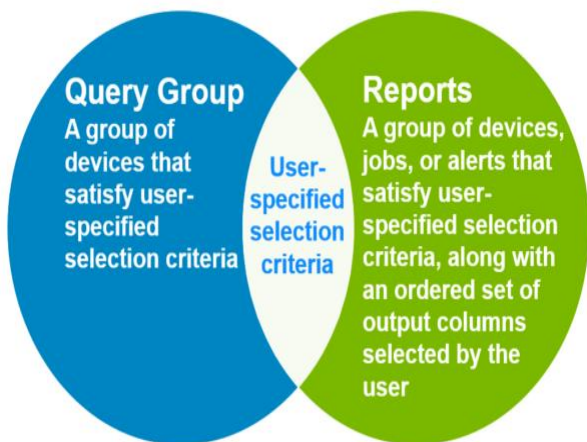**DELL**EMC

Define Custom Groups and Reports in Dell EMC OpenManage Enterprise

This technical white paper provides information about using the query builder feature to manage your Query Groups and Reports in managing your data center.

Query Group
A group of devices that satisfy user-specified selection criteria

User-specified selection criteria

Reports
A group of devices, jobs, or alerts that satisfy user-specified selection criteria, along with an ordered set of output columns selected by the user

Abstract
This technical paper discusses how to effectively define custom query groups and report definitions in Dell EMC OpenManage Enterprise 3.0 and later versions.

January 2019

Revisions

Date	Description
January 2019	Initial release

Acknowledgements

Contents

Terminology

Table 1   List of terminologies used in this technical white paper

Acronym	Expanded form
API	Application Program Interface
EMM	Enclosure Management Module
FRU	Field Replaceable Unit
GUI	Graphical User Interface
NIC	Network Interface Card

Executive summary

OpenManage Enterprise 3.0 and later versions provide the ability for customers to define their own device groups and reports, which are respectively referred to in the OpenManage Enterprise as Custom Groups and Custom Reports.

- Custom Groups can be either a static set of selected devices (referred to as a "Static Group") or a dynamic set of devices (referred to as a "Query Group") that satisfies selection criteria constraints (such as name or status) specified by the customer.
- Report definitions always use user-defined selection criteria.

In both cases, the term "query" is used to refer to the selection criteria and associated parameters specified for a query group or report definition. A simplified Graphical User Interface (GUI)—referred to as the Query Builder—is used for defining the queries to use for custom query groups and reports. This technical white paper discusses effectively using the Query Builder to define queries for custom query groups and reports.
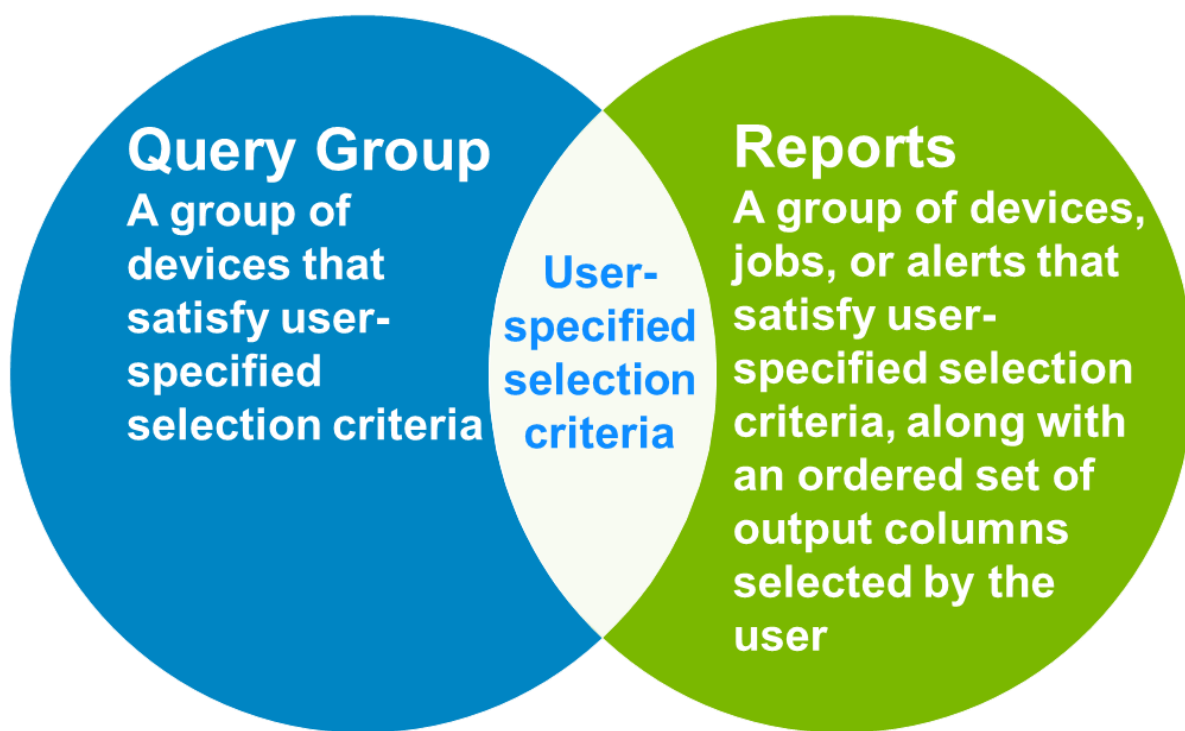
Query Group
A group of devices that satisfy user-specified selection criteria

User-specified selection criteria

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A group of devices, jobs, or alerts that satisfy user-specified selection criteria, along with an ordered set of output columns selected by the user

You can also view the following videos to get more information about using the unmatched features of Dell EMC OpenManage Enterprise Graphical User Interface (GUI):
- [Dell EMC OpenManage Enterprise Systems Management Console](#) (02:02 m)
- [Dell EMC OpenManage Enterprise](#) (01:44 m)

Note—For more information about the field definitions and tasks discussed in this technical white paper, see the context-sensitive *Online Help* documentation by clicking the **?** symbol in the upper-right corner of the respective page or dialog box on the OpenManage Enterprise GUI. Else, you can also see the Dell EMC OpenManage Enterprise 3.0 User's Guide available on the support site.

