

StruxureWare™ Power Monitoring Expert

Hierarchy Configuration Guide

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Safety information

Important information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol shall not be used with this signal word.

Please note

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Safety precautions

During installation or use of this software, pay attention to all safety messages that occur in the software and that are included in the documentation. The following safety messages apply to this software in its entirety.

WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software for critical control or protection applications where human or equipment safety relies on the operation of the control action.
- Do not use the software to control time-critical functions because communication delays can occur between the time a control is initiated and when that action is applied.
- Do not use the software to control remote equipment without securing it with an authorized access level, and without including a status object to provide feedback about the status of the control operation.

Failure to follow these instructions can result in death or serious injury.

WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software, as this can lead to incorrect reports and/or data results.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

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Hierarchy Configuration Guide

This document contains information regarding the configuration of hierarchies in the StruxureWare™ Power Monitoring Expert platform. It contains instructions for using the Hierarchy Configuration Utility, as well as instructions for adding content to a hierarchy .csv file, and the modification of a hierarchy xml template file. It is intended for use by Application Engineers or advanced users during the initial setup of a hierarchy, or when modifying or replacing an existing hierarchy.

Hierarchy Configuration Utility

The Hierarchy Configuration Utility is a command line tool that imports and exports hierarchy templates and Comma Separated Value (csv) files containing hierarchy configuration information to and from Power Monitoring Expert. Use the export config feature to output a csv file containing headers and a list of unconnected devices. With this file you can add configuration information which is then imported back into the system using the import config feature. Use the export template feature to export the template currently used in the system as an xml file, and use the import template feature to import a new template into the system.

The following is a list of available options for the Hierarchy Configuration Utility:

- **"Refresh configuration"**: refreshes the configuration cache.
- **"Export csv files"**: exports the hierarchy configuration to a csv file.
- **"Import csv files"**: imports the hierarchy configuration from a csv file.
- **"Export xml files"**: exports the template currently used in the system to an xml file.
- **"Import xml files"**: imports a template for use in the system from an xml file.
- **"Delete configuration content"**: deletes the hierarchy configuration, including history

The configuration utility is normally used in the initial installation and commissioning of a Power Monitoring Expert system to add large amounts of configuration information. For editing individual entries, or reassigning a device, use the Hierarchy Manager feature in the Management Console section of Power Monitoring Expert.

Note

Typing `HierarchyConfig.exe` at the command prompt provides you with a list of available commands and a brief description of each command.

Refresh configuration

Use the refresh config command to refresh the configuration cache. If new devices have been recently added to Power Monitoring Expert, this command helps ensure that an exported csv file contains an up to date list of devices. If the refresh configuration is not run,

there is a possibility that devices recently added to Power Monitoring Expert may not be present in the device list in the hierarchy .csv file. Therefore, the best practice is to run the refresh config command before exporting any csv file from the system.

To refresh the configuration cache:

1. Open a Command Prompt window. Click **Start > Run**, and type `cmd` or `cmd32`.
2. Navigate to the Hierarchy Configuration Utility directory. The default locations are C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\bin on a 64-bit system, or C:\Program Files\Schneider Electric\Power Monitoring Expert\Applications\bin for a 32-bit system.
3. Run `HierarchyConfig.exe refresh config`.

When complete, the utility responds with the message `Configuration cache refresh complete`.

Export csv files

The Hierarchy Configuration Utility allows you to export the template configuration as a csv file. With this file, you can add configuration information to the csv file, which can then be imported back into the system. This method can be used for importing large amounts of content into a system. See ["Configuring the csv file" on page 12](#) for more information regarding the configuration of a csv file.

To export a csv file:

1. Open a Command Prompt window. Click **Start > Run**, and type `cmd` or `cmd32`.
2. Navigate to the Hierarchy Configuration Utility directory. The default locations are C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\bin on a 64-bit system, or C:\Program Files\Schneider Electric\Power Monitoring Expert\Applications\bin for a 32-bit system.
3. Run `HierarchyConfig.exe export config <file path>\<file name>`, where `<file path>` is the location you want the csv file to be saved to, and `<file name>` is the name of the csv file. If you do not specify a file path, the current directory is used. You must provide a file name that includes the csv extension.

Note

If the csv file name and/or file path contains spaces, you must enclose the file path and file name in quotation marks. For example, `HierarchyConfig.exe export config "C:\test file.csv"`.

4. Navigate to the directory that contains the csv file and open it.

You can edit the csv file with a spreadsheet program like Microsoft® Excel. The file has a list of unused devices and column headers that represents the nodes in the system. See ["Export csv files" on page 8](#) for information regarding adding hierarchy information to the csv file.
5. Provide instance information under each heading. This is where you can establish which device is associated with each Node and how the different instances relate to one another.
6. Save the file (make sure to preserve the csv format) and exit.

