SAS® Information Map Studio 3.1: Tips and Techniques

The Power to Know®

The correct bibliographic citation for this manual is as follows: SAS Institute Inc. 2006. *SAS® Information Map Studio 3.1: Tips and Techniques*. Cary, NC: SAS Institute Inc.

SAS® Information Map Studio 3.1: Tips and Techniques

ISBN-13: 978-1-59994-004-5
ISBN-10: 1-59994-004-3

SAS Institute Inc., SAS Campus Drive, Cary, North Carolina 27513.

1st printing, March 2006

SAS Publishing provides a complete selection of books and electronic products to help customers use SAS software to its fullest potential. For more information about our e-books, e-learning products, CDs, and hard-copy books, visit the SAS Publishing Web site at **support.sas.com/pubs** or call 1-800-727-3228.

Contents

CHAPTER
1

About This Book

How to Use This Book

This book documents tips and best practices for using SAS Information Map Studio 3.1. Each tip begins with a summary of the tip and then provides either background information about the tip or a detailed description of the technique for implementing the tip.

Intended Audience

This book assumes that the reader has a working understanding of SAS Information Map Studio and SAS Information Maps. It is also useful for the reader to have some knowledge of related SAS business intelligence products such as SAS Management Console and SAS Data Integration Studio.

Online Help

This book is a companion to the online Help for SAS Information Map Studio. The Help describes all of the windows and dialog boxes in SAS Information Map Studio, and it describes the main tasks that you can perform with the software.

Use any of the following methods to get Help for SAS Information Map Studio:

- From the menu bar, select **Help ► SAS Information Map Studio**.
- Click **`Help`** (when available) in the application windows and dialog boxes.
- Press F1 in most application windows and dialog boxes.

CHAPTER 2

Tips for Setting Up Your Environment

Make User-Defined Formats Available

Tip

You have two options for making user-defined formats available to SAS Information Map Studio. One option is to place a specifically named format catalog in the directory that is assigned to the LIBRARY libref. The other option is to specify the format catalog in the FMTSEARCH system option in your SAS configuration file.

Technique

Use the LIBRARY Libref

Use the LIBRARY libref to make your user-defined formats available by completing the following steps:

1 Name the format catalog **formats.sas7bcat**.

2 Place the catalog in the directory that is assigned to the LIBRARY libref. By default, the SAS Configuration Wizard assigns the LIBRARY libref to the *SAS-config-dir*\Lev1\SASMain\SASEnvironment\SASFormats directory, where *SAS-config-dir* is the SAS configuration directory.

Note: For the z/OS* environment, in the SASRX REXX exec, you must also add the following LIBRARY ALLOCATE command, which points to the *SAS-config-dir*/Lev1/SASMain/SASEnvironment/SASFormats directory:

```
allocate dd(library)
   path('SAS-config-dir/Lev1/SASMain/SASEnvironment/SASFormats')
```

△

Use the FMTSEARCH System Option

Use the FMTSEARCH system option to make your user-defined formats available by completing one of the following sets of steps:

□ For all but the z/OS environment, complete the following steps:

1 Add a -CONFIG system option to the SAS configuration file *SAS-config-dir*\Lev1\SASMain\sasv9.cfg that points to a configuration file for handling user-defined format catalogs. For example, you might add the following -CONFIG system option:

```
-config "SAS-config-dir\Lev1\SASMain\userfmt.cfg"
```

* z/OS is the successor to the OS/390 operating system. SAS 9.1 for z/OS is supported on both z/OS and OS/390 operating systems and, throughout this document, any reference to z/OS also applies to OS/390, unless otherwise stated.

