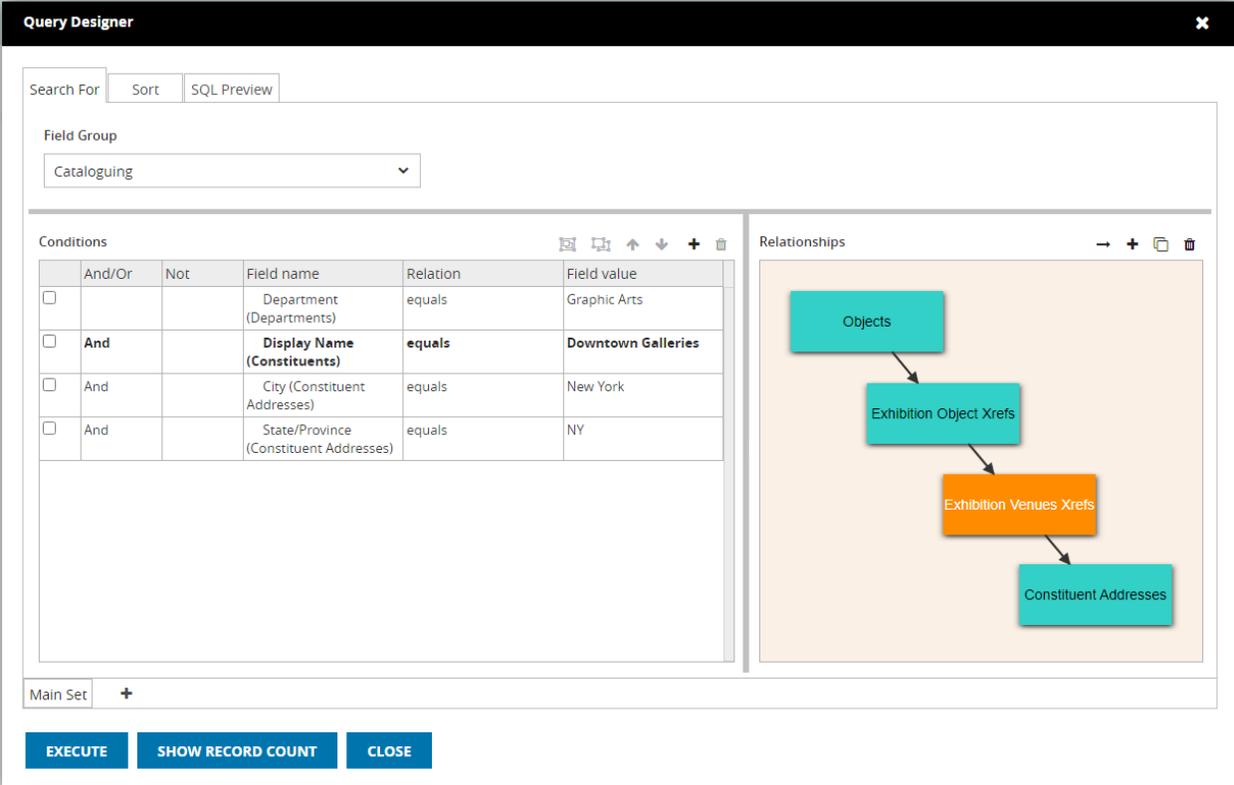# Query Designer

Overview

The main purpose of the Query Designer is to provide a way for TMS Web Apps users to define a database search query, which could be either immediately executed or saved as a named query for execution later. TMS Web Apps Query Designer is functionally like the Advanced Query feature in TMS for Windows, though it has additional functionality not present in Advanced Query and may not implement exact same set of features in the first release.

Visual Layout

Query Designer screen consists of the following areas:

1. "Search For" tab containing one or more single query designer panes, each of which contains "Field Group" combo box, "Conditions" grid and "Relationships" diagram.

2. "Sort" tab, where users can specify fields the results will be sorted on.
3. "SQL Preview" tab.
4. Action bar in the bottom containing a row of action buttons.

