



GE VERNOVA

Asset Performance Management

On-Premises APM

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APM Data Extraction

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Chapter 1

Overview

Topics:

- [About APM Data Extraction Service](#)

About APM Data Extraction Service

Data visualization is the representation of data and information in a graphical format allowing viewers to recognize patterns in the data more quickly.

APM helps optimize the performance of your assets. It connects different data sources from applications like EAM, CMMS, OSI PI, and others, and uses advanced analytics to turn data into actionable insights while fostering collaboration and knowledge management. The built-in APM reports and dashboards enable you to connect and access the data. However, it is not possible to analyze the data using data visualization techniques by connecting APM data to any third-party Business Intelligence (BI) tool.

The APM Data Extraction service using OData, bridges this void in data visualization with the help of BI tools providing advanced visualization techniques. OData is a REST standard for creating data-centric APIs and is used to share the data through HTTP in a secured manner. BI tools support OData through built-in adapters or connectors and use the extracted data for reporting.

The APM Data Extraction service has been implemented based on the OData v4.01 specification. Using this service, you can expose an APM database using an Open Data interface to different BI tools with an OData connector. This service enables you to query the entities of the APM database. You can build new queries for your data analysis and visualization requirements. Your reporting or BI tools can discover what data and functionality is available, enabling you to analyze the data.

Data visualization has the following advantages:

- **Visibility:** Provides visibility about various aspects of the data.
- **Decision-making:** Impacts decisions as data in a visual format is processed quickly.
- **Insights:** BI software with built-in data visualization tools provides insights that can be lost in traditional reports.
- **Interaction:** The audience can interact with the visual data allowing them to uncover hidden details of the data.

Chapter 2

Authentication

Topics:

- [Authenticate](#)

Authenticate

Before You Begin

- OData APIs are hosted as a part of APM Web API service.
- The Meridium Core (Foundation) license is required to use the OData functionalities.

Note: For more information on OData, refer to the OData documentation.

About This Task

You must authenticate OData requests to the APM database. You can use a Meridium token for the APM environment. To generate the Meridium token, you must make a HTTP POST call to the Login API.

Procedure

Use your credentials to generate a Meridium token.

Attributes	Values
Resource URL	{{host}}/meridium/api/core/security/login
HTTP Method	POST

Property	Description
DatasourceId	The name of the data source configured in the APM instance
Id	The username for the APM instance
Password	The password for the username

```
{
  "DatasourceId":{data_source_id},
  "Id":{apm_user_id},
  "Password":{apm_user_pwd}
}
```


Chapter 3

Supported Features

Topics:

- [OData Features Supported in APM](#)
- [System Queries](#)
- [Functions](#)
- [Binary Operations](#)

OData Features Supported in APM

OData Service Resource (Base URL): `{{host}}/meridium/api/odata`

The following OData features are supported:

Title	Description
Metadata	Generates metadata of the service (\$metadata)
EntityCollection	Returns the collection of entities for a family
EntityById	Returns an entity identified by entity key
Property	Returns the property of an entity identified by entity key
Projected Entities	Returns selected properties of an entity (\$select)
Server-driven pagination	Queries the data by pages
System queries	Basic system query options

System Queries

The following system query options are supported on the root entity:

- \$metadata (schema)
- \$count
- \$select (limited to depth level of 1)
- \$filter
- \$top
- \$orderby
- \$expand (to get relationship data, limited to depth level of 1)
- \$skip

Functions

You can use the following functions in your query:

Function	Description
startswith	<p>This function determines whether a string begins with the characters of a specified string, returning true or false as appropriate. It is used to filter data based on key words of a property.</p> <pre>~/odata/Work_Order? \$filter=startswith(Work_Order_ID , 'WO1')</pre>
endswith	<p>This function determines whether a string ends with the characters of a specified string, returning true or false as appropriate. It is used to filter data based on key words of a property.</p> <pre>~/odata/Work_Order? \$filter=endswith(Work_Order_ID , '012')</pre>
contains	<p>This function determines whether a string contains the characters of a specified string, returning true or false as appropriate. It is used to filter data based on key words of a property.</p> <pre>~/odata/Work_Order? \$filter=contains(Work_Order_ID , 'WO2101')</pre>
round	<p>This function rounds off a number to a specified number of decimal places. It is used to filter data by rounding off a decimal value for a property and compare with a given decimal value.</p> <pre>~/odata/Work_Order? \$filter=round(Labor_Cost) eq 1000</pre>
tolower	<p>This function converts a string to lowercase letters. It is used to convert data of a property to lowercase and compare to a given word.</p> <pre>~/odata/Work_Order? \$filter=tolower(Work_Order_Type) eq 'other'</pre>
toupper	<p>This function converts a string to uppercase letters. It is used to filter data by converting data to uppercase and compare with a given word.</p> <pre>~/odata/Work_Order? \$filter=toupper(Work_Order_Type) eq 'OTHER'</pre>
floor	<p>This function returns the largest integer value that is smaller than or equal to a number. It is used to filter data by rounding off to the floor value.</p> <pre>~/odata/Work_Order? \$filter=floor(Labor_Cost) gt 1000</pre>
ceiling	<p>This function returns the smallest integer value that is larger than or equal to a number. It is used to filter data by rounding off to the ceiling value.</p> <pre>~/odata/Work_Order? \$filter=ceiling(Labor_Cost) gt 1000</pre>

Function	Description
year	This function returns the year in a given date (a number from 1000 to 9999). It is used to filter data based on a year. ~/odata/Work_Order? \$filter=year(WO_Close_Date) gt 2000
month	This function returns the month part for a given date (a number from 1 to 12). It is used to filter data based on a month. ~/odata/Work_Order? \$filter=month(WO_Close_Date) gt 02
day	This function returns the day of the month (from 1 to 31) for a specified date. It is used to filter data based on a day. ~/odata/Work_Order? \$filter=day(WO_Close_Date) gt 21
length	This function returns the length of the string. It is used to filter data based on the length of the string. ~/odata/Work_Order? \$filter=length(Work_Order_ID) gt 6
trim	This function removes leading and trailing spaces from a string. It is used to ignore the leading and trailing spaces and filter the data. ~/odata/Work_Order?\$filter=trim(ID) eq 'WO-8300333'

Binary Operations

You can use the following binary operations in your query:

- Add
- And
- Divide
- Equal
- GreaterThan
- GreaterThanOrEqual
- LessThan
- LessThanOrEqual
- Multiply
- NotEqual
- Or
- Subtract
- Modulo

Chapter 4

Functionalities

Topics:

- [Metadata Request](#)
- [Entity Collection Request](#)
- [Entity by Id Request](#)
- [Entity Property Request](#)
- [Entity Count Request](#)
- [Configure Page Size](#)
- [Power M Query](#)

Metadata Request

Your applications can query the metadata of the OData service. To get the metadata of the OData service, you must make a HTTP GET call.

Table 1: RESOURCE

Attributes	Values
HTTP Method	GET
Resource URL	{{host}}/meridium/api/odata/\$metadata

Table 2: HEADERS

Name	Value
MeridiumToken	{{meridiumtoken}}

Entity Collection Request

To query the list of entities for a family, you must make a HTTP GET call.

Table 3: RESOURCE

Attributes	Values
HTTP Method	GET
Resource URL	{{host}}/Meridium/api/odata/{entity_name}

Table 4: HEADERS

Name	Value
MeridiumToken	{{meridiumtoken}}

Sample Query

```
{{host}}/Meridium/api/odata/Work_Order?$count=true
```

Note: The default page size is 1000.

Entity by Id Request

To query an entity based on id, you must make a HTTP GET call.