Import csv files

Once the configuration information has been added to the csv file, use the Hierarchy Configuration Utility to import the content of that file into the system.

To import a csv file:

1. Open a Command Prompt window. Click **Start > Run**, and type `cmd` or `cmd32`.
2. Navigate to the Hierarchy Configuration Utility directory. The default locations are C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\bin on a 64-bit system, or C:\Program Files\Schneider Electric\Power Monitoring Expert\Applications\bin for a 32-bit system.
3. Type `HierarchyConfig.exe import config <file path>\<file name>`, where `<file path>` is the location of the file you are importing, and `<file name>` is the name of the csv file to be imported. If you do not specify a file path, the current directory is used. You must provide a file name that includes the csv extension.

You can also add a timestamp to the configuration information. Adding year, month, and date information gives the references between nodes a start date corresponding with the date entered. If no date information is provided, the hierarchy information has a start date that corresponds with the system start date.

To add a timestamp, type `HierarchyConfig.exe import config <file path>\<file name> [yyyy/mm/dd]` where `<file path>` is the location of the file you are importing, and `<file name>` is the name of the csv file to be imported, and `[yyyy/mm/dd]` is the year, month and day that the imported hierarchy references use as a start date.

The utility provides feedback for each stage of the import. If the import operation was unsuccessful, the utility provides information about possible reasons why the import was unsuccessful.

Note

If the csv file name and/or file path contains spaces, you must enclose the file path and file name in quotation marks. For example, `HierarchyConfig.exe import config "C:\test file.csv"`.

Once the csv content has been imported into the system, you can verify the content by opening the Hierarchy Manager application from the **Management Console > Tools** menu. See "Hierarchy Manager" in the *StruxureWare Power Monitoring Expert 7.2 User Guide* for information regarding accessing the application.

Once in Hierarchy Manager, confirm that the content imported from the CSV file has been assigned as expected.

Export xml files

The Export Template feature allows you to export the template currently installed in the system as an xml file.

To export a template:

1. Open a Command Prompt window.
2. Navigate to the Hierarchy Configuration Utility directory. The default locations are C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\bin on a 64-bit system, or C:\Program Files\Schneider Electric\Power Monitoring Expert\Applications\bin for a 32-bit system.
3. Type `HierarchyConfig.exe export template <file path>\<file name>`, where <file path> is the location you want the xml file to be saved to, and <file name> is the name of the xml file. If you do not specify a file path, the current directory is used. You must provide a file name that includes the .xml extensions.

Note

If the xml file name and/or file path contains spaces, you must enclose the file path and file name in quotation marks. For example, `HierarchyConfig.exe export template "C:\test file.xml"`.

4. Confirm the xml file has been successfully exported to the correct location and file name.

Import xml files

The Import Template feature of Hierarchy Configuration Utility allows you to replace the template currently installed in your system with a different one.

NOTICE
LOSS OF DATA Export the existing hierarchy template out of Power Monitoring Expert before importing a new template. The new template can overwrite the existing template, which can permanently remove all information contained in the original. Failure to follow these instructions can result in a loss of data.

To import a template:

1. Open a Command Prompt window. Click **Start > Run**, and type `cmd`) or `cmd32`.
2. Navigate to the Hierarchy Configuration Utility directory. The default locations are C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\bin on a 64-bit system, or C:\Program Files\Schneider Electric\Power Monitoring Expert\Applications\bin for a 64-bit system.
3. Type `HierarchyConfig.exe import template <file path>\<file name>`, where <file path> is the location of the xml file, and <file name> is the name of the xml file to be imported. If you do not specify a file path, the current directory of the Hierarchy Configuration Utility is used. You must provide a file name.

The utility provides feedback for each stage of the import. If the import operation was unsuccessful, the utility provides information about why the import was unsuccessful.

Note

If the xml file name and/or file path contains spaces, you must enclose the file path and file name in quotation marks. For example, `HierarchyConfig.exe import template "C:\test file.xml"`

Confirm the template has been successfully imported by navigating to the Hierarchy Manager application in Management Console Tools. See "Hierarchy Manager" in the *StruxureWare Power Monitoring Expert 7.2 User Guide* for information regarding the Hierarchy Manager application. Hierarchy Manager should now contain the newly imported template.

Delete configuration content

The delete config command allows you to remove all hierarchy configuration content such as names and properties from Hierarchy Manager, allowing you to start fresh with new content.

