .  
The **Edit Schedule** window appears.
4. Provide values in the available fields.
5. Select **Save**.
6. In the **Asset Hierarchy Configuration** page, select **Save**.

## Results

The Asset Hierarchy rebuild is scheduled. In the **Asset Hierarchy Configuration** page, the status of the most recent Asset Hierarchy rebuild appears.

# Chapter

# 5

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## Data Loader

### Topics:

- [About the Custom Asset Hierarchy Data Loader](#)
- [About the Custom Asset Hierarchy Data Loader Requirements](#)
- [About the Custom Asset Hierarchy Data Loader Data Model](#)
- [About the Custom Asset Hierarchy General Loading Strategy](#)
- [About the Custom Asset Hierarchy Data Loader Workbook Layout and Use](#)
- [About Populating Site Reference Data](#)
- [About the Custom Asset Hierarchy Data Loader Load Verification](#)



## About the Custom Asset Hierarchy Data Loader

The Custom Asset Hierarchy Data Loader is designed to load data into the Asset Hierarchy Entity family in APM, and is also used to relate records in that family to other families in APM based on the relationship definitions defined in Family Management. You can create Custom Asset Hierarchy Data Loader workbooks for the following purposes:

- Entity Family Data: Used to load data or records.  
-and-
- Relationship Family Data: Used to relate a record in an entity family to another record in different entity family.

The data loader workbooks used by the Custom Asset Hierarchy Data Loader are created using the metadata definitions configured in your APM system. When the data is loaded, the Custom Asset Hierarchy Data Loader will trigger all of the associated field and family level rules, to ensure that the data is valid, but no further validation is done to the data. You should, however, verify that the intended data, records, or relationships are present in the APM system after a data load has been completed.

## About the Custom Asset Hierarchy Data Loader Requirements

### Determine Which Families and Relationships to Populate

You can determine which families are available and how families are related in Family Management. To access Family Management:

