Data Transformation Guide

Axiom Enterprise Decision Support

Version 2022.1

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Contents

Transform data for reporting

You can manipulate data in the Axiom database for reporting purposes by using data transformation definitions. These definitions let you define how, when, and where to change values in the database using different calculation types with no SQL knowledge necessary. The results of calculations can then be stored in certain Axiom standard and custom fields. For example, you could create a definition that increases Medicare payments by 5%, and stores the results in a new encounter table field.

Examples of types of definitions that you can create include:

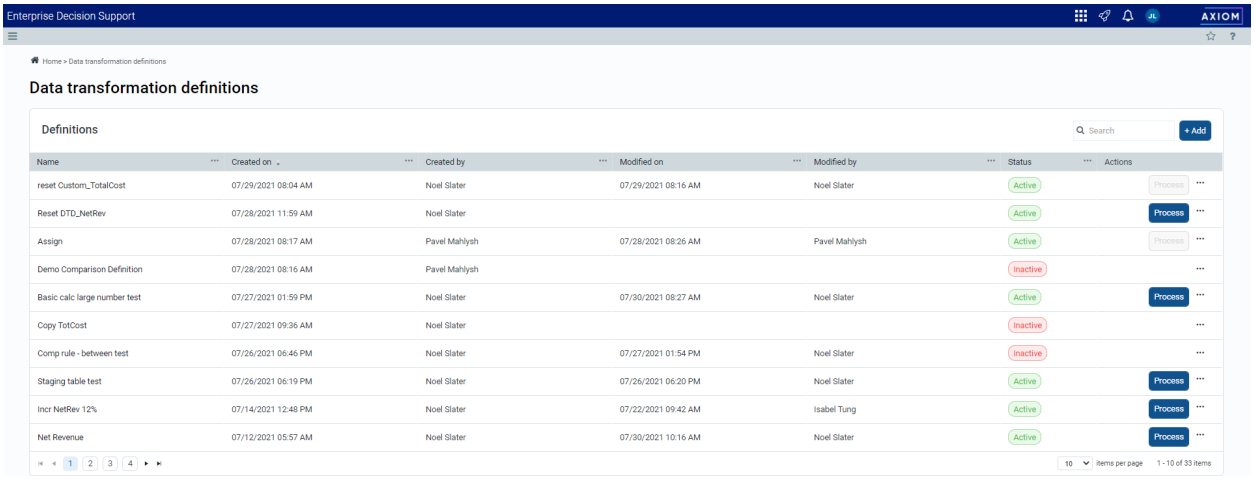
- Perform calculations on encounter data elements and store the results in Axiom fields.
- Assign a date, numeric, or text constant to a field.
- Identify outliers.
- Perform If-Then-Else comparisons.
- Create basic formulas using constants, and standard and custom fields for inputs

NOTE: Only users assigned the Axiom EDS Rules Writer role profile can access this feature.

About definitions

A data transformation definition includes calculations that Axiom applies to tables in the database.

The **Data transformation definitions** page displays a table with all definitions. From this page, you can add, edit, copy, or delete definitions, as well as process them. To search for a definition, you can use the search box in the upper right corner of the page. To filter the results in the table, select the ellipsis (**...**) in any of the available headings. To add a definition or folder, select **+ Add** in the upper right corner of the page.



From the **Actions** column, select the ellipsis (**...**) to edit, copy, or delete a definition. You can also process a definition, but definitions must first be active.

Work with data transformation definitions

A data transformation definition is a mathematical formula that describes the data you want to use, how you want to use it, and where you want to store a result. When you create a definition, you choose a type, and Axiom prompts you to "fill in the blanks" by selecting:

- Calculation variables
- The table column fields to use in the calculation
- An operator
- A constant, if applicable
- Result variable
- The table column field in which to store the result

The following table lists the available definition types:

Type	Description
Assign Constant	Stores a numeric, text, flag (Boolean), or date constant in an Axiom field. For example, you can store a benchmark or best practices length of stay for hip replacement surgery in an encounter custom field.
Basic Calculation	Calculates and stores a value from Axiom numeric fields and constants. You may combine and group the fields and constants to form an expression using addition, subtraction, multiplication, and division operators.
Concatenate	Joins Axiom fields and constants. You can use the constant as a delimiter.
Comparison	Creates If-Then-Else formulas that compare Axiom fields to each other or to constants, and stores a value based on whether the comparison is true or false.
Copy Field	Copies the value of one field to another field.

NOTE: A definitions inputs and results must be fields from within the same table.

Understand inputs and results

Inputs

If there is a custom column in the table, you can use data from the following dimension tables in the Table Library>!Dimensions folder:

- ACCT
- CALDATE
- CDMCODE
- CPT
- DEPT
- ENTITY
- FINCLASS
- JOBCODE
- LOCATION
- PAYOR
- PAYTYPE

Results

You can store results in standard and custom columns in tables in the EDS folder, except columns in custom tables.

You cannot store results in the following column types:

- Keys
- Pointers to key column on other tables
- Data that results from cost model processing (tables under CostModel and CostResults)
- CM$ tables
- Encounter total cost columns
- Columns, even custom, on any table in any folder other than EDS or dimensions

Important notes about transforming data

Consider the following when using and processing definitions:

- All the fields (inputs and results) in a single definition must be from the same table. Axiom will not let you select a field from a different table.
- You must manage the processing order. If the results of one definition feed into the inputs of another definition, you must ensure the first definition completes successfully before processing the second one.
- When creating a custom column on a table to store results, we recommend that you:
    - Create only text, numeric, date, or flag (Boolean) types. The system will not stop you from creating an Integer or an Integer32 column, but numeric is our recommendation.
    - Do not set a default value on a custom column.