2 Then, in that user-defined format configuration file (for example, **userfmt.cfg**), add a SET system option and a FMTSEARCH system option. For example, you might add the following system options:

```
-set fmtlib1 "SAS-config-dir\Lev1\Data\orformat"
-fmtsearch (fmtlib1.orionfmt)
```

In this example, *SAS-config-dir*\Lev1\Data\orformat is the location of the format catalog, and **orionfmt** (filename **orionfmt.sas7bcat**) is the name of the format catalog.*Note:* For UNIX environments, the variable name that you specify in the SET option must be converted to uppercase. For example, in the following option, you would specify **FMTLIB1** instead of **fmtlib1**:

```
-set FMTLIB1 "SAS-config-dir\Lev1\Data\orformat"
```

△

□ For the z/OS environment, complete the following steps:

1 Add an AUTOEXEC system option to the SAS launch command as shown in the following example:

```
SAS-config-dir/Lev1/SASMain/startsas.sh
   o("autoexec="./WorkspaceServer/userfmt.sas"")
```

In this example, **startsas.sh** is your SAS launch command script, and **userfmt.sas** is the name of the SAS autoexec file. When you enter the command, you must enter it all on one line.

2 Within the autoexec file, use the LIBNAME statement to assign the format library and the OPTIONS statement to set the FMTSEARCH system option. For example, you might specify the following statements:

```
libname fmtlib1 'SAS-config-dir/Lev1/Data/orformat';
options fmtsearch=(fmtlib1.orionfmt);
```

Make SAS Programs Available as SAS Stored Processes for Information Maps

Tip

To use a SAS program to update or create data for an information map, convert the SAS program to a SAS Stored Process and make it available for use with the information map.

Technique

To convert a SAS program to a stored process that is available for use with an information map, complete the following steps:

1 A table and its library must be defined in metadata before the table can be used as a data source for an information map. (For this reason, you cannot begin using the Work library for your output until after you first create a permanent location for your output.)

To define the program's output table (or tables) and its associated SAS library in the metadata repository, complete the following steps:

a If the output table does not physically exist, then run the program one time to create the table and to store it in a permanent library. The table that is created must contain header information about the columns and their attributes; rows are not required. Here is a sample program:

```
Libname source 'path-to-source-data';
Libname stpout 'c:\temp';

Data stpout.result_set;
  Set source.data1;
  /* more code */
run;
```

Note: This sample program contains LIBNAME statements for both a source library and an output library. The source library is the permanent (original) location of the data. This sample program reads data from the source table, modifies or updates it, and outputs the results to the output table. △

b Use either Data Library Manager (in SAS Management Console), SAS Data Integration Studio, or the SAS Metadata LIBNAME Engine to define the output table and its library to the metadata repository. When you specify the libref for the library definition, use the one that you specified in the program. For the above sample program, you would specify a libref of **STPOUT**.

2 In the SAS program, insert a *ProcessBody statement immediately after your global (%GLOBAL) macro variable declarations. This comment statement is required when the SAS program references macro variables (global or reserved) and the stored process runs on a SAS Workspace Server.

3 Modify the LIBNAME statement for your output table so that it references the Work library of the workspace server. The stored process will now write its output to this temporary location.

Note: This step is optional. You can continue to use the permanent table and library that you created in step 1. However, using the Work library prevents the original data from being over-written and enables multiple, concurrent users of a stored process to each have access to a temporary, private version of the resulting data. △

The following example shows the modified sample program:

```
*ProcessBody;
Libname source 'path-to-source-data';
Libname stpout (work);
            /* The output library and table must already */
            /* be defined in metadata */

Data stpout.result_set;
  Set source.data1;
  /* more code */
run;
```

4 Save the program.

5 Define the program in the metadata repository as a stored process (using either BI Manager in SAS Management Console or SAS Enterprise Guide). Specify that execution will take place on a workspace server and then specify an output type of NONE. If you use global macro variables in your SAS program and want to use them to prompt users for values, then add a stored process input parameter for each global macro variable that your code references. (For information about using stored process input parameters with an information map, see "Use SAS Stored Process Input Parameters with an Information Map" on page 43.)

Note: The stored process must run on a *workspace server*. A stored process that runs on a stored process server cannot be used by an information map. If you use input parameters with the stored process, then be aware that the workspace server supports single selection parameters only. △

6 Using BI Manager, navigate to the stored process and verify that your SAS Information Map Studio users have ReadMetadata access to the stored process.

The stored process can now be used with an information map. For details, see "Use a SAS Stored Process with an Information Map" on page 40.

For more information about stored processes, see "SAS Stored Processes" in the *SAS 9.1.3 Integration Technologies: Developer's Guide* at **http://support.sas.com/rnd/itech/doc9/dev_guide/stprocess/index.html**.