"Conditions" grid has these columns:

1. Row selector.
2. "And/Or" - allows either "And" or "Or" operator to be entered to combine multiple search conditions.
3. "Not" - allows to optionally specify "Not" operator to negate a specific condition or condition group.
4. "Field Name" - required for any condition - selected from a list of available searchable fields.
5. "Relation" - comparison operator, required, list of available operators is determined based on field type.
6. "Field Value" - required for all conditions except when the comparison operator is specified as "is empty".

Conditions Grid

This is where all search query conditions are maintained. When creating a new query, the conditions grid is initially empty - to add conditions the user has to press "Add" button in the toolbar positioned right above the conditions grid. Search conditions can be combined using either "And" or "Or" operator ("And" is the default). When conditions are combined, "And" operator is applied before "Or" operator unless the conditions are arranged into groups. Inside a group of conditions operators are applied using the same precedence ("And" precedes "Or") but any operators outside of a group are applied after that. Conditions can be grouped with any level of nesting (groups within groups). Besides that, any single condition or a group of conditions can be negated using optional "Not" operator.

Adding conditions

Conditions can be added from 2 sources:

1. Field Group - a query field group maintained in DBConfig.
2. Relationship diagram.

Field Groups are defined in DBConfig - only users with System Administrator privileges can create new Field Groups or add/remove fields in a group. To add a condition from a Field Group:

1. Choose a field group from Field Group combo box.
2. Press "Add" button in the Conditions grid toolbar.
3. Choose "Add From Field Group" menu item.
4. In the newly added condition row select the field to search on in the "Field Name" column.

To add a condition from the relationship diagram a specific entity on the diagram has to be selected first (by either clicking on it or tabbing to it and pressing space bar). Each entity on the Relationships diagram is represented by a rectangle - only one entity can be selected at a time (it is highlighted when selected). To add a condition from the Relationships diagram:

1. Select an entity on the Relationships diagram.
2. Press "Add" button in the Conditions grid toolbar.
3. Choose "Add From Relationships Diagram" menu item.
4. In the newly added condition row select the field to search on in the "Field Name" column.

When the condition is added from a Field Group and a specific field from that group is selected then if an entity the selected field belongs to is not shown on the Relationships diagram - that entity is added to the diagram along with any other entities through which the added entity relates to the entity, which was already present on the diagram prior to field selection.

When adding a condition from the Relationships diagram the list of fields in the drop-down list of the "Field Name" combo box is determined by the entity selected on the diagram at the time the condition is added. When adding conditions from the Field Group the list of fields in the drop-down list of the "Field Name" combo box is determined by the selected field group in the Field Group combo box, but only when selecting the field for the first time - on subsequent field selection the drop-down list is populated with all searchable fields from an entity the originally selected field belongs to.

A search condition is valid only if the field to search on, the comparison operator (relation) and the field value are specified. The only exception is when "is empty" comparison operator is chosen - in this case the field value is not required and cannot be entered (the grid cell is not editable). If a condition in

the Conditions grid is not valid (not complete) then this condition will not be used in the generated search query.

Existing conditions can be deleted from the Conditions grid. To delete a condition:

1. Select a single condition row in the Conditions grid.
2. Press "Delete" button in the Conditions grid toolbar.

Comparison operators

Here is the full list of comparison operators available across all field data types:

1. contains,
2. equals,
3. in,
4. is empty,
5. is less than,
6. is more than,
7. starts with.

Fields with text content (irrespective of the actual data type in the database) support all the above comparison operators with the exception of "in" operator, which is supported only for the fields that are marked as "QueryDistinct" in DDColumns data dictionary table.

Fields with Boolean values (marked as "YesNo" in DDColumns) support just one "equals" operator.

Numeric and date fields support "equals", "is empty", "is less than" and "is more than" operators.

Additionally, operator "in" is supported for authority-controlled fields (like Department or Object Type).

Grouping conditions

Conditions in the Conditions grid can be grouped together. To group several conditions together:

1. Select rows in the Conditions grid to be grouped together.
2. Press "Group" button in the Conditions grid toolbar.

To be grouped together the selected conditions must be either all ungrouped or to be members of the same group. Both single condition and condition group rows can be selected to be grouped together. "Group" toolbar button is enabled only when more than one row is selected.