<i>NOTICE</i>
LOSS OF DATA Performing this operation permanently removes configuration content from the system. Ensure that this operation is necessary before proceeding. This procedure cannot be undone. Failure to follow these instructions can result in a loss of data.

To delete configuration content:

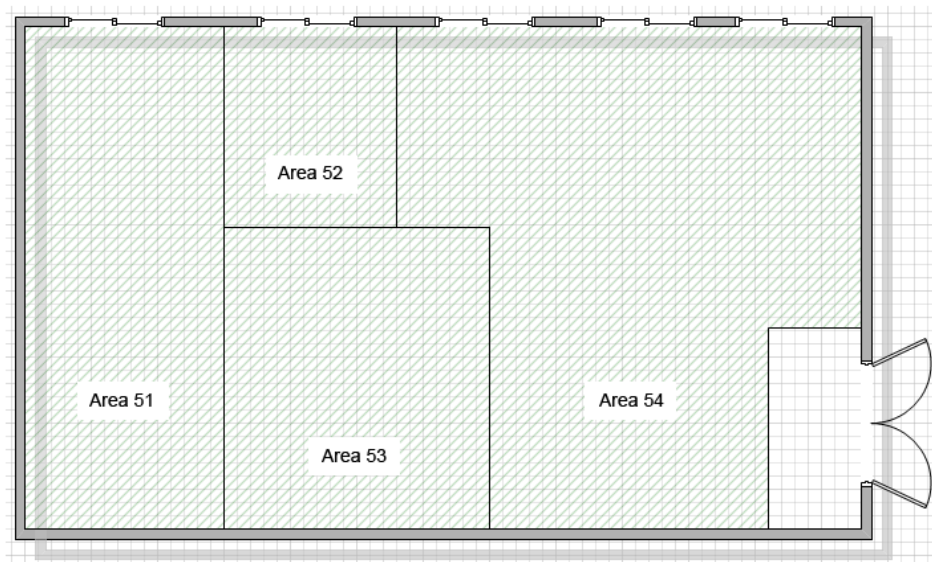
1. Open a Command Prompt window.
2. Navigate to the Hierarchy Configuration Utility directory. The default locations are C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\bin on a 64-bit system, or C:\Program Files\Schneider Electric\Power Monitoring Expert\Applications\bin for a 32-bit system.
3. Type `HierarchyConfig.exe delete config`. Type **yes** when prompted. The utility deletes all hierarchy configuration content. To confirm, open Hierarchy Manager. There should be no hierarchy content displayed.
4. Export a CSV file and populate with configuration content as required. See ["Export csv files" on page 8](#) for instructions.

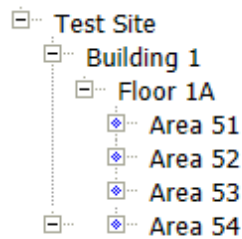
Configuring the csv file

Adding information to the system using a csv file and the ImportConfig command is the recommended method to configure large amounts of hierarchy information, and is a task normally performed when first installing and commissioning Power Monitoring Expert. After information is added to the file, it is imported into Power Monitoring Expert. After a successful import, the hierarchy information can be modified in the Hierarchy Manager feature, and used in different parts of Power Monitoring Expert, such as Reports and Dashboards. Spreadsheet software such as Microsoft Excel can be used to edit the csv file.

This section describes the process involved with adding hierarchy content to an example csv file using Microsoft Excel. This example csv file has been exported from a system that uses a physical layout template. The template contains Site, Building, Floor, and Area Nodes. Since there are different templates that can be run on a system, the csv file can contain different node and properties information, depending on the template currently in use. The format for configuring any csv file exported from the system is similar, regardless of the template used.

The image below shows the layout of areas on a floor of a building. By using the Hierarchy Configuration Utility, you can assign devices and define the relationships between the different elements of the template. When complete, the hierarchy looks similar to the view shown below.





Before you begin

Before exporting the csv file from your system, make sure the following tasks have been completed:

- Plan out how the hierarchy is going to be configured, such as naming conventions, which devices are going to be mapped to which Node, and how the different elements are grouped together. This can save time when entering content into the csv file and is very important when dealing with a large number of devices.
- Ensure you have a copy of Microsoft Excel, or another tool that can be used to open and edit CSV files present on your system.
- Make sure that devices, logical devices, and/or managed circuits have been added to Power Monitoring Expert using Management Console. Additional devices can be added to the system at a later time, but an initial number of devices must be added prior to exporting the CSV file. See "Management Console" in the *StruxureWare Power Monitoring Expert 7.2 User Guide* for additional information regarding adding devices to Power Monitoring Expert.
- Determine whether virtual meters and apportioned meters have been enabled in the hierarchy template. Check the hierarchy template to see if the `apportionmentEnabled` flag, located in the Template element, is set to true. If it has been enabled, you can create virtual meters in the Hierarchy Manager interface prior to exporting the configuration file. If the `apportionmentEnabled` flag is set to false, no virtual meters are exported to the configuration file. If the `apportionmentEnabled` flag is not present in the template, it is the same as setting the flag to false.
- See ["Modifying the xml elements" on page 18](#) for more information regarding the `apportionmentEnabled` flag.
- Export the csv file using the Hierarchy Configuration Utility.