1 Managing Custom Query groups and Reports in OpenManage Enterprise

This section describes some basic terms related to the interface pages for creating Query Groups and report definitions. Topics you can read about in this section:

- Custom Query Groups in OpenManage Enterprise
- Report Definitions in OpenManage Enterprise
- Query Builder in OpenManage Enterprise

1.1 Custom Query Groups in OpenManage Enterprise

As mentioned earlier, OpenManage Enterprise 3.0 and later versions support the ability to create two types of custom groups:

- Static Groups
- Query Groups

This technical white paper discusses only Query Groups and how to set up the query for a custom query group.

1. Custom Query Groups are created and managed on the **Devices → All Devices** page.
   The left pane of the GUI lists all the Custom Groups.
2. Hover the pointer over **Query Groups**.
   A vertical ellipsis (three periods) appear at the right edge of the pane.
3. Click **Query Groups** to display a list of the devices in all custom Query Groups.
4. Click the vertical ellipsis to view an action menu.
   The menu has an option to create a new custom Query Group. Custom reports also display vertical dots for an action menu, with options to edit, clone, rename, or delete them.

Each Custom Query group uses a query (that is selection criteria) to determine which devices must be included in the group. The set of devices in the group can change over time—For example, if the group query specifies devices with a specific status, OpenManage Enterprise periodically runs the query that determines the set of devices in the group.

1.2 Report Definitions in OpenManage Enterprise

A report definition defines an output table consisting of rows and columns.

Report definitions are similar to Query Group definitions in that they also specify selection criteria, to determine the output rows for the report. Output rows for a report is a set of devices (as is always the case for Query Groups) or it is a set of other items (such as Alerts).

Report definitions have more functionality than just selecting a set of rows for output. They also specify a set of columns to display for each output row and an order for output rows.

Note—Report definitions are created and managed on the **Monitor → Reports** page. You can create, edit, copy, export, and delete report definitions.

Each report definition uses a query to identify which output rows to include in the report, the output columns for the report, and in which output rows are listed.

1.3   Query Builder in OpenManage Enterprise

The functional component in OpenManage Enterprise that provides support for defining custom query groups and report definitions is referred to as the Query Builder. The Query Builder component is used for both custom queries and report definitions.

SQL and Query Builder

• SQL is a complex query language that is used to look up information in a database. Behind the scenes, the OpenManage Enterprise Query Builder uses SQL to query the database. However, no knowledge of SQL is required to use the Query Builder to define custom groups or reports. In fact, the OpenManage Enterprise Query Builder is designed to make it as easy as possible to define custom groups and reports. It does not imply that it provides every functionality that a full SQL editor can support.

The Query Builder in OpenManage Enterprise enables you to specify the following:

- Query selection criteria for the items to select. Custom query groups always select devices. Report definitions may select devices, alerts, or other supported item type.

- A Query Category, indicating the type of items to select—applies to report definitions.

- Output columns—applies to report definitions.

Figure 1 shows the similarities and differences of queries used for Query Groups and Report Definitions. Note that the query used for report definitions is an extension of the query that is used for Query Group definitions. The query components shown below will be discussed in greater detail in the next section.

Query Group	Report Definition

Identification
   Group Name
   Group Description
	Identification
	   Report Name
	   Report Description

Query
   Filter (Selection Criteria)
	Query
	   Query Category
	   Filter (Selection Criteria)
	   Output Columns
	   Row Order

Figure 1   Queries used for Query Groups and Report Definitions in OpenManage Enterprise

2 Creating Query Groups and Report Definitions

This section provides more in-depth information about creating the queries to use for Query Groups and Report Definitions. Topics you can read about in this section:

- Interface pages for Query Groups and Report Definitions
- Query Category in OpenManage Enterprise
- Selection criteria for a Query Group or Report Definition
- Copy an existing query
- Query Criteria Selection–field definitions
- Query Criteria Selection–Multiple entries
- Output row order for a Report Definition

2.1 Interface pages for Query Groups and Report Definitions

To accommodate the differences between queries for Query Groups and Report Definitions (as depicted in Figure 1), their interface pages vary a bit as discussed in Interface pages for Query Groups and Interface pages for Report Definitions of this technical white paper.

2.1.1 Interface pages for Query Groups

The interface for Query Groups has two pages:
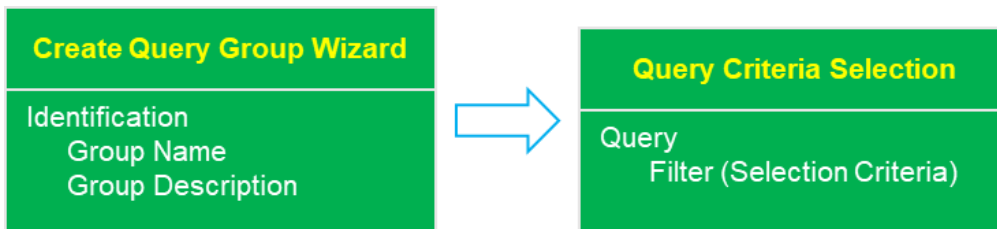
Figure 2   The Query Group interface in OpenManage Enterprise

The first page of the wizard contains the group name and description. The second page is used to specify the query selection criteria for the group (to determine which devices to include in the group).

2.1.2 Interface pages for Report Definitions

The interface for Report Definitions has three pages:
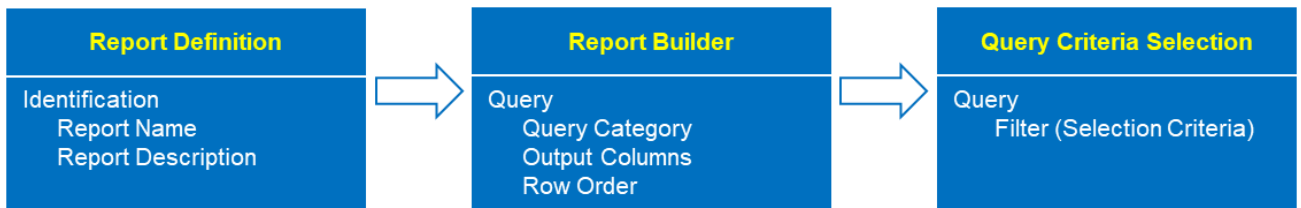

Figure 3   The Report Definitions interface in OpenManage Enterprise

- The first page contains the group name and description (the same as for the Query Groups interface).
- The second page is used to select the Query Category and the set of output columns wanted. The third page is used to define the query selection criteria for the report output rows.