1. Log in to APM.
2. In the **Applications** menu, select **Admin**, and then select **Family Management**.

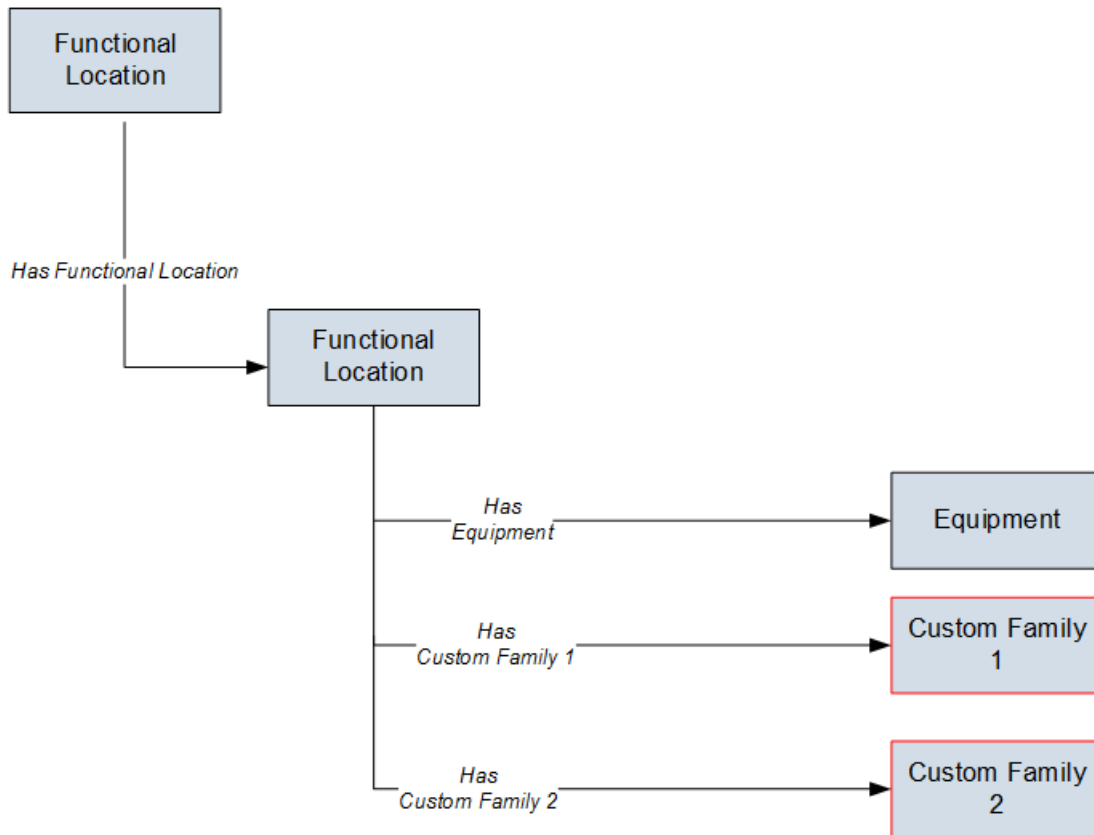
### Security Settings

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. Depending on the type of data that the Security User wants to load, the user may need to be associated with additional Security Roles to grant privileges to create the necessary records. To determine if additional Security Role association is needed to create a particular type of record, refer to the About Roles section of the APM Administrative User Help documentation.

## About the Custom Asset Hierarchy Data Loader Data Model

The following data model illustrates the records that the Custom Asset Hierarchy Data Loader supports. The Family records illustrated with a red border are customizable.

## Custom Asset Hierarchy Data Loader Data Model



## About the Custom Asset Hierarchy General Loading Strategy

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

### General Loading Strategy Workflow

1. Determine what families and or relationships you want to populate using the Custom Asset Hierarchy Data Loader.
2. Populate the **Configuration** worksheet.

This data loader may run on a schedule as part of the EAM data load service.

## About the Custom Asset Hierarchy 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 Custom Asset Hierarchy Data Loader, 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 **MI\_AH\_Entity\_Dataloader.xlsx** workbook.

| Worksheet            | Description  |
|----------------------|--|
| Configuration        | The <b>Configuration</b> 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. |
| AHEntity             | Where you specify the actual Asset Hierarchy entities that you want to load.   |
| LinkAHEntitytoEntity | Where you can connect an Asset Hierarchy entity to another Asset Hierarchy entity.   |
| LinkAHEntitytoFL     | Where you can connect an Asset Hierarchy entity to a Functional Location, Equipment, or some other asset concept defined by the Family Management settings.  |

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

### Configuration Worksheet

The Configuration worksheet tells the Custom Asset Hierarchy 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 | Potential Value(s)   | Comments   |
|--------------------------|---------------------|-----------|--|--|
| Load Data From Worksheet | LOAD_DATA_WORKSHEET | Boolean   | <ul style="list-style-type: none"> <li>True</li> <li>False</li> </ul>  | The value in this column will determine whether or not the data should be loaded from the worksheet.   |
| Data Worksheet ID        | DATA_WORKSHEET_ID   | Character | <ul style="list-style-type: none"> <li>AHEntity</li> <li>LinkAHEntitytoEntity</li> <li>LinkAHEntitytoFL</li> </ul>             | This column contains the name of the worksheet where the actual data is located. It needs to have the same name as the worksheet in the data loader workbook.  |
| Batch Filter Column      | BATCH_FILTER_COL_ID | Character | <ul style="list-style-type: none"> <li>MI_AH_ENTITY_PRT_ID_CHR</li> <li>'&lt;PRED_FAMILY_ID&gt; MI_AH_ENTITY_ID_CHR</li> </ul> | When the data is loaded into APM, it is processed in a series of batches. This column contains the Data Column ID that will be used for the batching of the data. All of the records will be grouped together by the unique values in the column specified in the worksheet. This column must also be the first column that exists in the worksheet. It must be the Column ID, which is in the second row on the worksheet and not the Field ID. |