Add, edit, or copy a data transformation definition

When adding or editing a definition name, note the following:

- Can include up to 80 characters.
- Are case-sensitive.
- Must have a unique name.

IMPORTANT: All the fields (inputs and results) in a single definition must be from the same table. Axiom will not let you select a field from a different table.

To add, edit, or copy a data transformation definition

1. From the Enterprise Decision Support home page, in the **Data enhancement and refinement** drop-down, select **Define data transformations**.

   NOTE: Only users assigned the Axiom EDS Rules Writer role profile can see and access this feature.

2. Do one of the following:

   - To add a definition, select **+ Add**.
   - To edit or copy a definition, in the **Actions** column, select the ellipsis (**...**), and from the drop-down, select **Edit** or **Copy**.

3. At the top of the page, enter a name for the definition.

   NOTE: Although the forward slash is accepted, you should avoid it.

4. On the **Step 1 Select data definition type** page, complete the following fields:

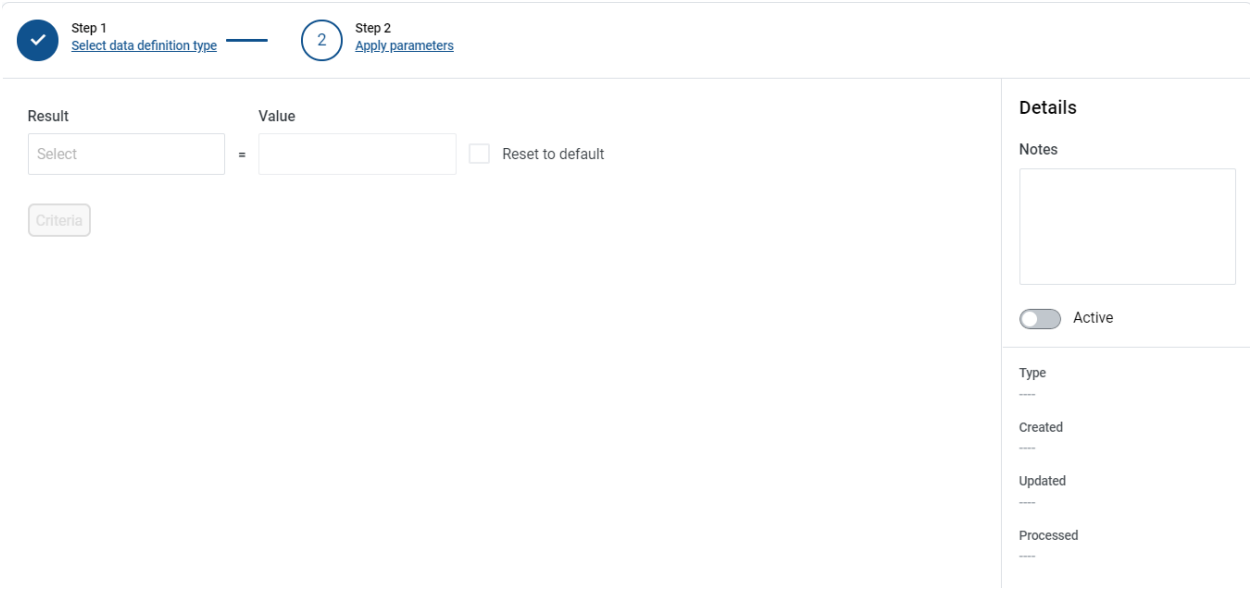
Field	Description
Type	Select one of the following data definition types: • **Assign Constant** - Stores a numeric, text, flag (Boolean), or date constant in an Axiom field. For example, you can store a benchmark or best practices length of stay for hip replacement surgery in an encounter custom field. • **Basic Calculation** - Calculates and stores a value from Axiom numeric fields and constants. You may combine and group the fields and constants to form an expression using addition, subtraction, multiplication, and division operators. • **Concatenate** - Joins Axiom fields and constants. You can use the constant as a delimiter. • **Comparison** - Creates If-Then-Else formulas that compare Axiom fields to each other or to constants, and stores a value based on whether the comparison is true or false. • **Copy Field** - Copies the value of one field to another.

5. Select **Next**, or select **Step 2 Apply parameters**. The fields to complete in this section are determined by the definition type you selected in Step 1. To complete the definition setup, select the following type:

   NOTE: A definition's inputs and results must be fields from within the same table.

   - Assign Constant
   - Basic Calculation
   - Concatenate
   - Comparison
   - Copy Field

Assign Constant



6. Select **Result field**.
7. In the **Select field** dialog box, do the following:
    a. From the **Table** drop-down, select the table in which to add, edit, or clear a value.

    > **NOTE:** The dialog box only shows those tables and fields that you are allowed to update.

    b. Select a column name from those shown. You can find a desired column by doing one of the following:
        - In the search box, enter the part or all of the column name. Axiom shows columns that include the name.
        - To display a tree structure of all the columns, select the arrow next to the table name.

        > **NOTE:** Be aware of the maximum character limit of this column. Data going into the result field will be truncated if it exceeds that limit.

    c. Select **Apply**.
8. Do one of the following:
    - **Enter a value** - The value you enter in the **Value** field is determined by the table and field you select in the **Table** drop-down. For example, if the field is a date field (such as Encounter table>DischargeDate), then a date picker will appear.