Adding content to the csv file

The csv file is used to associate devices with Nodes and define the relationships between Nodes. Beside each device name, you can map devices to Nodes. Below the device list, you can define the relationships between each of the Nodes. Once the content has been added to the csv file and the file information imported into Power Monitoring Expert, it can then be viewed, edited, or deleted in the Hierarchy Manager application.

To add content to a hierarchy csv file with Microsoft Excel:

1. Open the csv file with Microsoft Excel. Along the left side of the Excel page is a list of devices that are not currently assigned to a Node. Along the top of the Excel page is a header that contains the names of the Node types present in the hierarchy template.

A B

	A	B	C	D	E	F	G	H
1	Devices_Full Name	_Percentage	Virtual Meter_Name	Areas_Name	Floors_Name	Buildings_Name	Site_Name	
2	Test_Site.Test_8600_A							
3	Test_Site.Test_8600_B							
4	Test_Site.Test_8600_C							
5	Test_Site.Test_8600_D							
6	Test_Site.Test_8600_E							
7	Test_Site.Test_8600_F							
8	Test_Site.Test_8600_G							
9	Test_Site.Test_8600_H							
10	Test_Site.Test_8600_I							
11								

A	Device list	B	Header
---	-------------	---	--------

2. Under the applicable heading, enter the name of the instance associated with each device. For example, To map a device to an instance of the Floors_Name Node, enter the name of the floor beside the device and under the Floors_Name heading. To assign a device to multiple Nodes, enter a separate device name in the Devices_Full_Name list, one for each Node to be assigned.
3. Repeat this process for each device. When you have finished mapping devices to Nodes, you can begin creating the relationships between the Nodes.
4. Define the associations below the list of devices under the heading names. In this example, there is one site, two buildings, two floors, and five areas. The configuration is shown below.

	A	B	C	D	E	F	G	H	I
1	Devices_Full Name	_Percentage	Virtual Meter_Name	Areas_Name	Floors_Name	Buildings_Name	Site_Name		
2	Test_Site.Test_8600_A								
3	Test_Site.Test_8600_B								
4	Test_Site.Test_8600_C	80		Area 51					
5	Test_Site.Test_8600_D								
6	Test_Site.Test_8600_E		Common Meter						
7	Test_Site.Test_8600_F	-100	Common Meter						
8	Test_Site.Test_8600_G								
9	Test_Site.Test_8600_H								
10	Test_Site.Test_8600_I								
11									
12				Area 51	Floor 1A	Building 1	Test Site		
13	Common Meter			Area 52	Floor 1A	Building 1	Test Site		
14									
15									
16									
17									

In a physical layout hierarchy such as the one shown, areas are associated with floors, floors are associated with buildings, and buildings are associated with sites. List all the area names under the Areas_Name heading. To the right of each of these areas, enter the floor name they are associated with under the Floors_Name heading. This creates the association of areas to floors. To the right of the floor names, enter the building that floor is

associated with under the Buildings_Name heading. Provide the Site name beside each applicable building name. Other templates have their associations set up in a similar manner.

If the apportionmentEnabled flag is set to true in the template, two new columns are generated during the export of a configuration file, '_Percentage' and 'Virtual Meter_Name'.

An apportioned meter allows for a percentage of a device's value to be assigned to a Node. This can be accomplished in the configuration file by entering a percent value into the '_Percentage' column on the row where you are assigning a device to a node, or are assigning a device to a virtual meter.

Virtual meters are created by entering the name in the 'Virtual Meter_Name' column on a row that contains an entry in the Devices_Full Name column. During the creation of a virtual meter it can not be assigned to a Node; however, you can assign an apportioned meter to a virtual meter by including an entry in the _Percentage column . Multiple devices can be assigned to a new virtual meter by using the same name in the Virtual Meter_Name column on multiple rows.

A new virtual meter can be assigned to a Node by entering the name of the virtual meter in the Device_Full Name column and then making an entry in the appropriate Node column. A virtual meter must be created on a previous row prior to being assigning to a Node.