| Field Caption             | Field ID                  | Data Type | Potential Value(s)  | Comments  |
|---------------------------|---------------------------|-----------|---|---|
| Primary Family ID         | PRIMARY_FAMILY_ID         | Character | <ul style="list-style-type: none"> <li>MI_AH_ENTITY</li> <li>MIR_ENTYHSENTY</li> <li>MIR_ENTYHSASSET</li> </ul> | <p>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 (&lt;&gt;).</p> <p>For example, if in the 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 &lt;PRIMARY_FAMILY_ID&gt;.</p> <p>If the Family ID in the APM metadata contains spaces, then you have to use this feature.</p> |
| Primary Family Key Fields | PRIMARY_FAMILY_KEY_FIELDS | Character | <ul style="list-style-type: none"> <li>MI_AH_ENTITY_ID_CHR</li> </ul>   | <p>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 &lt;none&gt; constant.</p> <p>If the Primary Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the &lt;none&gt; constant.</p>   |
| Family Type               | FAMILY_TYPE               |           | <ul style="list-style-type: none"> <li>Entity</li> <li>Relationship</li> </ul>                                  | <p>The value in this column should be Entity or Relationship depending on the type of data that is being loaded.</p>  |
| Predecessor Family ID     | PRED_FAMILY_ID            | Character | <ul style="list-style-type: none"> <li>&lt;PRED_FAMILY_ID&gt;</li> </ul>  | <p>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 &lt;none&gt; constant. You can also use the data in each of the rows to determine the Predecessor Family ID.</p>  |

| Field Caption                 | Field ID               | Data Type | Potential Value(s)   | Comments  |
|-------------------------------|------------------------|-----------|--|---|
| Predecessor Family Key Fields | PRED_FAMILY_KEY_FIELDS | Character | <ul style="list-style-type: none"> <li>MI_AH_ENTITY_ID_CHR</li> </ul>                                | <p>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.</p> <p>If the Predecessor Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the &lt;none&gt; constant.</p> |
| Successor Family ID           | SUCC_FAMILY_ID         | Character | <ul style="list-style-type: none"> <li>&lt;SUCC_FAMILY_ID &gt;</li> </ul>                            | <p>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 &lt;none&gt; constant. You can also use the data in each of the rows to determine the Successor Family ID.</p>  |
| Successor Family Key Fields   | SUCC_FAMILY_KEY_FIELDS | Character | <ul style="list-style-type: none"> <li>MI_AH_ENTITY_ID_CHR</li> <li>MI_FNCLOC00_FNC_LOC_C</li> </ul> | <p>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.</p> <p>If the Successor Action is ACTION_INSERTONLY, then no key fields need to be specified, so you can use the &lt;none&gt; constant.</p>       |

| Field Caption      | Field ID       | Data Type | Potential Value(s)   | Comments   |
|--------------------|----------------|-----------|--|--|
| Primary Action     | PRIMARY_ACTION | Character | <ul style="list-style-type: none"> <li>ACTION_INSERTUPDATE</li> </ul>                | <p>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:</p> <ul style="list-style-type: none"> <li>ACTION_INSERTONLY</li> <li>ACTION_INSERTUPDATE</li> <li>ACTION_UPDATEONLY</li> <li>ACTION_DELETE</li> <li>ACTION_PURGE</li> </ul> <p>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 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:</p> <ul style="list-style-type: none"> <li>ACTION_INSERTONLY</li> <li>ACTION_INSERTUPDATE</li> <li>ACTION_UPDATEONLY</li> <li>ACTION_DELETE</li> </ul> |
| Predecessor Action | PRED_ACTION    | Character | <ul style="list-style-type: none"> <li>ACTION_NONE</li> <li>ACTION_LOCATE</li> </ul> | <p>The value in this column will determine the action that will be applied to the Predecessor Family records. The possible values are:</p> <ul style="list-style-type: none"> <li>ACTION_INSERTONLY</li> <li>ACTION_INSERTUPDATE</li> <li>ACTION_UPDATEONLY</li> <li>ACTION_DELETE</li> <li>ACTION_PURGE</li> <li>ACTION_LOCATE</li> </ul> <p>If the Family Type is Entity then the value needs to be:</p> <ul style="list-style-type: none"> <li>ACTION_NONE</li> </ul>   |