Value type	Description
Numeric	Enter a positive or negative number with up to four decimal places.
Date/time	Select a date and time.
Text	Enter a value. **NOTE:** If the value is large than the field, Axiom truncates the text.
Boolean	Select **True** or **False**.

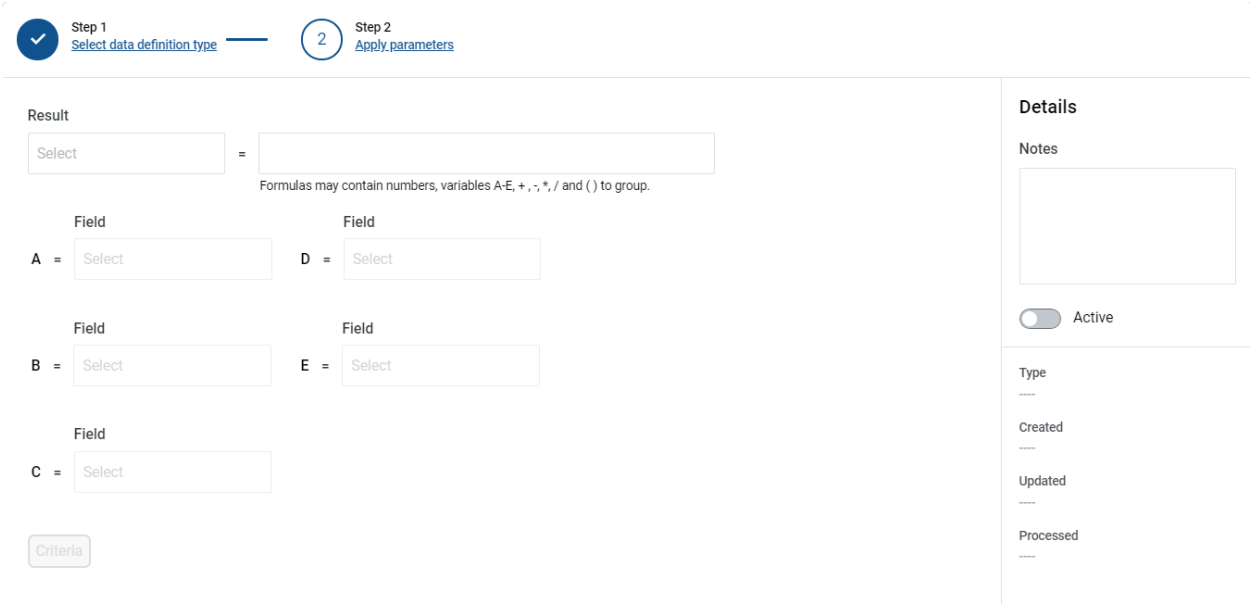
- **Reset or clear the value** - Some fields in the database store default values. For these types of fields, you can replace the current value with the default value by selecting the **Reset to default** check box. If the Axiom field does not have a default value, then this option inserts a blank (null) value.

9. To identify the records in the database in which to apply the value, select **Criteria**. The Filter Wizard appears, letting you define specific attribute to define the record(s) to update. For example, to apply a specific discharge date, you may not want to apply that change to every encounter. You can use the Filter Wizard to define what condition in which to add or edit the value, such as based on procedure code, diagnosis code, or any other attribute tied to the encounter. For instructions, see Using the Filter Wizard.
10. In the **Details** section on the right side of the page, complete the following:
    - **Notes**- (Optional) Enter your own description to help you identify the definition.
    - **Active** - Select the toggle to activate or deactivate the definition. Only active definitions can be processed.

      NOTE: If the rule is selected as active, then Axiom automatically reviews the definition for any missing information or criteria, which are indicated with error messages. After resolving these issues and saving, the definition can be processed.
11. Select **Save**.
12. To process the definition now, select **Process**. Follow the instructions in Process a data transformation definition.

    NOTE: You can process the definition later from the **Data transformation definitions** page.

Basic Calculation



6. Select **Result field**.
7. In the **Select field** dialog box, do the following:
    a. From the **Table** drop-down, select the table in which to store the value.

    > **NOTE:** The dialog box only shows those tables and fields that you are allowed to update. Only numeric fields are allowed for this definition type.

    b. Select a column name from those shown. You can find a desired column by doing one of the following:
        - In the search box, enter the part or all of the column name. Axiom displays columns that include the name.
        - Select the arrow next to the table name to display a tree structure of all the columns.

        > **NOTE:** Be aware of the maximum character limit of this column. Data going into the result field will be truncated if it exceeds that limit.

    c. Select **Apply**.
8. In the formula box, enter a formula by using numbers, using the variables identified as A-E, or a combination of the two. Valid operators are:

Operator	Description
( )	Use for grouping definition For example, A+(B*(C-D))
+	Addition
-	Subtraction
*	Multiplication
/	Division