2.2   Query Category in OpenManage Enterprise

In Figure 3, one of the differences shown between the query for Query Groups and the query for Report Definitions is the Query Category.

Query Category

• A Query Category specifies the type of items to be selected by the query. The Query Category is not applicable to Query Groups because query groups always select devices. However, for Report Definitions, you can select the type of item for the report (such as Devices, Servers, Jobs, or Alerts).

The screen shot in Figure 4 shows the Report Builder page used for report definitions in OpenManage Enterprise. The Category control enables you to select the Query Category. Initially, it is set to "Devices" (the most common option), but can be changed to query Jobs, Alerts, Servers, or Groups. The Servers category is a subset of the Devices category, limiting query results to include only server devices.
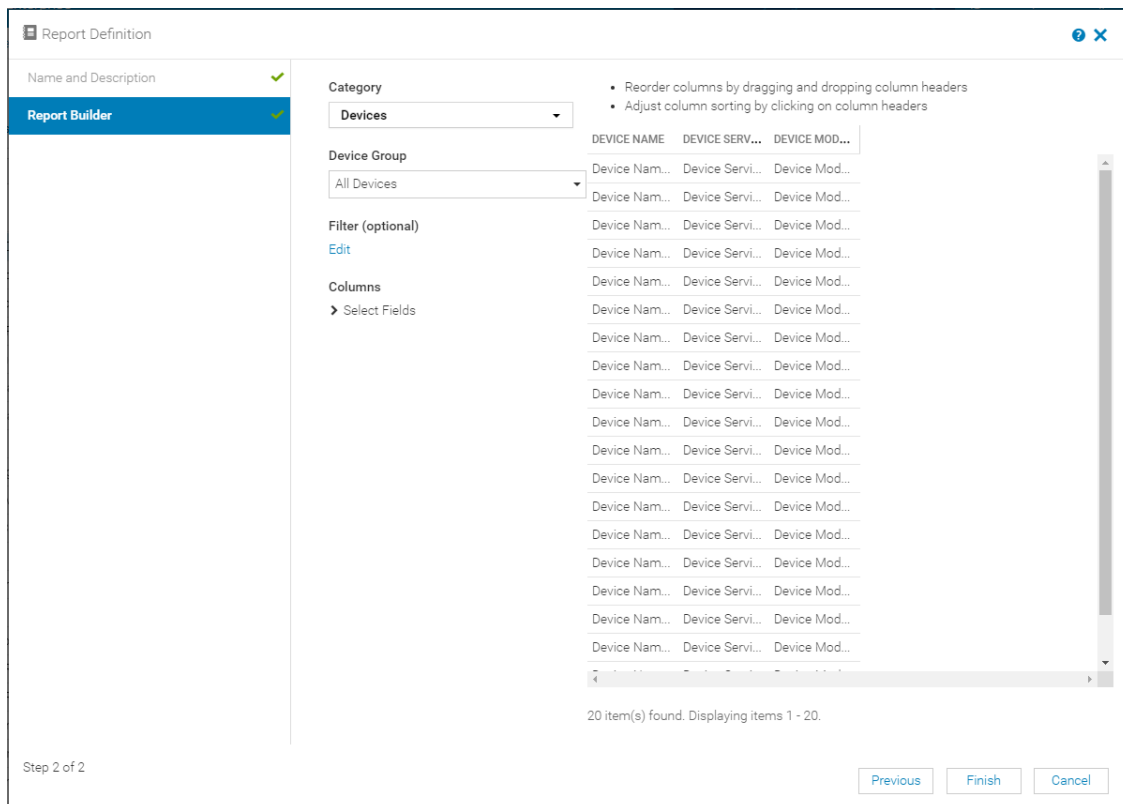
Figure 4   The Report Definition page in OpenManage Enterprise

Also, note the Columns control on this page, which is used for selecting the output columns for the report. The working pane displays an example of what the report will look like. As output columns are selected for a report definition, their names appear at the top of the sample output display. These headings can be dragged to change the column order or clicked to specify the required sort order for output rows when the report is generated.

The **Edit** link transfers control to the third page of report definition, for specifying the query selection criteria for the rows to include in the report.

2.3 Selection criteria for a Query Group or Report Definition

As indicated above, the same interface page is used for specifying query selection criteria for a Query Group and Report Definition. For Query Groups, it is the second page of the interface, and for Report Definitions, it is the third page of the interface. The same query selection criteria interface page is also used for editing Query Groups and Report Definitions, except that the current group or report selection criteria details are displayed.

For Query Groups, this page is used to specify the selection criteria for determining which devices to include in the group. For Report Definitions, it is used to specify the selection criteria for the devices (or other type of items) to include in the report output (that is, the output rows of the report). The following sections discuss the tasks you can perform on this page:

- Copy an existing query
- Query Criteria Selection–field definitions
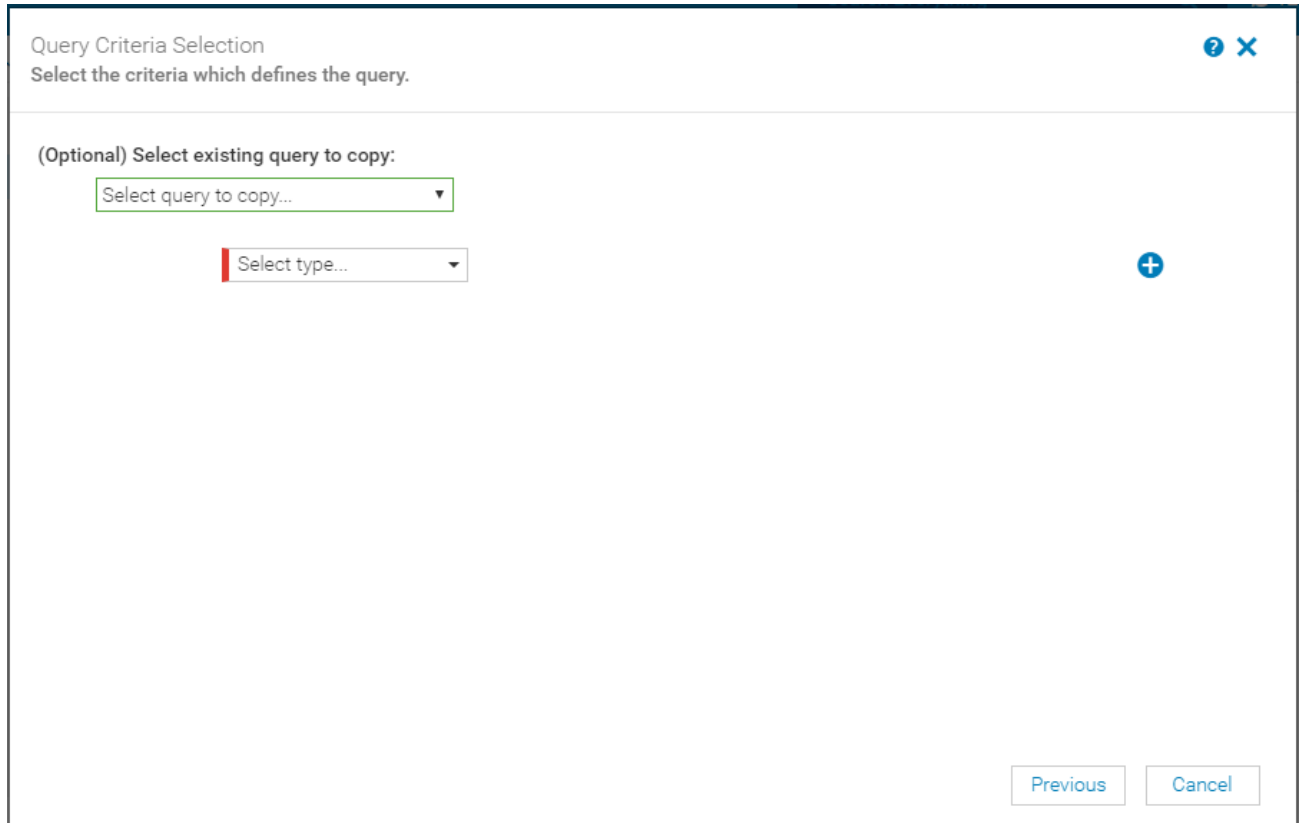- Query Criteria Selection–Multiple entries

Figure 5   Specify query criteria for generating a report in OpenManage Enterprise

2.3.1   Copy an existing query

The top control on the Query Criteria Selection page may be used, if necessary, to copy the selection criteria from another query. It essentially provides a starting point for defining a new query. For example, it could be used to create a query that is similar to an existing query.

The control displays a drop-down menu of queries which can be selected. It includes only queries defined by using the Query Builder. Because the data for Report Definitions is a superset of the data for Query Group definitions, when a report definition is being created this drop-down menu includes Query Builder queries for both Query Groups and other Report Definitions. When creating a Query Group, queries from Report Definitions are not included in the drop-down menu.

Query Builder & System Groups

- Most of the System Groups shown in the devices tree in the left pane of the **All Devices** page are actually Query Groups with a Query Builder definition. As a result, most System Groups appear in the drop-down menu for this control. However, a few System Groups are not included in the drop-down menu. It implies that the query for that particular group was too complex to be defined in the Query Builder (so it couldn't be included in the drop-down menu).

If a query is selected from the drop-down menu, the selection criteria from that query is used to populate the query currently being defined. Any selection criteria entries that are currently displayed will be removed and replaced by the selection criteria of the selected query. The query criteria selection page is updated to show that criteria. The entries in that query can be modified or deleted as wanted, and additional query criteria entries may be added.

2.3.2   Query Criteria Selection–field definitions

Query criteria is specified by using one or more "conditions", where each condition has the following form:

FieldName   Operator   Value

In a few cases, the value is included in the operator. Therefore, it is not designated separately. The Field-Name control is a drop-down menu that stores a large number of data items maintained by OpenManage Enterprise in its database. Data items with a similar purpose or usage are grouped together. These data items may be selected as necessary for specifying all the criteria for the members of a Query Group or the output rows of a report.

Note—If you are familiar with a database structure, the groups and fields listed in the Field-Name drop-down menu are similar to tables and columns in a database.

Note that the Query Criteria Selection page (Figure 5) initially displays just a Field-Name control. After a Field Name is selected, a control for the Operator appears next to it. The Operator control is also a drop-down menu. The options in the list vary based on the data type of the selected Field Name.

Note—The large list of fields contained in the Field-Name drop-down menu may seem confusing and overwhelming, and difficult to use in creating queries. Advanced topics about Query Groups and Report Definitions provides additional information that should help make more sense of this long list of field names.

In some cases, when an option is selected in the Operator control, the Value control appears to the right of the Operator control, allowing a required value to be entered or selected. The Value control also varies depending on the data type of the selected Field Name. For example, if a numeric field is selected, the Value control allows only numbers to be entered. Some fields, such as Status fields, are required to have specific values. In these cases, the Value control is a drop-down menu from which a valid option must be selected.

Note—In some cases, a field may not have any value for a particular device (or other item). For example, it may be that a device does not have an Asset Tag value. The "is null" and "is not null" options in the Operator drop-down menu enable the query to specify devices where a particular field has a value or where a particular field does not have a value.

When the operator "is null" or "is not null" is selected, a Value control is not displayed because the value is expressed as a part of the operator.

The following table shows the different data types that a field may have, the applicable operators to each data type, and the type of Value control for each data type:

Table 2   Field Data Types and Operators

Field Data Type	Operators	Value Control
Timestamp	=, !=, before, after, is null, is not null	Date selector and time selector controls
String	=, !=, <, <=, >, >=, begins with, ends with, contains, does not contain, is null, is not null	Text control – any text may be entered, up to the field's maximum length
Number	=, !=, <, <=, >, >=, is null, is not null	Spinner control; allows a number to be entered
Value Set	=, !=, is null, is not null	Drop-down containing allowed values

2.3.3   Query Criteria Selection–Multiple entries

The Query Criteria Selection page allows a query to contain multiple conditions (up to 20 of them, which should be more than would ever be required). The page also supports building complex logical expressions using the individual conditions.