Restrict Access to Specified Rows by Using a SAS Stored Process

Tip

You can use a SAS Stored Process to restrict an information map user's access to certain rows in a table. A stored process that is associated with an information map is executed before any of the queries that are generated from that information map. Therefore, the stored process can be used to perform any type of data subsetting that must occur before a query is run.

Technique

Background

To restrict access to certain rows of data in your table, you can create a stored process that filters out those rows so that the information map user queries against only the remaining subset of data. To determine whom to restrict access to, reference the _METAPERSON and _METAUSER reserved macro variables in the stored process's source code (SAS program). These macro variables are system variables that automatically contain the user's metadata user name (_METAPERSON) and login (_METAUSER).

The following example scenario describes how to create a stored process that uses the _METAPERSON reserved macro variable to restrict row-level access.

Note: In the example, the report user is also the stored process user because the report user runs the stored process every time he or she runs the report. △

Example Scenario: Description

Your sales organization has a SAS library named Orstar. This library contains an orders table (Order_Fact) that lists orders by employee ID and an employees table (Organization_Dim) that contains a list of salespeople.

You have an information map that enables the salespeople to view the orders in the orders table. You need to ensure that when a salesperson (report user) uses your information map to generate an order report, that person will see only his or her own orders. To enforce this policy, you need to create a stored process that you can associate with the information map.

Example Scenario: The Basic Query

The stored process that you create needs to contain a query that filters out employee IDs that do not belong to the report user. The query has the following basic structure:

```
Employee_ID IN (
SELECT org.Employee_ID
   FROM
      orstar.Organization_Dim AS org,
      <subquery:
      generates-lookup-table-containing-report-user's-employee-id>;
   WHERE org.Employee_ID = lookup.Employee_ID
)
```

Example Scenario: The Subquery

You know that the names in the Employee_Name column of the Organization_Dim table are used as the employees' metadata user names (_METAPERSON). By using the following SELECT statement, you can determine the employee ID of the employee who is running the report.

```
SELECT Employee_ID FROM orstar.Organization_Dim AS o2
     WHERE (o2.Organization_Dim = "&_metaperson") AS lookup
```

Example Scenario: The Completed Query

Incorporate the subquery into the basic structure that you created, and you get the following query:

```
Employee_ID IN (
SELECT org.Employee_ID
   FROM
      orstar.Organization_Dim AS org,
      (SELECT Employee_ID FROM orstar.Organization_Dim AS o2
         WHERE (o2.Employee_Name = "&_metaperson")) AS lookup
   WHERE org.Employee_ID = lookup.Employee_ID
)
```

Example Scenario: The Stored Process

The following example shows how the query that you created is incorporated into a SAS program that controls access to the Order_Fact table. To convert this SAS program into a stored process and use it with an information map, see “Make SAS Programs Available as SAS Stored Processes for Information Maps” on page 6.

```
*ProcessBody;
libname orstar 'c:\Orstar';
libname ortemp (work);
proc sql;
   CREATE TABLE ortemp.Orders_rls AS
   SELECT * FROM orstar.Order_Fact
       WHERE
           Employee_ID IN (
           SELECT org.Employee_ID
              FROM
                 orstar.Organization_Dim AS org,
                 (SELECT Employee_ID
                    FROM orstar.Organization_Dim
                       AS o2
                    WHERE (o2.Employee_Name = "&_metaperson"))
                       AS lookup
             WHERE org.Employee_ID = lookup.Employee_ID
           );
quit;
```