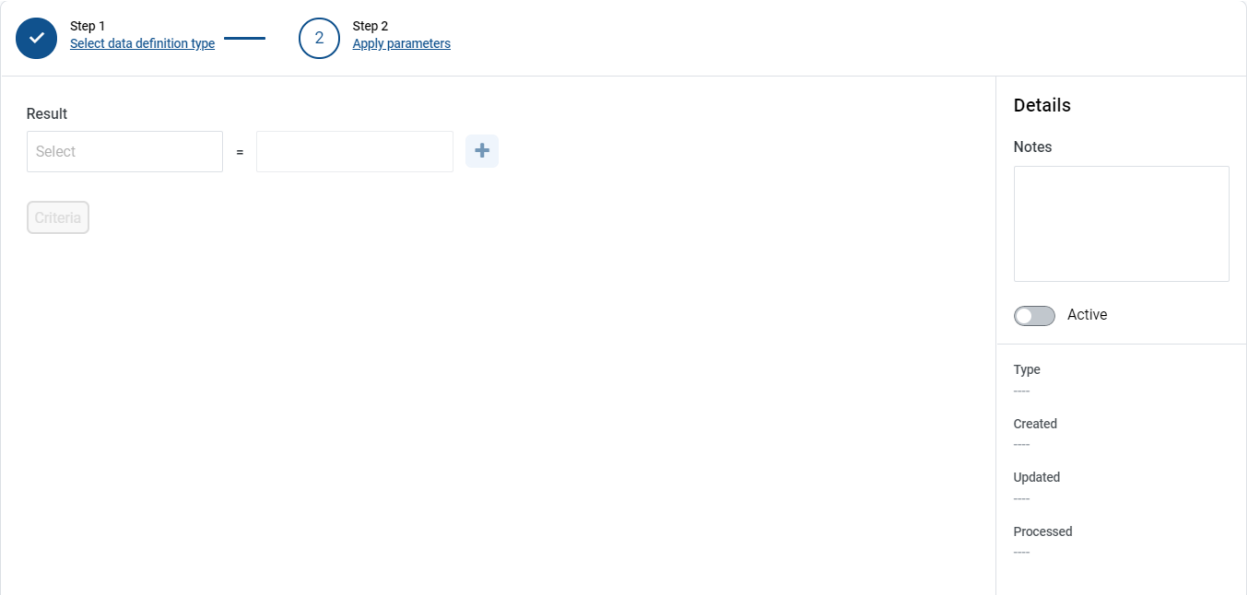
9. In **Fields A-E**, select the fields to select the values to use in the formula. In the **Select field** dialog box, do the following:
    a. From the **Table** drop-down, select the table in which to store the calculated value.

    > **NOTE:** The dialog box only shows those tables that you are allowed to update. You are not updating these fields, but simply using them as the inputs. Axiom shows numeric fields only.

    b. To select a column name, do one of the following:
        - In the search box, enter the part or all of the column name. Axiom shows columns that include the name.
        - Select the arrow next to the table name to display a tree structure of all the columns.
    c. Select **Apply**.
10. To identify the records in the database in which to apply the value, select **Criteria**. The Filter Wizard appears letting you define specific attribute to define the record(s) to update. For example, to apply a specific discharge date, you may not want to apply that change to every encounter. You can use the Filter Wizard to define what condition in which to add or edit the value, such as based on procedure code, diagnosis code, or any other attribute tied to the encounter. For instructions, see Using the Filter Wizard.
11. In the **Details** section on the right side of the page, complete the following:
    - **Notes**- (Optional) Enter your own description to help you identify the definition.
    - **Active** - Select the toggle to activate or deactivate the definition. Only active definitions can be processed.
12. Select **Save**.
13. To process the definition now, select **Process**. Follow the instructions in Process a data transformation definition.

NOTE: You can process the definition later from the **Data transformation definitions** page.

Concatenate



6. Select **Result field**.
7. In the **Select field** dialog box, do the following:
    a. From the **Table** drop-down, select the table in which to store the value.

    NOTE: The dialog box only shows those tables/fields that you are allowed to update. Only text fields are allowed for this definition type.

    b. Select a column name from those shown. You can find a desired column by doing one of the following:

    - In the search box, enter the part or all of the column name. Axiom will display columns that include the name.
    - Select the arrow next to the table name to display a tree structure of all the columns.

    NOTE: Be aware of the maximum character limit of this column. Data going into the result field will be truncated if it exceeds that limit.

    c. Select **Apply**.
8. Select +, and select one of the following from the drop-down:

- **Add constant** - Enter a constant value of up to 25 characters, including spaces.
- **Add field** - Select a field from the database by selecting the table where it resides.

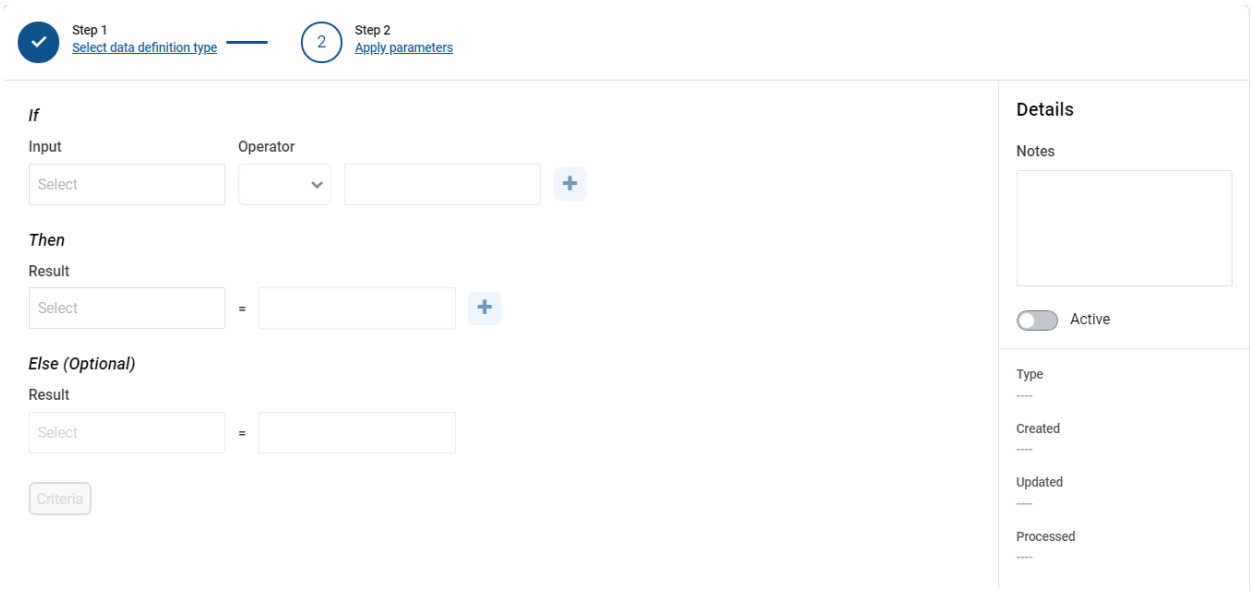
9. As needed, continue to add constants and/or fields by selecting +.