| Field Caption             | Field ID                     | Data Type | Potential Value(s)   | Comments  |
|---------------------------|------------------------------|-----------|--|---|
| Successor Action          | SUCC_ACTION                  | Character | <ul style="list-style-type: none"> <li>• ACTION_NONE</li> <li>• ACTION_LOCATE</li> </ul> | <p>The value in this column will determine the action that will be applied to the Successor Family records. The possible values are:</p> <ul style="list-style-type: none"> <li>• ACTION_INSERTONLY</li> <li>• ACTION_INSERTUPDATE</li> <li>• ACTION_UPDATEONLY</li> <li>• ACTION_DELETE</li> <li>• ACTION_PURGE</li> <li>• ACTION_LOCATE</li> </ul> <p>If the Family Type is Entity then the value needs to be:</p> <ul style="list-style-type: none"> <li>• ACTION_NONE</li> </ul>  |
| Insert with Null Values?  | OPTION_INSERT_ON_NULL        | Boolean   | <ul style="list-style-type: none"> <li>• True</li> <li>• False</li> </ul>                | 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   | <ul style="list-style-type: none"> <li>• True</li> <li>• False</li> </ul>                | 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.  |
| Replace an Existing Link? | OPTION_REPLACE_EXISTING_LINK | Boolean   | <ul style="list-style-type: none"> <li>• True</li> <li>• False</li> </ul>                | <p>The Replace Existing Relationship option is used to determine how a relationship is to be maintained by its cardinality definition.</p> <p>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.</p> |

| Field Caption                      | Field ID                      | Data Type | Potential Value(s)  | Comments  |
|------------------------------------|-------------------------------|-----------|---|---|
| Allow Change of Family?            | OPTION_ALLOW_CHANGE_OF_FAMILY | Boolean   | <ul style="list-style-type: none"> <li>• True</li> <li>• False</li> </ul> | <p>Allows the data loader to move an entity from one family to another.</p> <p>For example, this would allow an entity that is currently assigned to the Centrifugal Pump family to be moved to the Reciprocating Pump family.</p> <p>All relationships will be maintained as long as the family to which the entity is being moved allows the same relationships.</p> <p><b>Note:</b> Because of the extra processing required, by selecting this option, the interface performance will decrease.</p> |
| Process Each Row as a Transaction? | OPTION_TRANSACTION_PER_ROW    | Boolean   | <ul style="list-style-type: none"> <li>• True</li> <li>• False</li> </ul> | <p>When this value is set to True, each row in the spreadsheet is committed before the next row is processed.</p> <p>If this is set to False, then all of the records in the batch are processed in one transaction.</p> <p>In general, you will get better performance when processing data in a batch, assuming that the data being loaded is clean, meaning that the vast majority of records will not be rejected.</p>  |

### Asset Hierarchy Entity (AHEntity) Worksheet

The following table outlines the options that are valid or the values that are expected in each of the columns on the Asset Hierarchy worksheet.