Make Detail Data Available for Drill-Through

Tip

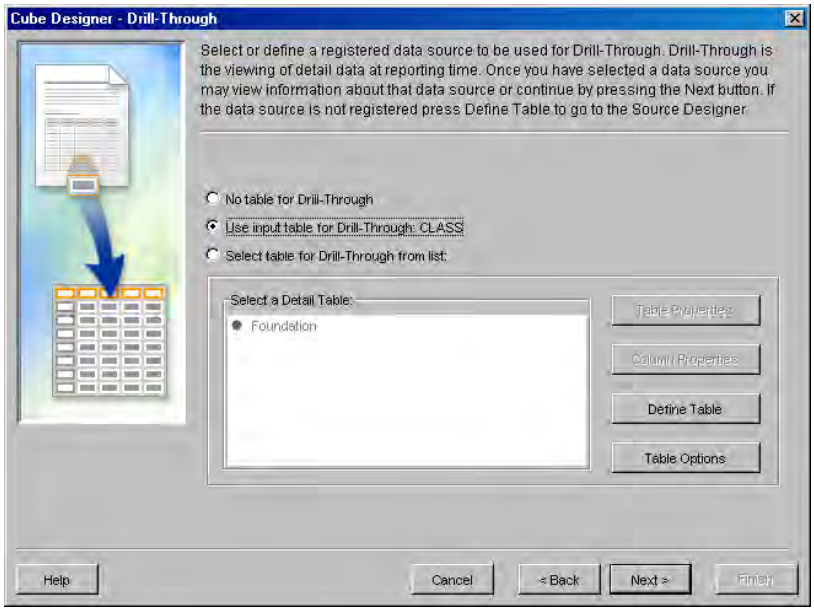
You can drill through an OLAP report to the underlying detail data only after you make the detail data available to the cube, its SAS OLAP Server, and the information map that you use for creating the report.

Technique

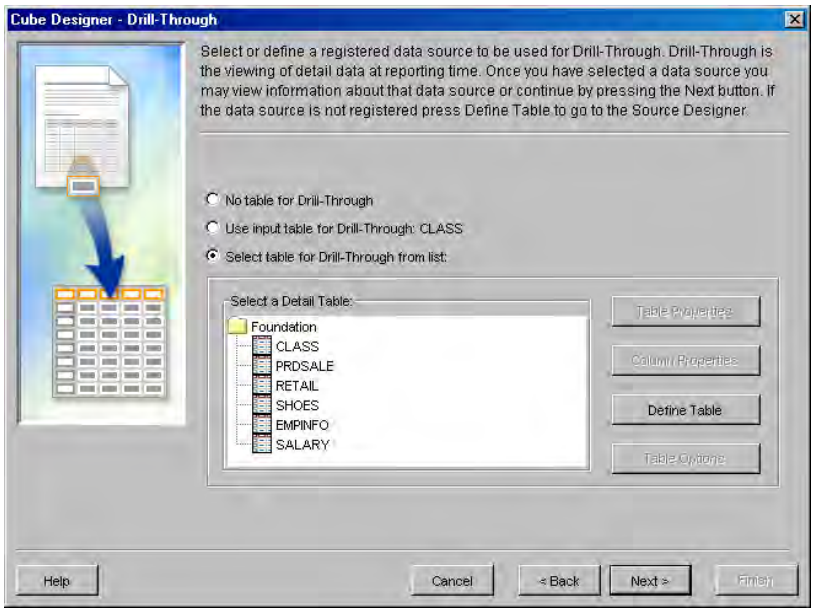
Make Detail Data Available to a Cube

You can use either SAS OLAP Cube Studio or the OLAP procedure to make detail data available to the cube.

- In SAS OLAP Cube Studio, you can specify a table for drill-through when you create or edit the cube using the Cube Designer wizard. On the Drill-Through page of the wizard, select one the following radio buttons:
  - **`Use input table for Drill-Through`** (to use the table that you selected on the Input page of the wizard).



- **`Select table for Drill-Through from list`** (to select a table from the list of tables on the Drill-Through page. If only a repository folder is listed, then select the repository folder in order to see the tables).



For more information about the Cube Designer wizard, see the SAS OLAP Cube Studio Help.

- In the PROC OLAP statement, use the DRILLTHROUGH_TABLE option to specify the name of the drill-through table to use. For more information about the DRILLTHROUGH_TABLE option, see "PROC OLAP Statement" in the *SAS OLAP Server: User's Guide*.