   TIP: To remove a constant/fields, select the trash can icon.

10. To identify the records in the database in which to apply the value, select **Criteria**. The Filter Wizard appears letting you define specific attribute to define the record(s) to update. For example, to apply a specific discharge date, you may not want to apply that change to every encounter. You can use the Filter Wizard to define what condition in which to add or edit the value, such as based on procedure code, diagnosis code, or any other attribute tied to the encounter. For instructions, see Using the Filter Wizard.
11. In the **Details** section on the right side of the page, complete the following:
    - **Notes**- (Optional) Enter your own description to help you identify the definition.
    - **Active** - Select the toggle to activate or deactivate the definition. Only active definitions can be processed.
12. Select **Save**.
13. To process the definition now, select **Process**. Follow the instructions in Process a data transformation definition.

    NOTE: You can process the definition later from the **Data transformation definitions** page.

Comparison



6. In the **If** section, complete the following:

Field	Description
Input	In the **Select field** dialog box, do the following: a. From the **Table** drop-down, select the table in which to store the value. **NOTE:** The dialog box only shows those tables that you are allowed to update. b. Select a column name by doing one of the following: • In the search box, enter the part or all of the column name. Axiom displays columns that include the name. • To display a tree structure of all the columns, select the arrow next to the table name. c. Select **Apply**.
Operator	Select one of the following: > Greater than >= Greater than or equal to < Less than <= Less than or equal to = Equal to <> Not equal to Between Only number or date values are available for comparison. Like Only text values are available for comparison. **TIP:** You can use % and _ (underscore) to represent any string of characters or any single character. For example, %Aspirin will find Baby Aspirin, Buffered Aspirin, etc.
Numeric constant	Enter a numeric, date, or text value, depending on the input field type you selected.

7. Add more If statements, as needed, by selecting +.

NOTE: Select + first to choose if you are using a value from an existing field or entering a constant.

TIP: To remove a constant/fields, select the trash can icon .

8. In the **Then** section, complete the following:

Field	Description
Result	Select the table and column in which to store the value if the comparison is true. **NOTE:** Be aware of the maximum character limit of this column. Data going into the result field will be truncated if it exceeds that limit.
Text constant	Enter the text value to add or edit to the field.

9. Add more Then statements, as needed, by selecting .

NOTE: Select first to select if you are using a value from an existing field or entering a constant.

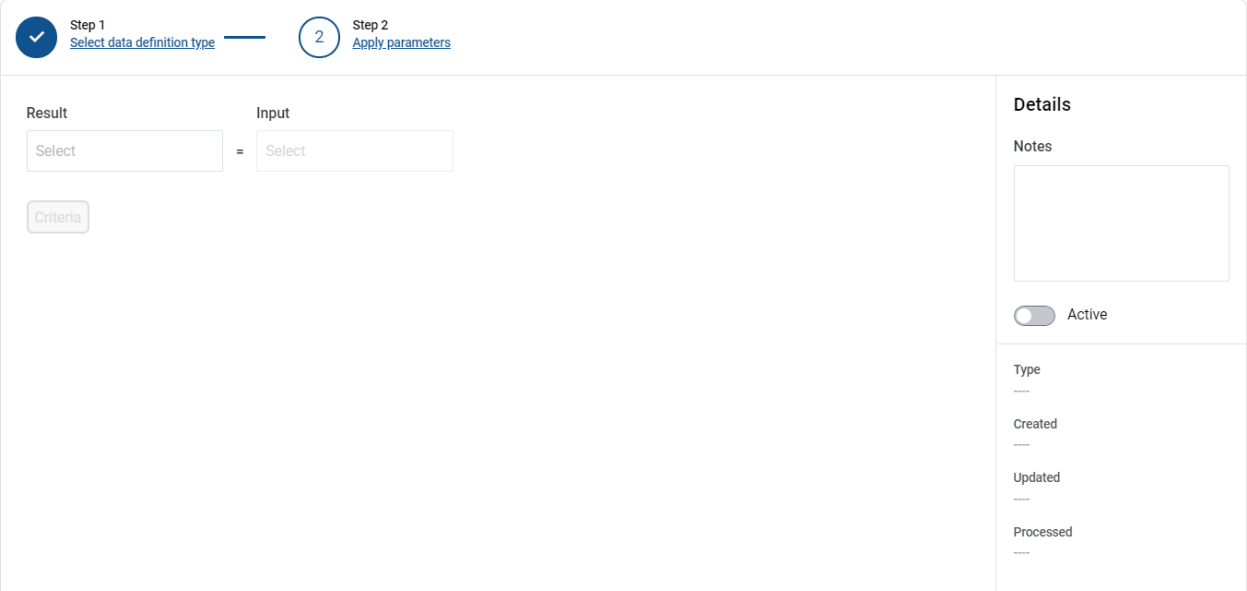
10. In the **Else (Optional)** section, in the **Text constant** field, enter the text value to add or edit to the field.