Once conditions are grouped a new "condition group" row is added to the Conditions grid - all conditions in the newly created group are shown as immediate children of the condition group in a tree-like view. When a condition group is collapsed it is labeled with a presentation of the combination of all conditions in the group.

To ungroup grouped conditions:

1. Select condition group row in the Conditions grid.
2. Press "Ungroup" button in the Conditions grid toolbar.

Single conditions can be moved into existing group or out of the existing group by using "Move Up" and "Move Down" actions described below.

Moving (reordering) conditions

Conditions can be moved up and down in the Conditions grid. To move a condition:

1. Select either a single condition or a condition group row.
2. Press either "Move Up" or "Move Down" button in the Conditions grid toolbar.

When moving conditions up or down the moved condition will traverse the grid moving in and out of any existing condition groups - a condition can be moved inside an existing group or outside of it this way.

Relationships diagram

When creating a query from scratch the Relationships diagram is populated with only one entity - the root entity for the selected module. For example: when building a query in Objects module the Relationships diagram will have "Objects" entity already added. The root entity cannot be deleted from the Relationships diagram - it is always present.

The user can add related entities to the diagram. To add related entity:

1. Select entity on the Relationships diagram.

2. Press "Add" button in the Relationships diagram toolbar.
3. In the "Select Entity" popup select one related entity.
4. Press "Select" button - selected entity will be added to the diagram.

The "Select Entity" popup is presented as a tree - any node in the tree can be expanded, which will show any entities related to the expanded one as immediate children. The user can select any entity from the tree - if the selected entity is a descendant node in tree, then it will be added to the diagram along with its ascendants. If any entity to be added to the diagram is already present on the diagram it will not be added again.

Some related entities can be added to the diagram more than once - only entities with one-to-many relationship can be added more than once. To add an entity more than once:

1. Select an entity.
2. Press "Copy" button in the Relationships diagram toolbar - a new "aliased" entity will be added to the diagram (with the same name and a sequential number as a differentiator).

By default, related entities are linked to the "parent" entity using "Left Join" link. The user can change the link type to "Inner Join". To change link type:

1. Select a child entity.
2. Press "Left Join" / "Inner Join" button in the toolbar.
3. Choose "Left Join" or "Inner Join" menu item - the link arrow on the diagram will reflect the join type (left joins are represented by single-directional arrow, inner joins - by two-directional arrow).

User can delete entities from the diagram. To delete an entity:

1. Select an entity on the diagram.
2. Press "Delete" button in the toolbar.

If a parent entity is deleted all the child entities are deleted too. The root entity cannot be deleted. If the Conditions grid contains any fields from the entities to be deleted a confirmation message is shown. If the user confirms deletion, then the conditions for fields from deleted entities will be deleted from the Conditions grid too.

Combining multiple queries

Query Designer allows to design a complex query as a combination of multiple queries. Besides the main query, the user can define additional queries combined with the main one using the following set operations:

1. Union
2. Except
3. Intersect

When a query is added using "union" operation its results are added to the results from the main query. An "except" query results will be subtracted from the main query results. When using "intersect" operation only the records, which present in both query results are included in the final result set.

Currently there is no limit on how many queries can be combined with the main query - the set operators are applied in the order the queries are added.

To add a query to the main query:

1. Press a "+" button next to "Main Set" tab in the bottom tab strip.
2. Select "Union", "Except" or "Intersect" from the menu - a new query panel will be added with the tab labeled using the chosen set operator ("Union", "Except" or "Intersect").
3. Design the added query on the new tab.
4. Use tabs in the bottom tab strip to switch between queries.

To delete added queries press "x" button on the query panel tab. The main query cannot be deleted.

Previewing generated SQL statement

To preview the SQL statement, which is generated on the back end based on the provided query definition press "SQL Preview" tab in the top tab strip.

Checking query results record count

To check number of records returned by running the query press "Show Record Count" button.