Multiple conditions in a query

- Each condition after the first one begins with a drop-down menu with options "AND" and "OR":
- AND-Indicates that a device is included in the group or a result row is included in a report—only if both the previous condition and the current condition are satisfied (that is, both are true).
- OR-Indicates that a device is included in the group or a result row is included in a report—if either the previous condition or the current condition is satisfied (that is, either is true).

Figure 6 indicates query criteria containing two conditions, each of which must be satisfied for a device to be included in a Query Group or report output:

Figure 6   Specify query criteria with mulitple contiditions for generating a report in OpenManage Enterprise

Conditions may also be grouped within parentheses to specify precedence for applying the "AND" and "OR" conditions. By default, each condition begins with an open parentheses and ends with a close parentheses, which implies that it is not grouped with any other condition. Conditions that are not grouped with any other conditions are processed in the order they appear in the query.

Consider the following query:

Figure 7   Specify multiple conditions for building a report in OpenManage Enterprise

The user actually wanted a report that lists all Servers and Network Switches whose model name begins with "PowerEdge". However, because every condition above is in its own set of parentheses, they are evaluated in the order listed. Rather than getting the desired results, the report gets all devices that:

- Are servers whose model name begins with "PowerEdge", or
- Is a network switch (regardless of their model name)

Graphically, the query above uses the following logic (because each condition is not grouped with any other conditions).
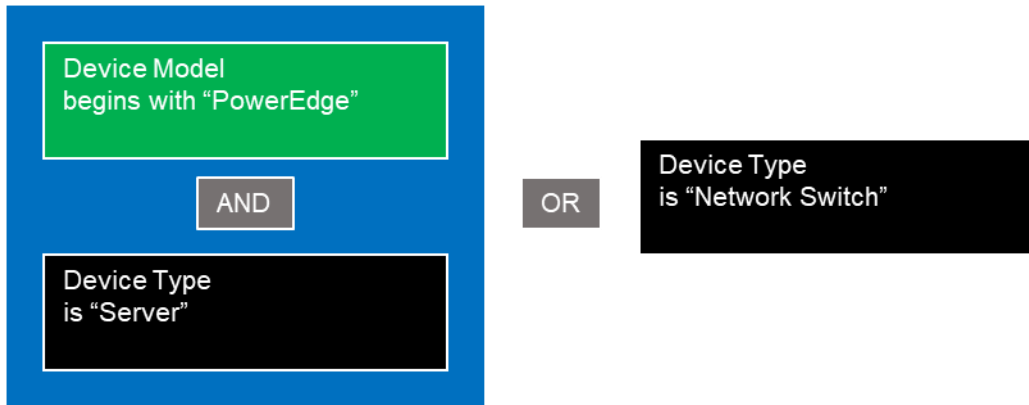

Figure 8   Ungrouped query condition in generating a report in OpenManage Enterprise

The following query uses the same conditions but groups the Device Type conditions together to get the desired output. Note that the only changes made to the first query were to remove (a) the right parentheses on the second condition, and (b) the left parentheses on the third condition. As a result, the second and third conditions are evaluated together as a composite condition.

Figure 9   Specify multiple conditions for building a report in OpenManage Enterprise

Note that the only changes made to the first query were to remove (a) the right parenthesis on the second condition, and (b) the left parenthesis on the third condition. As a result, the second and third conditions are evaluated together as a composite condition. Graphically, the updated query logic is now as follows:
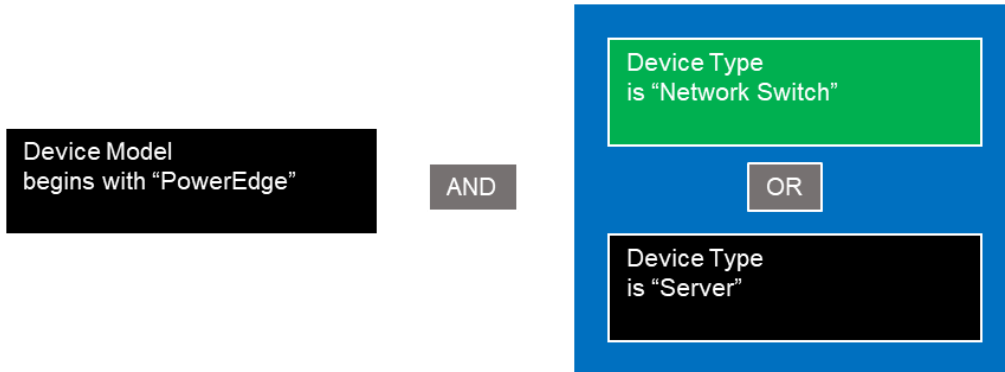

Figure 10   Grouped query condition in generating a report in OpenManage Enterprise

Now, as the report generator wanted, the query gets devices whose model name begins with "PowerEdge" that are either a network switch or a server. As necessary, parentheses can be nested (multiple layers of parentheses within parentheses) to create complex queries.

2.4   Output columns for a Report Definition

This functionality applies only to report definitions. As mentioned earlier, the Report Builder page lets output columns be selected for a report definition. The "Select Fields" control is a drop-down menu that lists fields that be included in a report. This control lists the same groups and field names as the Field-Name control on the **Query Criteria Selection** page.

The working pane of the Report Builder page displays a sample of what the report output will look like. As fields are selected in "Select Fields" control, they are added to the sample report display, with the field name at the top of each added column. As necessary, the order of the output columns can be changed by clicking a field name heading and dragging it to the required position in the sample report display.

3 Advanced topics about Query Groups and Report Definitions

This section discusses a few advanced topics related to creating queries and report definitions.