NOTE: You cannot change the **Result field** here. Whatever result field you selected in the Then section is used here.

11. To identify the records in the database in which to apply the value, select **Criteria**. The Filter Wizard dialog box appears letting you define specific attribute to define the record(s) to update. For example, to apply a specific discharge date, you may not want to apply that change to every encounter. You can use the Filter Wizard to define what condition in which to add or edit the value, such as based on procedure code, diagnosis code, or any other attribute tied to the encounter. For instructions, see Using the Filter Wizard.
12. In the **Details** section on the right side of the page, complete the following:
    - **Notes**- (Optional) Enter your own description to help you identify the definition.
    - **Active** - Select the toggle to activate or deactivate the definition. Only active definitions can be processed.
13. Select **Save**.
14. To process the definition, select **Process**. Follow the instructions in Process a data transformation definition.

NOTE: You can process the definition later from the **Data transformation definitions** page.

Copy Field



6. Select **Result field**.
7. In the **Select field** dialog box, do the following:
    a. From the **Table** drop-down, select the table in which to copy the value.

    > **NOTE:** The dialog box only shows those tables/fields that you are allowed to update.

    b. Select a column name from those shown. You can find a desired column by doing one of the following:
        - In the search box, enter the part or all of the column name. Axiom shows columns that include the name.
        - To display a tree structure of all the columns, select the arrow next to the table name.

        > **NOTE:** Be aware of the maximum character limit of this column. Data going into the result field will be truncated if it exceeds that limit.

    c. Select **Apply**.
8. Select **Input field**, and in the **Select field** dialog box, select the table and column to copy the value.

9. To identify the records in the database in which to apply the value, select **Criteria**. The Filter Wizard appears letting you define specific attribute to define the record(s) to update. For example, to apply a specific discharge date, you may not want to apply that change to every encounter. You can use the Filter Wizard to define what condition in which to add or edit the value, such as based on procedure code, diagnosis code, or any other attribute tied to the encounter. For instructions, see Using the Filter Wizard.
10. In the **Details** section on the right side of the page, complete the following:
    - **Notes-** (Optional) Enter your own description to help you identify the definition.
    - **Active** - Select the toggle to activate or deactivate the definition. Only active definitions can be processed.
11. Seelct **Save**.
12. To process the definition, select **Process**. Follow the instructions in Process a data transformation definition.

    NOTE: You can process the definition later from the **Data transformation definitions** page.

Activate or deactivate a data transformation definition

Only activated rules can be processed.

To activate or deactivate a data transformation definition

1. From the Enterprise Decision Support home page, in the **Data enhancement and refinement** drop-down, select **Define data transformations**.
2. In the **Actions** column, select the ellipsis (**...**), and select **Edit**.
3. In the **Details** section on the right side of the page, select the **Active** toggle.
4. Select **Save**.
5. To process the definition now, select **Process**.

   NOTE: You can process the definition later from the **Data transformation definitions** page.

Delete a data transformation definition

Deleting a definition does not delete data obtained as a result of processing the definition, nor does it change the data back to its original value.

To delete a data transformation definition

1. From the Enterprise Decision Support home page, in the **Data enhancement and refinement** drop-down, select **Define data transformations**.
2. In the **Actions** column of the definition to delete, select the ellipsis (**...**), and then select **Delete**.
3. At the **Delete?** prompt, select **Delete**.

Process a data transformation definition

Processing a data transformation definition updates the database with the value changes you defined in the definition calculations. Only active rules can be processed.

IMPORTANT: While five different definitions can be processed together, Axiom determines the order in which they are processed. This may not be the same order in which they were selected. We recommend that if you need to process definitions in a specific order (such as the results of one definition are used as an input in a subsequent definition), you must ensure that the first definition completes before the next one is processed.

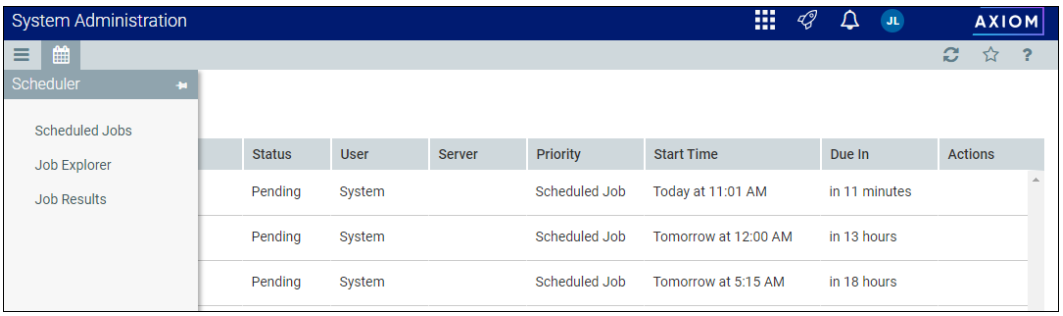
To process a data transformation definition

1. From the Enterprise Decision Support home page, in the **Data enhancement and refinement** drop-down, select **Define data transformations**.
2. In the **Actions** column for the definition to process, select **Process**.
3. If the definition uses the encounter table, the a **Process** dialog box appears. Complete the following, and then select **Process**:

Field	Description
Name	Displays the name of the definition, which cannot be edited from this dialog box.
Entity	Select one or more entities in which to process the definition.
From/To	To limit processing encounter data to a specific time frame, select a from and to date.
Admit date/Discharge date	Select whether to process encounters by admit or discharge date.