When finished, save the Excel file. If prompted, click **Yes** in the Excel dialog box to keep the csv format.

Import the csv file into Power Monitoring Expert(see ["Configuring the csv file" on page 12](#) for instructions). Open Hierachy Manager to confirm the imported hierarchy content.

Modifying a hierarchy template file

Power Monitoring Expert comes with number of standard hierarchy templates that provide a structure to model different aspects of your organization. However, there are situations where the default templates provided with Power Monitoring Expert require modification to more accurately represent these aspects. This section discusses the layout of the hierarchy template xml file, and how to edit the template to be used by your organization.

Note

Every time you make a change to a template, you must save it and import the modified .xml file into Power Monitoring Expert for those changes to take effect. See ["Hierarchy Configuration Guide" on page 7](#).

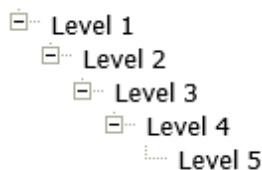
Prerequisites

Make sure you have completed the tasks described in this list before you begin.

- Decide the layout that represents the best method of modeling your organization. Is this going to be a representation based on the physical layout of your facility? An electrical layout? A representation designed to assist with customer billing?
 - Determine the number of levels for the hierarchy.
 - Determine the relationships between levels.
 - Determine which levels connect to a device.
- Find a text or code editing application.
 - The xml files can be modified by using many different text or code editors. Source editors such as Notepad++ make editing the template xml files a much easier task.
- Locate the xml file. You can export the currently installed template using the Hierarchy Config Utility (see ["Hierarchy Configuration Guide" on page 7](#)), copy an xml template from the SampleTemplates folder [Path]\Applications\Hierarchy Manager\SampleTemplates, or copy the generic template content from this guide and paste it into your editor.
- Do not modify the original xml template file. Make a copy of the file and save under a different name.

The hierarchy template

The hierarchy template is an xml file that defines the Node names, attributes, and relationships that are used in Hierarchy Manager. Each element of the template is defined using information contained in the different tags that make up the template. When imported into Power Monitoring Expert, the template can produce a hierarchy view similar to the five level generic template view show below:



In the example template the bottom three levels of the hierarchy have been configured for devices to be connected to them, although devices can be associated with any level of a hierarchy. These devices are added to the Node instance for each level using Hierarchy Manager.

Note

The example file shows the workings of the different parts of the xml file and provides information that can be used to build a new hierarchy template from scratch. In most cases however, the best approach is to find an existing template that closely matches your requirements and modify it to suit your purposes.

The table below identifies and describes the various elements that make up the template xml file.

Tag	Description	Example
<Template>	Contains template namespace information and the apportionmentEnabled flag	<Template version="1.0" apportionmentEnabled="true" xmlns="uri:application-modules/power/model/template#">
<Types>	Container tag for Type and Attribute elements	<Types> </Types>
<Type>	Defines elements that define characteristics used by the node. Each type represents a tab in Hierarchy Manager.	<Type displayName="level_1".../>
<Attribute>	Defines the characteristics used in each type.	<Attribute displayName="id" dataType="String" uri="uri::application-modules/power/model/attribute#name" />
<Reference>	Used to create relationships between nodes. For a relationship to exist between nodes, Each Type element must contain reference information for every other element it is associated with.	<Reference displayName="level_2" isReverse="true" target="uri:application-modules/power/model/type#level_2" uri="uri:application-modules/power/model/relation#1_2" />
<Views>	Contains elements that define how the Node types are presented in different hierarchical views.	<Views> </Views>
<View>	Specifies the node type the view start at. Contains Relation elements.	<View displayName="Generic Layout" rootNodeTypeUri="uri:application-modules/power/model/type#level_1">
<Relation>	Contained in a View element, defines the order that the node types are displayed in.	<Relation follow="ur:application-modules/power/model/relation#1_2" reverse="true" />

Modifying the xml elements

This section explains each element in the template xml file and how to change the generic template into one that represents a model of your organization.

<Template>

The template element contains namespace information and the apportionmentEnabled flag.

```
<Template version="1.0" apportionmentEnabled="true" xmlns="uri:application-modules/power/model/template#">
```

The apportionmentEnabled flag allows the apportioned meter and virtual meter features to be toggled on and off.

The following features are available in the Hierarchy Manager interface if this toggle is true and unavailable if the toggle is false:

- The **Virtual Meter** tab.
- The **Percentage** field in device selection dialogs.
- The presence of created virtual meters in the device selection dialogs.