3.1 Field structure

The Query Builder displays a list of fields to choose from in the following places:

- Custom Query Group–Selection Criteria
- Report Builder–Output Columns
- Report Builder–Selection Criteria

The GUI page shows a list of possible fields. Fields that are related to each other are grouped under a field title. The Selection Criteria page displays an expanded list of the headers and fields under each header. The Report Builder Output Columns controls displays an unexpanded list, initially showing only the headers. The following is an example of the Output Columns listing, with a few headings expanded to show its fields:

> Alert
> Alert Catalog
> Alert Definition
> Alert Sub-Category
> Chassis Controller
> Chassis Device
> Chassis PCI Device
> Chassis Power Supply
> Chassis Slot
> Device FRU
> Device General Info
    ☐ Device Global Status
    ☐ Device Model
    ☐ Device Name
    ☐ Device Power State
    ☐ Device Service Tag
    ☐ Device Type
> Device License Info
> Server Card
    ☐ Card Description
    ☐ Card Manufacturer
    ☐ Card Slot Length
    ☐ Card Slot Number
    ☐ Card Slot Type
> Server Device
    ☐ Server Chassis Service Tag
    ☐ Server Express Service Code
    ☐ Server Manufacturer
    ☐ Server Max CPU Sockets
    ☐ Server Total Memory
> Server Memory Device
    ☐ Memory Bank Name
    ☐ Memory Current Operating Speed
    ☐ Memory Description

☐ Memory Manufacturer
☐ Memory Name

Some headers contain fields that apply to several or all types of devices:

- General Device Data headers—Device FRU, Device License Info, Device Location, etc.
- Alert headers—Alert, Alert Catalog, Alert Definition, Alert Sub-Category
- Storage headers—Storage Device EMM, Storage Enclosure, Storage Physical Disk, etc.

Other headers are for fields that contain info for a specific type of device:

- Server headers—Server Device, Server Card, Server Memory Device, etc.
- Chassis headers—Chassis Device, Chassis Controller, Chassis PCI Device, etc.
- Network Switch headers—Network Switch
- Storage Device headers—Storage Device EMM, Storage Enclosure, Storage Physical Disk, and so on.

The field data presented by the control can be considered as a three-tiered hierarchy. Each header's name begins with its top-tier grouping. For example, all headers for server data begin with the word "Server", and all headers for chassis data begin with the word "Chassis". The following figure shows the top-two header tiers for the Devices category (fields, which are the lowest tier, are not shown):
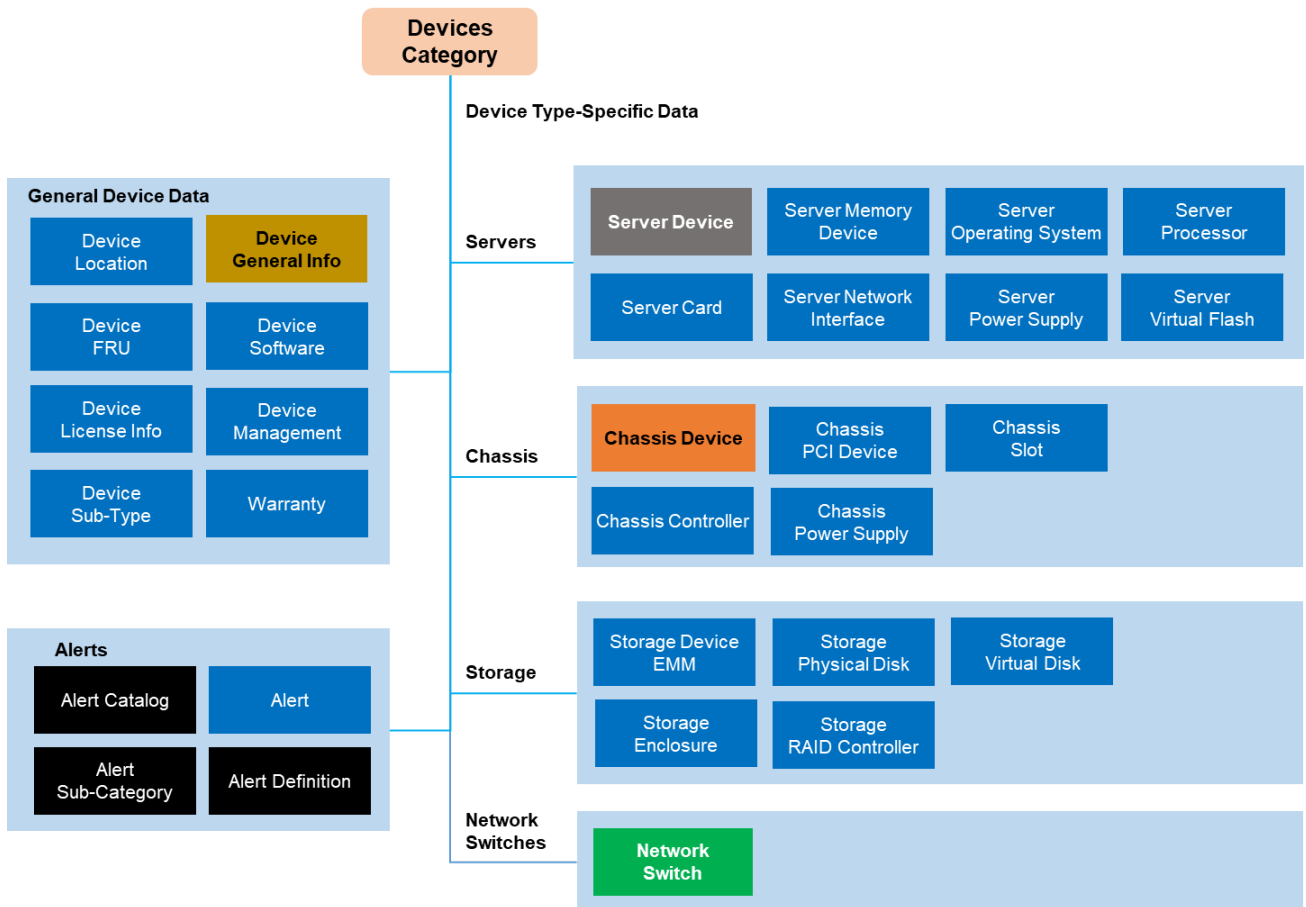

Figure 11   The top-two header tiers for the Devices category in OpenManage Enterprise

The blue boxes with white text indicate groups of fields that may have multiple occurrences per device. These headers are discussed later in Avoid multiple multiples.

3.2 Report Definition Categories

Custom Query Groups always query for devices. Therefore, the Devices category is implicitly used for all these groups. However, report definitions support several additional categories and the necessary category may be selected for each report. The header structure for these additional report categories is discussed later.