Table 5: RESOURCE

Attributes	Values
HTTP Method	GET
Resource URL	{{host}}/Meridium/api/odata/ {entity_name}({entityid})

Table 6: HEADERS

Name	Value
MeridiumToken	{{meridiumtoken}}

Sample Query

```
{{host}}/Meridium/api/odata/Work_Order(2003303)
```

Entity Property Request

To query a property of an entity based on id, you must make a HTTP GET call.

Table 7: RESOURCE

Attributes	Values
HTTP Method	GET
Resource URL	{{host}}/Meridium/api/odata/ {entity_name}({entityid})/ {property_name}

Table 8: HEADERS

Name	Value
MeridiumToken	{{meridiumtoken}}

Sample Query

```
{{host}}/Meridium/api/odata/Work_Order(2003303)/Work_Order_ID
```

Entity Count Request

To find the number of existing entities for a family, you must make a HTTP GET call.

Table 9: RESOURCE

Attributes	Values
HTTP Method	GET
Resource URL	{{host}}/Meridium/api/odata/{entity_name}/\$count

Table 10: HEADERS

Names	Value
MeridiumToken	{{meridiumtoken}}

Sample Query

```
{{host}}/Meridium/api/odata/Work_Order/$count
```

Configure Page Size

About This Task

You can configure the page size of the OData request payload.

Procedure

1. Access the `Web.config` file.
2. In the `appSettings` section, modify the `ODATA_PAGE_SIZE` value.

Note: The default page size is 1000.

Configuration Key	Value	Type
ODATA_PAGE_SIZE	1000	Integer

3. Save the `Web.config` file.

Power M Query

The following is a sample query to authenticate the APM environment and retrieve the metadata.

```
let
  actualUrl = "{{host}}/Meridium/api/core/security/login",
  body =
Text.ToBinary("{\"DatasourceId\":\"datasource\",\"Id\":\"user\",\"Passw
```



```
ord"":""pwd""}),
  options = [Headers =[#"Content-type"="application/json"],
Content=body],
  Source = Web.Contents(actualUrl, options),
  retVal = Json.Document(Source,65001),
  token = retVal[sessionId],
  feed = OData.Feed("#{host}/Meridium/api/odata/", null, [Headers =
[ MeridiumToken= token ]])
  in
  feed
```

Chapter 5

External Tools

Topics:

- [Microsoft Excel Query](#)
- [Power BI Query](#)

Microsoft Excel Query

About This Task

You can query the data and save the data in a Microsoft Excel spreadsheet.

Procedure

1. Open a Microsoft Excel spreadsheet.
2. Select **Data**, and then select **Get Data**.
3. In the window, select **Other Sources**, and then select **Blank Query**.
A **Power Query Editor** window appears.
4. Enter your Power M query, and then select **Done**.
Note: Refer to the [Power M query](#) section for a sample query.
5. If prompted for data privacy information, select **Ignore**, and then select **Save**.
All the database families appear in the preview page.
6. Select the **Data** column of a family, then right-click and select **Drill Down**.
The preview data is downloaded.
7. Select **Close & Load**, and then select **Close & Load**.
Excel will the query the full data for an entity and download a document.
8. Select **File**, and then select **Save**.
The document is saved.

Power BI Query

About This Task

You can query the data using the Microsoft Power BI application.

Procedure

1. Access the Microsoft Power BI application.
2. Select **Home**, then select **Get Data**, and then select **Blank Query**.
The **Power Query Editor** window appears.
3. Select **Advance Editor**, then enter the Power M query, and then select **Done**.
Note: Refer to the [Power M query](#) section for a sample query.
4. If prompted for data privacy information, select **Ignore**, and then select **Save**.
5. Select the **Data** column of a particular family, then right-click and select **Drill Down**.
The preview data is downloaded.
6. Select **Close & Load**, and then select **Close & Load**.
The **Power BI** window appears. You can view the property of the selected entity in the **FIELDS** section.
7. Select **Charts** in the **Visualizations** section, and then generate the charts by dragging the entity properties to the **axis** and **value** sections in the chart.
8. Select **File**, and then select **Save**.
The document is saved.