| Field Caption    | Field ID                | Data Type | Potential Value(s)  | Comments  |
|------------------|-------------------------|-----------|---|---|
| Entity Parent ID | MI_AH_ENTITY_PRINT_ID_C | Character | <ul style="list-style-type: none"> <li>• MRD-PER</li> </ul>   | This is the unique identifier of the parent value that you want to link to your entity. |
| Entity ID        | MI_AH_ENTITY_ID_C       | Character | <ul style="list-style-type: none"> <li>• MRD-PER</li> <li>• MRD-PER-ABC</li> <li>• MRD-PER-DEF</li> </ul> | This is the unique identifier for the entity that you are adding to the worksheet.      |



| Field Caption  | Field ID                | Data Type | Potential Value(s)  | Comments  |
|----------------|-------------------------|-----------|---|---|
| Entity Name    | MI_AH_ENTITY_NAME_<br>C | Character | <ul style="list-style-type: none"> <li>Perth</li> <li>ABC Perth</li> <li>DEF Perth</li> </ul> | The name of the asset that you are adding to the worksheet. |
| Site Reference | MI_SITE_NAME            | Character | <ul style="list-style-type: none"> <li>Perth, Australia</li> </ul>                            | The site reference associated with the entity.              |

### Link an Asset Hierarchy Entity to Another Entity (LinkAHEntityToEntity) Worksheet

The following table outlines the options that are valid or the values that are expected in each of the columns on the Asset Hierarchy Entity to Entity worksheet.

| Field Caption         | Field ID  | Data Type | Potential Value(s)   | Comments  |
|-----------------------|---|-----------|--|---|
| Parent ID             | <PRED_FAMILY_ID>  <br>MI_AH_ENTITY_PRINT_<br>ID_C | Character | <ul style="list-style-type: none"> <li>MRD-PER</li> </ul>      | This is the unique identifier of the parent value that you want to link to your entity.   |
| Predecessor Family ID | PRED_FAMILY_ID                                    | Character | <ul style="list-style-type: none"> <li>MI_AH_ENTITY</li> </ul> | 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 | Potential Value(s)   | Comments  |
|---------------------|--------------------------------------|-----------|--|---|
| Entity ID           | <SUCC_FAMILY_ID> <br>MI_AH_ENTY_ID_C | Character | <ul style="list-style-type: none"> <li>MRD-PER-ABC</li> <li>MRD-PER-DEF</li> </ul> | The unique identifier of the asset that is being loaded into the Asset Hierarchy.   |
| Successor Family ID | SUCC_FAMILY                          | Character | <ul style="list-style-type: none"> <li>MI_AH_ENTITY</li> </ul>                     | 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. |

### Link an Asset Hierarchy Entity to a Functional Location (LinkAHEntitytoFL) Worksheet

The following table outlines the options that are valid or the values that are expected in each of the columns on the Asset Hierarchy Entity to Functional Location worksheet.

| Field Caption         | Field ID                                   | Data Type | Potential Value(s)   | Comments  |
|-----------------------|--|-----------|--|---|
| Entity_ID             | <PRED_FAMILY_ID> <br>MI_AH_ENTY_PRINT_ID_C | Character | <ul style="list-style-type: none"> <li>MRD-PER-ABC</li> <li>MRD-PER-DEF</li> </ul> | The unique identifier of the asset that is being loaded into the Asset Hierarchy.   |
| Predecessor Family ID | PRED_FAMILY_ID                             | Character | <ul style="list-style-type: none"> <li>MI_AH_ENTITY</li> </ul>                     | 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 | Potential Value(s)   | Comments  |
|---------------------|--|-----------|--|---|
| Functional Location | <SUCC_FAMILY_ID> <br>MI_FNCLOC00_FNC_<br>LOC_C | Character | <ul style="list-style-type: none"> <li>MRD-ROA-ABC-XYZ-FCV1005</li> <li>MRD-ROA-ABC-XYZ-FCV1006</li> <li>MRD-ROA-ABC-XYZ-PCV1001</li> <li>MRD-ROA-ABC-XYZ-PCV1002</li> </ul> | The location of the asset that you are loading into the Asset Hierarchy.  |
| Successor Family ID | SUCC_FAMILY                                    | Character | <ul style="list-style-type: none"> <li>MI_FNCLOC00</li> </ul>  | 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. |

## About Populating Site Reference Data

The Custom Asset Hierarchy Data Loader can be used to populate the Site Reference on Equipment and Functional Location records in APM. The Custom Asset Hierarchy 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 APM. The Custom Asset Hierarchy 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.