The following features are available in the Hierarchy Configuration Utility if this toggle is true and unavailable if the toggle is false:

- The columns '_Percent' and 'Virtual Meter_Name' are present during export and are accepted during import.
- New or existing virtual meter names can be included in the "Device_Full Name" column during import.

The apportionmentEnabled="true" flag allows you to create apportioned meters and virtual meters and to assign them to Hierarchy nodes. The apportionmentEnabled="false" flag does not affect the underlying system, and all created and assigned apportioned meters and virtual meters report their values and names correctly if the toggle is changed from true to false.

If the apportionmentEnabled attribute is not present in the template, its value is assumed to be false.

<Types>

This is a containment tag for all Type elements. Make sure any Type elements are inside this containment tag.

```

<Types>
  <Type displayName="level_1" uri="uri:application-modules/power/model/type#level_1">
    <!-- every Type must have attribute#name - change displayName as needed -->
    <Attribute displayName="id" dataType="String" uri=
      "uri:application-modules/power/model/attribute#name" />
    <!-- use these elements to add attributes to nodes -->
    <Attribute displayName="string" dataType="String" uri=
      "uri:application-modules/power/model/attribute#str" />
    <Attribute displayName="notes" dataType="LongText" uri=
      "uri:application-modules/power/model/attribute#note" />
    <Attribute displayName="number" dataType="Number" uri=
      "uri:application-modules/power/model/attribute#num" />
    <Attribute displayName="boolean" dataType="Boolean" uri=
      "uri:application-modules/power/model/attribute#bool" />
    <!-- this is how to create one half of the relationship between two nodes, you need a
    similar reference on the other end of the relationship -->
    <Reference displayName="level_2" uri="uri:application-modules/power/model/relation#1_2"
      target="uri:application-modules/power/model/type#level_2" />
  </Type>
</Types>

```

<Type>

The <Type> tag contains all the information required to define the Node. Each defined Type adds a tab in Hierarchy Manager. The name that is defined in the displayName is the tab name in Hierarchy Manager, and is displayed as part of the header in an exported csv file. The <Type> tag also contains one or more <Attribute> and <Reference> tags.

```

<Type displayName="level_1" uri="uri:application-modules/power/model/type#level_1">
  <!-- every Type must have attribute#name - change displayName as needed -->
  <Attribute displayName="id" dataType="String" uri=
    "uri:application-modules/power/model/attribute#name" />
  <!-- use these elements to add attributes to nodes -->
  <Attribute displayName="string" dataType="String" uri=
    "uri:application-modules/power/model/attribute#str" />
  <Attribute displayName="notes" dataType="LongText" uri=
    "uri:application-modules/power/model/attribute#note" />
  <Attribute displayName="number" dataType="Number" uri=
    "uri:application-modules/power/model/attribute#num" />
  <Attribute displayName="boolean" dataType="Boolean" uri=
    "uri:application-modules/power/model/attribute#bool" />
  <!-- this is how to create one half of the relationship between two nodes, you need a
  similar reference on the other end of the relationship -->
  <Reference displayName="level_2" uri="uri:application-modules/power/model/relation#1_2"
    target="uri:application-modules/power/model/type#level_2" />
</Type>

```

To change the tab name in Hierarchy Manager, modify the display name in the template file.

```

<Type displayname="level_1" uri= "uri:application-
modules/power/model/type#level_1">

```

becomes

```

<Type displayname="new_name" uri="uri:application-
modules/power/model/type#new_name">

```

Continue changing the display name for each type as required.

<Attribute>

The <Attribute> tag defines the characteristics of the type. These characteristics could be things like name, floor number, or breaker ratings, depending on the template layout. The dataType is different depending on what the attribute field contains. There must be at least one Name attribute that is defined by the user for each row added in a tab. The name attribute must have the uri `uri:application-modules.com/power/model/relation#name`

- `dataType="String"` - For short blocks of text (e.g. name)
- `dataType="LongText"` - For long blocks of text (e.g. notes, contact information)
- `dataType="Number"` - For numeric fields (e.g. breaker rating in Amps)
- `dataType="Boolean"` - For checkboxes (e.g. Rack Circuit)

```
<Attribute displayName="id" dataType="String" uri=
"uri:application-modules/power/model/attribute#name" />
```

To add an attribute to a tab, determine the characteristic you need to capture with that attribute, determine the appropriate dataType, and create the attribute. To define the name characteristic for a type, you can create an attribute similar to this:

```
<Attribute displayName="Name" dataType="String"
uri="uri:application-modules/power/model/attribute#name" />
```

<Reference>

The <Reference> tag is used to define the interaction between types. Each Type can have references to other types. To have this reference, the target field must match the uri of an existing Type.