The Servers category is similar to the Devices context, except that it limits all query results to only server devices. Therefore, fewer headers are applicable. Reports that use the Servers category report only about servers, even if no server-specific fields are included in the report definition. For this category, the Storage headers are for server-specific storage only (not standalone storage devices). The Figure 11 shows headers for the Servers context:
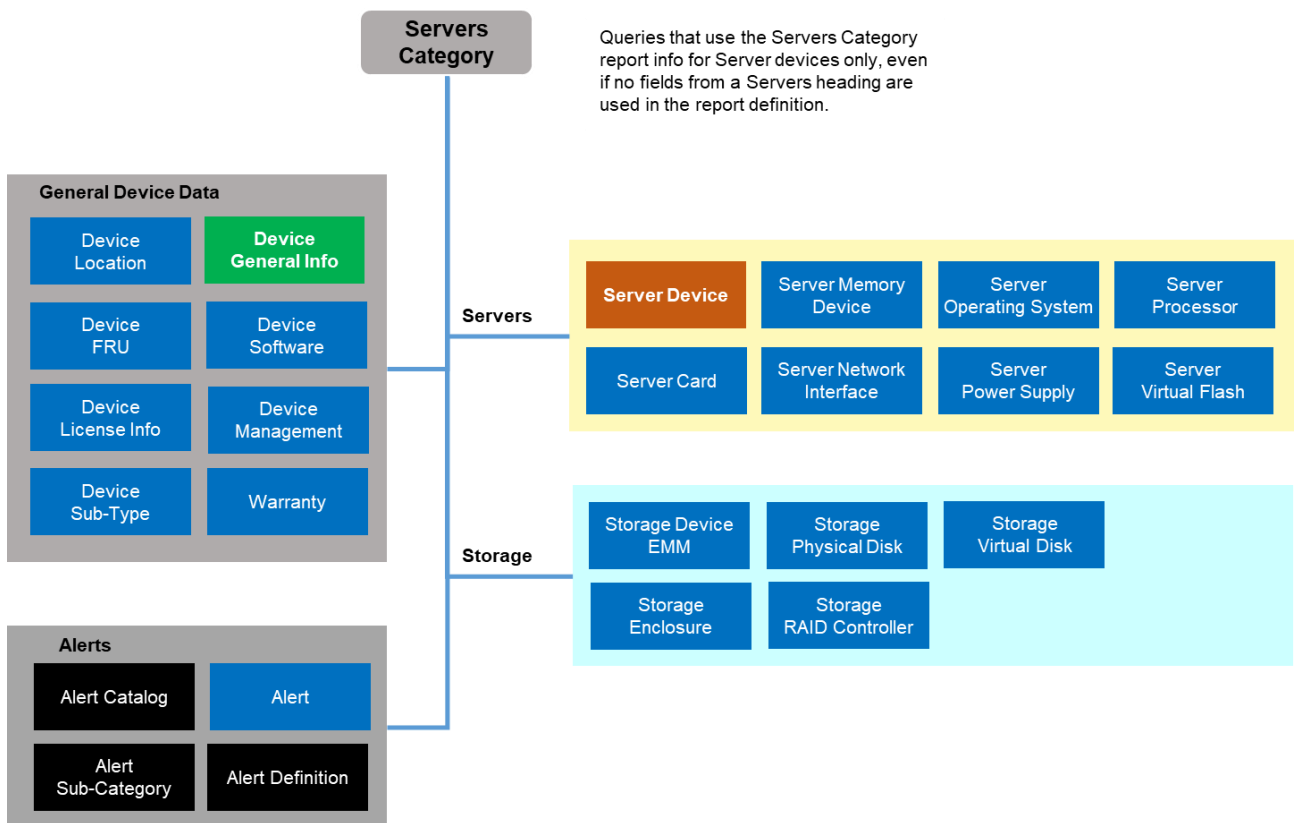

Figure 12   Server-specific headers in OpenManage Enterprise

The Jobs category may be used to build reports on jobs run by the application.
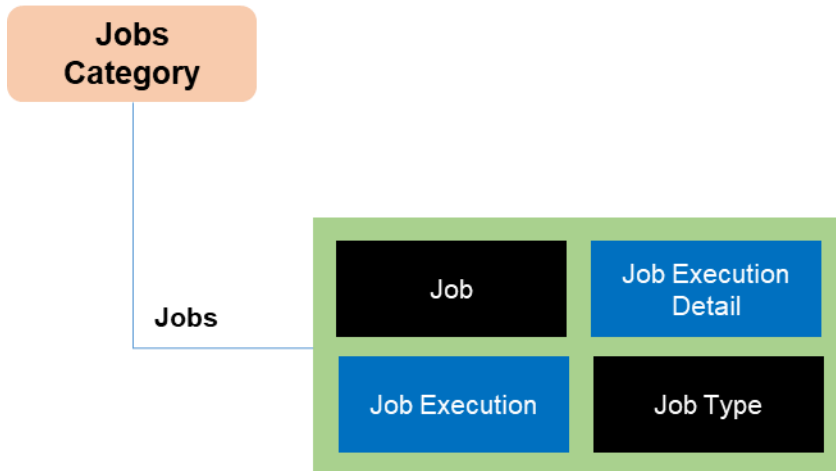

Figure 13   The Jobs category in OpenManage Enterprise

Observe that the Job Execution and Job Execution Detail boxes are in blue with white text. Each job may have multiple executions, and each execution may have multiple execution detail entries.