### Steps: Populate Site Reference Using the Site Name


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. The column name might take the form 'MI\_EQUIP000|MI\_SITE\_NAME', where MI\_EQUIP000 is the Family ID.
2. Enter the site name to designate the site by which the asset record, once loaded into APM, will be filtered.
3. Continue populating the source workbook, and then run the data loader. The site reference value will filter the equipment records as determined in the source workbook.

## About the Custom Asset Hierarchy Data Loader Load Verification

After loading data, you must perform the following steps in APM to ensure the integrity and accuracy of the data imported from the data loader workbook:

- Review the details of the import job. These details will indicate any errors that occurred during the data load. The log helps you identify any records that are not loaded.
- Run a query on the relevant family to ensure that the records have been created and populated as expected.
- Verify the imported records in Asset Hierarchy to ensure that the relationships between families have been created.
- Verify that the assets in a Functional Location of the Custom Asset Hierarchy Data Loader exist.

To view the assets, perform the following steps:

1. Log in to APM.
2. On the top navigation bar, select  .  
The **Assets** page appears.
3. Select a Functional Location of Custom Asset Hierarchy Data Loader.

# Chapter 6

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## Troubleshooting

### Topics:

- [Troubleshooting Scenarios](#)

# Troubleshooting Scenarios

## Troubleshooting Scenarios

The following topics can help you troubleshoot issues that you may have with the Asset Hierarchy module:

- [Asset Hierarchy Does Not Launch](#)

## Asset Hierarchy Does Not Launch

### Description

In APM, when you attempt to access the Asset Hierarchy, a message with `Entities with multiple parents exist` appears and the hierarchy does not display. Assume you have the following three relationships configured in Asset Hierarchy Configuration:

- Functional Location Has Functional Location as Root
- Functional Location Has Equipment
- Equipment Has Equipment

In the following scenario:

- An Equipment EQ1 is related to Equipment EQ2 using the Equipment has Equipment relationship, where EQ2 is the predecessor and the EQ1 is the successor.
- The same Equipment EQ1 is related to a Functional Location FL1 using the Functional Location has Equipment, where FL1 is the predecessor and EQ1 is the successor.

This results in the EQ1 having two parents EQ2 and FL1 which violates the requirement that an asset can only have a single parent in the hierarchy.

### Cause

An Asset in the hierarchy that you are attempting to access may have multiple parent relationships.

### Solution

Perform the following steps:


1. Run the following query and analyze the results.

```
SELECT enty_key, fmly_key, enty_id
from MIV_MI_AST_HRCY_MV
```

2. If only one row appears with an error message `Entities with multiple parents exist`, run the following query.

```
SELECT MIV_MI_AST_HRCY_MV_DUP.parent_enty_key
, MIV_MI_AST_HRCY_MV_DUP.parent_fmly_key
, MIV_MI_AST_HRCY_MV_DUP.enty_key
, MIV_MI_AST_HRCY_MV_DUP.enty_id
, mi_families.fmly_id
FROM MIV_MI_AST_HRCY_MV_DUP
JOIN mi_families ON MIV_MI_AST_HRCY_MV_DUP.fmly_key =
```

```
mi_families.FMLY_KEY  
ORDER BY MIV_MI_AST_HRCY_MV_DUP.enty_key Asc
```

3. All the assets with multiple parents will be listed.
4. Access the parent record in the Record Manager and select > to view the parent record datasheet.
5. Select  and select **Unlink this record** to ensure that no multiple parent relationships exists.