- If the referenced type is a parent, there is either no isReverse condition, or isReverse is set to "false"
- If the referenced type is a child, isReverse is set to "true".
- Each type with a reference to a type must have a corresponding reference in the related type. For example, For the level_1 and level_2 types to be related, each must have a reference that corresponds to the other.

```
<Reference displayName="level_2" isReverse="true" uri=
"uri:application-modules/power/model/relation#2_3" target=
"uri:application-modules/power/model/type#level_2" />
```

To establish the relationship between two types, create a reference element for each type. Each reference element must contain the displayName of the type it is related to. It must also contain whether it is a parent or a child. To establish a relationship between a building type and a floor type, add the following reference to the Buildings type:

```
<Reference displayName="Floors" uri="uri:application-
modules/power/model/relation#Buildings_Floors"
target="uri:application-modules/power/model/type#Floors" />
```

and the following reference to the Floors type:

```
<Reference displayName="Buildings" isReverse="true" uri="uri:application-
modules/power/model/relation#Buildings_Floors" target="uri:application-
modules/power/model/type#Buildings" />
```

A physical or logical device, or managed circuit can be associated with any type. To configure a type to connect with a device, create a Reference tag similar to the example below:

```
<Reference displayName="device" uri="uri:application-
modules/power/model/relation#meteredBy" target="uri:application-
modules/power/model/type#device" />
```

The last portion of the Reference element provides a relation name, which is used in the Relation element when defining the view structure of a hierarchy.

<Views>

This is a containment tag for all View elements. Make sure any View elements are inside this containment tag.

```
<Views>
  <!-- View displayName shows up in the drop-down of Reports/Gadgets -->
  <!-- specify the node type to start at, then add the relations to follow -->
  <View displayName="Generic Layout" rootNodeTypeUri=
    "uri:application-modules/power/model/type#level_1">
    <Relation follow="uri:application-modules/power/model/relation#1_2" />
    <Relation follow="uri:application-modules/power/model/relation#2_3" />
    <Relation follow="uri:application-modules/power/model/relation#3_4" />
    <Relation follow="uri:application-modules/power/model/relation#4_5" />
  </View>
  <!-- do not need to add the "meteredBy" relation in the View
  if a "meteredBy" relation has a mapped device no matter what level of the hierarchy
  then the aggregation will return the value from the mapped device -->
</Views>
```

<View>

The <View> tag is used to define how a hierarchy can be viewed in Power Monitoring Expert. These different views provide different ways that a hierarchy can be displayed, or different ways the device data associated with the hierarchy types can be grouped together. The <View> tag groups together the Relation elements in the order the view appears in.

```
<View displayName="Generic Layout" rootNodeTypeUri=
  "uri:application-modules/power/model/type#level_1">
  <Relation follow="uri:application-modules/power/model/relation#1_2" />
  <Relation follow="uri:application-modules/power/model/relation#2_3" />
  <Relation follow="uri:application-modules/power/model/relation#3_4" />
  <Relation follow="uri:application-modules/power/model/relation#4_5" />
</View>
```

The view displayName is defined here, and is displayed in the Available Views window of Hierarchy Manager. The view is also used when selecting a data source in the Dashboards and Reports feature.

<Relation>

The <Relation> tag is used to establish how the different views of the hierarchy are structured. The initial relation is defined in the Reference element. Specify the node type to start at, then add the relations to follow.

```
<Relation follow="uri:application-modules/power/model/relation#4 5" />
```

Additional notes

If you do not require all the levels provided in the example template, you can comment out the types you do not need, from the bottom type up. Commenting out the type, rather than just deleting the type preserves the structure of the template file and allows you to reinstate the type with a minimum of effort. Put the comment tags <!-- <Type>...</Type> --> around the Type element to comment it out. Remove the comment tags to restore the type.

If your template contains multiple view elements, and you want to remove one or more of them, you can also wrap the comment tags around the applicable View tags. Remove the comment tags to restore the View elements.

When importing the xml file, the Hierarchy Configuration Tool performs a validation test on the file. If the file validation is not successful, the utility will not import the file and provides information regarding where the validation process was stopped. Check for any discrepancies in the file, save the changes and reimport the file.