The Alerts category may be used to build reports about alerts received by the application. Reports that use the Alerts category report only about alerts and devices associated with alerts, even if no alert-specific fields are included in the report definition. The Figure 13 shows headers for the Alerts context:
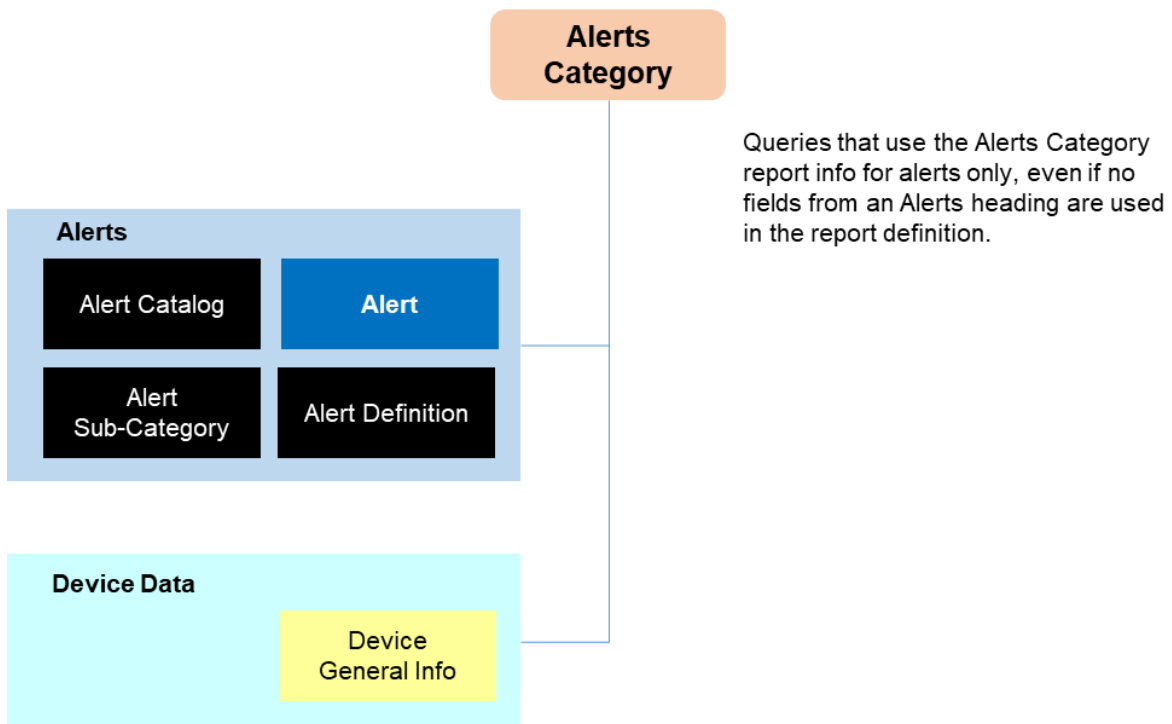

Figure 14   Headers for the Alerts category in OpenManage Enterprise

Each device may have multiple alerts associated with it.

There is also a Groups category, which has a single header—Groups. This category can be used to create reports on custom groups that are defined.

3.3 Best practices and guidelines

This section lists a few pitfalls that must be avoided when creating custom query groups and report definitions.

3.3.1 Avoid conflicting conditions

This guideline applies to both Custom Query Groups and Report Definitions. It pertains primarily to the Devices category.

The Selection Criteria page (used to set conditions for both Custom Query Groups and Report Definitions) allows any conditions to be selected, which implies that conflicting conditions could be specified.

In most cases, all conditions should specify fields for only one type of device. A query that specifies conditions about fields under headers for different device types—with an AND operator—will always result in no result rows (because each device has only one device type—no device can satisfy conditions which pertain to more than one device type). For example, if a query is for servers, all conditions must use fields under the set of headers for servers (such as Server Device, Server Card, and Server Memory Device).

The exception to this guideline is if the different conditions are OR'ed together. That way, some devices can satisfy conditions which require one device type and other devices can satisfy conditions which require a different device type.

Conditions which use fields under headers for a specific device type can always be combined with conditions which use fields under headers for general device data and alerts (since fields under those headers apply to all device types).

Watch for other conflicts too. For example, if a condition is created on the Device Type field (under the Device General Info header) for the device type to be "chassis" then any device type-specific conditions should all be from fields under headers for chassis; otherwise, the query will have no result rows.

3.3.2 Avoid multiple multiples

This guideline applies to Report Definitions only. In the preceding diagrams, headings that contain a set of fields which may occur multiple times per device are shown in blue boxes with white text. For example, a Server may have multiple "Server Card" occurrences, multiple "Server Memory Device" occurrences, multiple "Server Network Interface" occurrences, and so on. However, the set of fields under "Server Device" (which has a single-line border) occur only once per server.

Note—When creating a report definition, it is recommended to select fields from at most one heading that can have multiple occurrences (for both the Columns control and in the Filter). Else, the report may contain many more output rows than are expected. That is because the report will have an output row for each first occurrence with each second occurrence.

For example, consider a report that specifies the following two fields as output columns, each of which may have multiple occurrences per device:

1. Field "Card Description", from the "Server Card" heading.
2. Field "Memory Name", from the "Server Memory Device" heading.

If a server has 12 cards and four memory devices, the report will have 48 output rows for that device (because data from each card gets combined with data from each memory device). And, if that happened for 100 devices, the result would be 4,800 output rows.

Bottom line

- For a report definition, it is best to select fields from zero or more headings where a single occurrence is possible, along with fields from only one heading where multiple occurrences are possible. For example, it would be fine to select one or more fields from the "Device General Info" heading, and one or more fields from the "Server Device" heading, and one or more fields from the "Server Memory Device" heading (since only the "Server Memory Device" heading can have multiple occurrences per device).

The preceding discussion applies to only to report definitions. For Query Groups, the query result is just a set of Device IDs, with duplicate IDs removed.

Conclusion

Monitoring your data center is key to efficient management of IT infrastructure and business-critical operations. Such effectiveness and efficiency is enhanced when you minimize efforts required to control your devices by using Custom Groups features of OpenManage Enterprise. Viewing the status of your data center by using micro-level data is made possible by using the Reports feature—both these features are controlled by the queries that can be customized to suit your operations. This technical white paper provides in-depth information about using these features by using the OpenManage Enterprise Graphical User Interface (GUI).

More information about field definitions and procedures can be viewed by pressing the **?** symbol in the upper-right corner of the GUI element you are. You can also read the *OpenManage Enterprise User's Guide* available on the support site. Procedures to manage these features by using REST API are provided in the API documentation available on the support site.

You can also view the following videos to get more information about using the unmatched features of Dell EMC OpenManage Enterprise Graphical User Interface (GUI):

- [Dell EMC OpenManage Enterprise Systems Management Console](#) (02:02 m)
- [Dell EMC OpenManage Enterprise](#) (01:44 m)

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