4. To view the process status of definitions, do the following:
   a. Select the Area menu in the Global navigation bar, and then select **System Administration**.
   b. Select the menu icon on the left side of the task bar , and then select **Scheduler**.
   c. From the navigation pane, select **Tools>Scheduler**.
   d. To display the Scheduler pane, select the calendar icon , and then select **Job Results**. To refresh the list, select the Refresh icon in the task bar.

TIP: To keep the Scheduler pane open while you are working on the page, select the thump tack icon .



Using the Filter Wizard

You can use or create your own filters to customize the data to view. The Filter Wizard walks you through the process of building complex limit query filters, rather than having to construct them manually. You can create and save new filters for future use as well as use and edit existing filters.

Using an existing filter

To use an existing filter

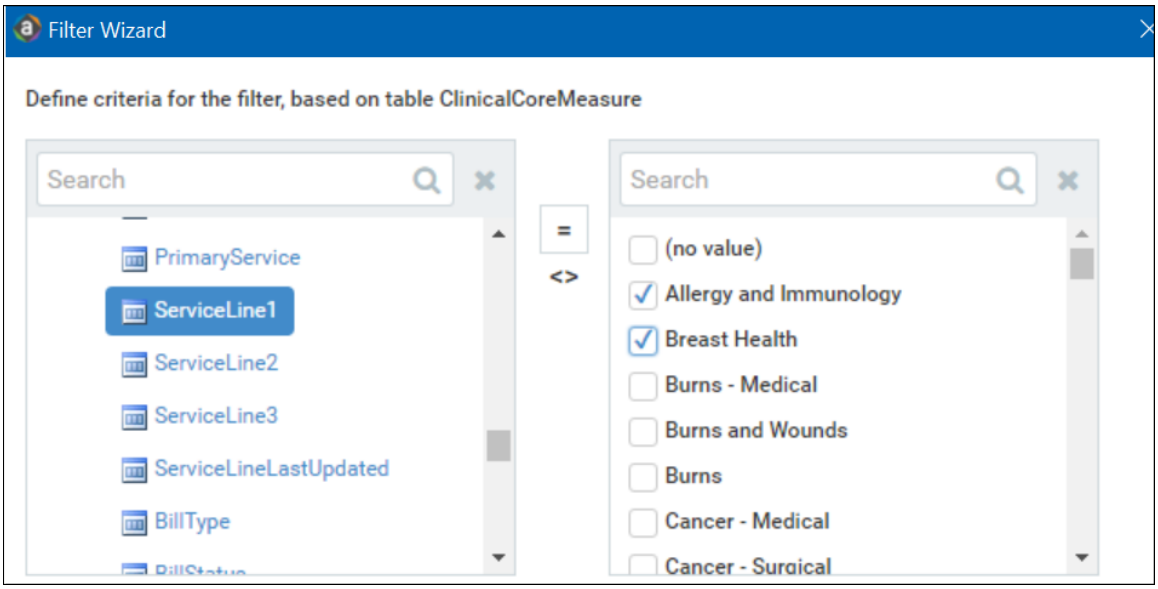
1. Next to the **Preview** field, select the folder icon.

2. In the **Filter Library** dialog, select the filter to use, and select **OK**.
3. In the **Filter Wizard** dialog, select **Apply**.
4. Click **OK**.

Creating a filter

TIP: You can create a new filter from an existing filter by selecting it from the folder icon in the **Preview** field, and then follow these steps to make the appropriate changes. Make sure to give the filter a new name so that you do not overwrite the existing filter.

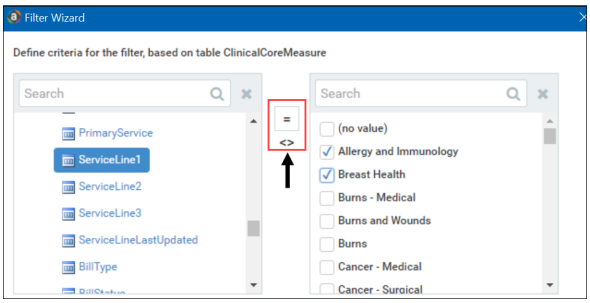
1. On the left side of the dialog, select the table column on which you want to base the filter. After you select a table column, the values in that column appear in the right side of the dialog.



2. In the right side of the dialog, enter or select the value on which to base the filter. You can enter

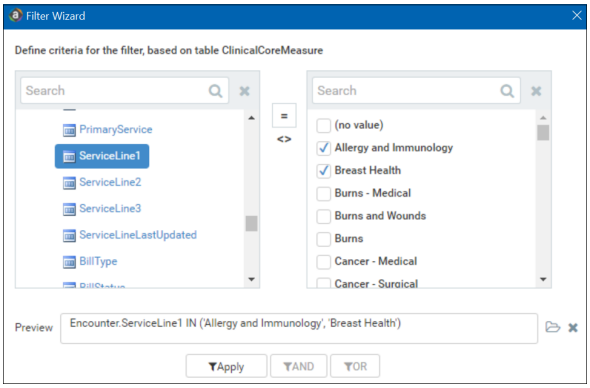
information in the field above the list of values to filter the list or to specify a value. If one or more values are selected, then those items are used in the filter. Otherwise, whatever you enter into the field is used by the filter.