Generic 5 Level Template

```

<Template version="1.0" apportionmentEnabled="true" xmlns="uri:application-
modules/power/model/template#">

<!--
This is a template for a simple 5 level hierarchy. All the relations and nodes have been pre-configured. To
customize for your purposes, search and replace "level_1" with the name of your top-level type (e.g. Site),
...
"level_5" with the name of your lowest-level type (e.g. Room)
With this template you can attach "devices" to the lower 3 levels.
-->

<Types>

<Type displayName="level_1" uri="uri:application-modules/power/model/type#level_1">
<!-- every Type must have attribute#name - change displayName as needed -->
<Attribute displayName="id" dataType="String" uri="uri:application-modules/power/model/attribute#name" />
<!-- use these elements to add attributes to nodes -->
<Attribute displayName="string" dataType="String" uri="uri:application-modules/power/model/attribute#str" />
<Attribute displayName="notes" dataType="LongText" uri="uri:application-
modules/power/model/attribute#note" />
<Attribute displayName="number" dataType="Number" uri="uri:application-
modules/power/model/attribute#num" />
<Attribute displayName="boolean" dataType="Boolean" uri="uri:application-
modules/power/model/attribute#bool" />

<!-- this is how to create one half of the relationship between two nodes, you need a similar reference on the other
end of the relationship -->

<Reference displayName="level_2" uri="uri:application-modules/power/model/relation#1_2"
target="uri:application-modules/power/model/type#level_2" />
</Type>

<Type displayName="level_2" uri="uri:application-modules/power/model/type#level_2">
<Attribute displayName="id" dataType="String" uri="uri:application-modules/power/model/attribute#name" />
<!-- this is the other end of the relationship marked above - isReverse is opposite, relation#... must be equal -->
<Reference displayName="level_1" isReverse="true" uri="uri:application-modules/power/model/relation#1_2"
target="uri:application-modules/power/model/type#level_1" />
<Reference displayName="level_3" uri="uri:application-modules/power/model/relation#2_3"
target="uri:application-modules/power/model/type#level_3" />
</Type>

<Type displayName="level_3" uri="uri:application-modules/power/model/type#level_3">
<Attribute displayName="id" dataType="String" uri="uri:application-modules/power/model/attribute#name" />
<Reference displayName="level_2" isReverse="true" uri="uri:application-modules/power/model/relation#2_3"
target="uri:application-modules/power/model/type#level_2" />
<Reference displayName="level_4" uri="uri:application-modules/power/model/relation#3_4"
target="uri:application-modules/power/model/type#level_4" />
<Reference displayName="device" uri="uri:application-modules/power/model/relation#meteredBy"
target="uri:application-modules/power/model/type#device" />
</Type>

<Type displayName="level_4" uri="uri:application-modules/power/model/type#level_4">
<Attribute displayName="id" dataType="String" uri="uri:application-modules/power/model/attribute#name" />
<Reference displayName="level_3" isReverse="true" uri="uri:application-modules/power/model/relation#3_4"
target="uri:application-modules/power/model/type#level_3" />
<Reference displayName="level_5" uri="uri:application-modules/power/model/relation#4_5"

```

```
target="uri:application-modules/power/model/type#level_5" />
<Reference displayName="device" uri="uri:application-modules/power/model/relation#meteredBy"
target="uri:application-modules/power/model/type#device" />
</Type>

<Type displayName="level_5" uri="uri:application-modules/power/model/type#level_5">
<Attribute displayName="id" dataType="String" uri="uri:application-modules/power/model/attribute#name" />
<Reference displayName="level_4" isReverse="true" uri="uri:application-modules/power/model/relation#4_5"
target="uri:application-modules/power/model/type#level_4" />
<!-- this is how to connect up a logical/physical device to provide metered data to a node
this can appear anywhere in the hierarchy e.g. main meter for building, metering points for specific loads,
managed circuits for multi-circuit monitors -->
<Reference displayName="device" uri="uri:application-modules/power/model/relation#meteredBy"
target="uri:application-modules/power/model/type#device" />
</Type>

</Types>

<Views>

<!-- View displayName shows up in the drop-down of Reports/Gadgets -->
<!-- specify the node type to start at, then add the relations to follow -->
<View displayName="Generic Layout" rootNodeTypeUri="uri:application-modules/power/model/type#level_1">
<Relation follow="uri:application-modules/power/model/relation#1_2" />
<Relation follow="uri:application-modules/power/model/relation#2_3" />
<Relation follow="uri:application-modules/power/model/relation#3_4" />
<Relation follow="uri:application-modules/power/model/relation#4_5" />
</View>

<!-- do not need to add the "meteredBy" relation in the View
if a "meteredBy" relation has a mapped device no matter what level of the hierarchy
then the aggregation will return the value from the mapped device -->
</Views>
</Template>
```


StruxureWare Power Monitoring Expert Hierarchy Configuration Guide

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