3. In the space between the two selection boxes, select the operator to use for the filter criteria statement, such as equals, not equals, greater than, or less than.



4. Review the filter criteria statement in the **Preview** box to ensure that it is as intended. If you need to make changes, edit your selections made above.

NOTE: For instructions about writing filter syntax, see Filter criteria syntax.



5. Do one of the following:
   - If the filter criteria statement is finished, select **OK**. The Filter Wizard uses the statement in the Preview box (you do not have to select **Apply** in this case).
   - To create a compound filter, select **Apply** to move the current criteria statement into the **Filter** box. To create another criteria statement, repeat steps a-d. When the next statement is complete, to join it to the prior statement, select **AND** or **OR**.
6. In the **File name** field, enter a name for the filter.
7. In the **Description** field, enter a description of what the filter does.
8. Select **Save**.
9. In the Filter Wizard dialog, select **OK**.

Filter criteria syntax

Several areas of Axiom Enterprise Decision Support use criteria statements to define a set of data. The syntax for these criteria statement is as follows:

```
Table.Column='Value'
```

- *Table* is the name of the database table.
- *Column* is the name of the column in the database table.
- *Value* is the value in the column.

If the column is String, Date, or DateTime, the value must be placed in single quotation marks as shown above. If the column is Numeric, Integer (all types), Identity, or Boolean, then the quotation marks are omitted.

For example:

- To filter data by regions, the filter criteria statement might be: `DEPT.Region='North'`. This would limit data to only those departments that are assigned to region North in the Region column.
- To filter data by a single department, the filter criteria statement might be: `DEPT.Dept=100`. This would limit data to only department 100.

If the table portion of the syntax is omitted, then the table is assumed based on the current context. For example, if the filter is used in an Axiom query, then the primary table for the Axiom query is assumed. If the current context supports *column-only syntax*, and the specified column is a validated key column, then the lookup table is assumed.

Operators

The criteria statement operator can be one of the following: =, >,<,<>,<=,>=. Greater than or less than statements can only be used with numeric values. For example:

```
ACCT.Acct>1000
```

SQL IN and LIKE syntax can also be used. For example:

```
DEPT.Region IN ('North','South')
```

Compound criteria statements

You can use `AND` and `OR` to combine multiple criteria statements. If you are creating long compound criteria statements with multiple ANDs or ORs, you can use parentheses to group statements and eliminate ambiguity. For example:

```
(DEPT.Region='North' OR DEPT.Region='South') AND (ACCT.Acct=100 OR
ACCT.Acct=200)
```

NOTES:

- When filtering on multiple values in the same column, you must use OR to join the statements, not AND. In the example above, if the statement was instead `DEPT.Region='North' AND DEPT.Region='South'`, that statement would return no data because no single department belongs to both the North and South regions. When you use OR, the statement will return departments that belong to either the North or the South regions.
- Alternatively, you can use the SQL IN syntax to create a compound statement for values in the same column. For example, the statement `DEPT.Region='North' OR DEPT.Region='South'` can also be written as `DEPT.Region IN ('North','South')`. The Filter Wizard uses IN syntax by default.

Using criteria statements in functions

If you are using a criteria statement in a function, such as GetData, you must place the entire criteria statement in double quotation marks. For example:

```
=GetData("Bud1","DEPT.Region='North'","GL1")
```

You can also place the criteria statement in a cell and then use a cell reference in the function. In this case, you do not need to use double quotation marks in the function, unless you are concatenating text and cell reference contents within the function.

Referencing blank values in filters

If a string column contains a blank value, you may want to create a filter that includes or excludes records with these blank values. For SQL Server, the blank value is stored as an empty string. This empty string is indicated with empty quotation marks in the filter. For example: `ACCT.CMAssign=''` or `ACCT.CMAssign<>''`

If you use the Filter Wizard to construct the filter, it will automatically use the appropriate syntax.

Referencing values with apostrophes in filters

If a string column contains a value with an apostrophe (such as O'Connor), then that apostrophe must be escaped with another apostrophe so that it is not read as the closing apostrophe for the filter criteria statement. For example:

`Dept.VP='O'Connor'`

Invalid. This construction does not work because Axiom Enterprise Decision Support reads it as Dept.VP='O' and then does not know what to do with the rest of the text.

`Dept.VP='O''Connor'`

Valid. The extra apostrophe tells Axiom Enterprise Decision Support that the apostrophe is part of the string value and is not the closing apostrophe.

NOTE: This syntax must use two apostrophe characters in sequence and *not* a double quotation mark. If you create the filter using the Filter Wizard, Axiom Enterprise Decision Support will construct the appropriate syntax for you.

Referencing Date or DateTime values in filters

If your locale uses a date format where the first value is the day, filters using that date or date-time value will not process correctly. Instead, the date or date-time value must be in standard format. Standard format is `YYYY-MM-DDTHH:MM:SS` for DateTime and `YYYY-MM-DD` for Date.

If you use the Filter Wizard to construct the filter, it will automatically convert the date or date-time value to the appropriate syntax.