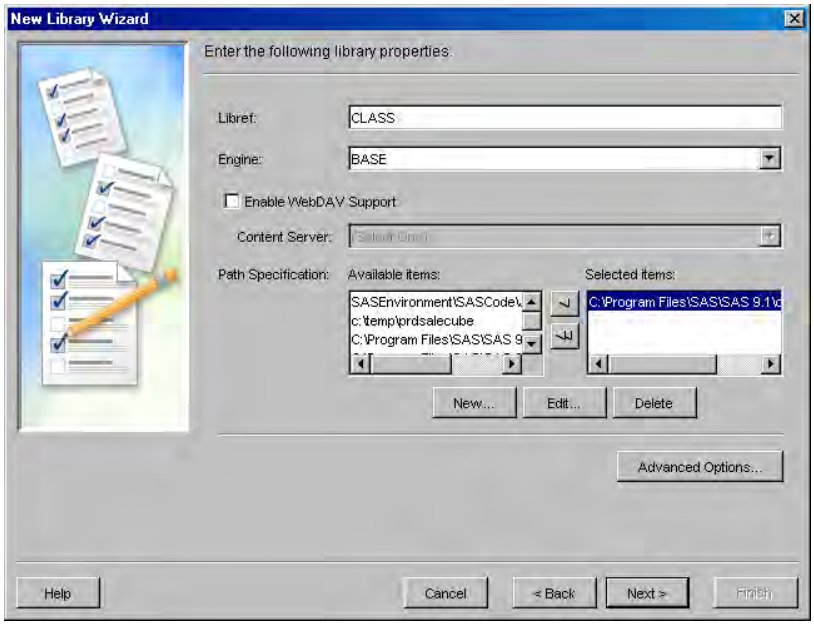
Make Detail Data Available to an OLAP Server

In order for the OLAP server to make detail data available for a cube, the SAS library for the table that contains the detail data must be defined so that the OLAP server can access it. The simplest way to define the library to the server is to pre-assign it in the metadata repository.

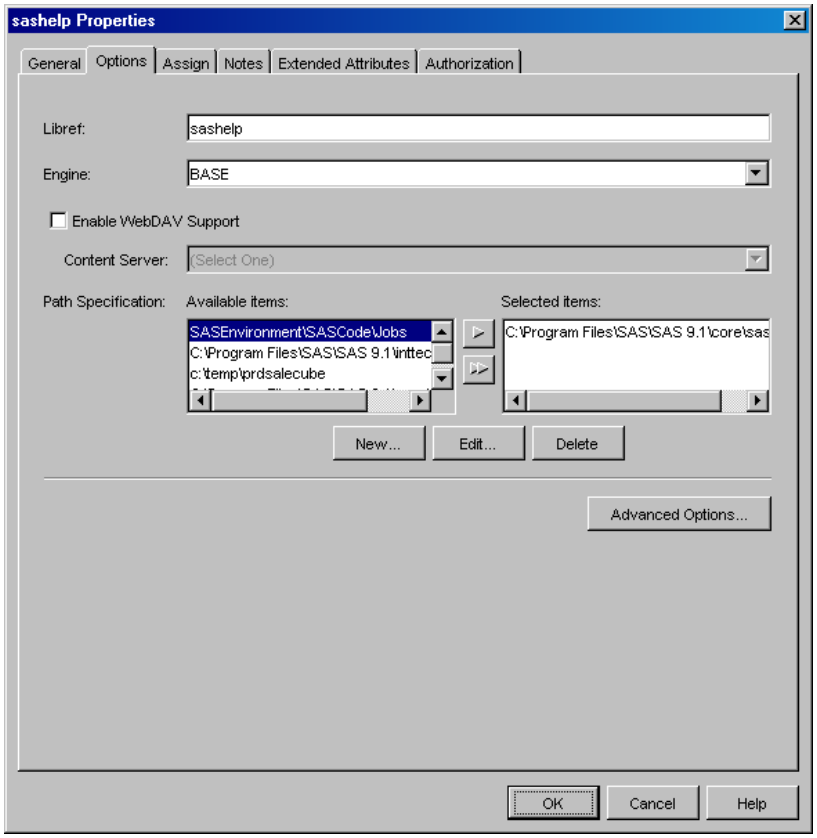
To specify a library as pre-assigned for an OLAP server, complete the following steps:

1 In Data Library Manager (in SAS Management Console), find the **`SAS Libraries`** folder and perform one of the following tasks to get to the dialog box that lets you select advanced options:

   - For a new library, right-click the **`SAS Libraries`** folder and select **`New Library`** to start the New Library Wizard. Then navigate to the wizard page that enables you to specify library options such as the libref.

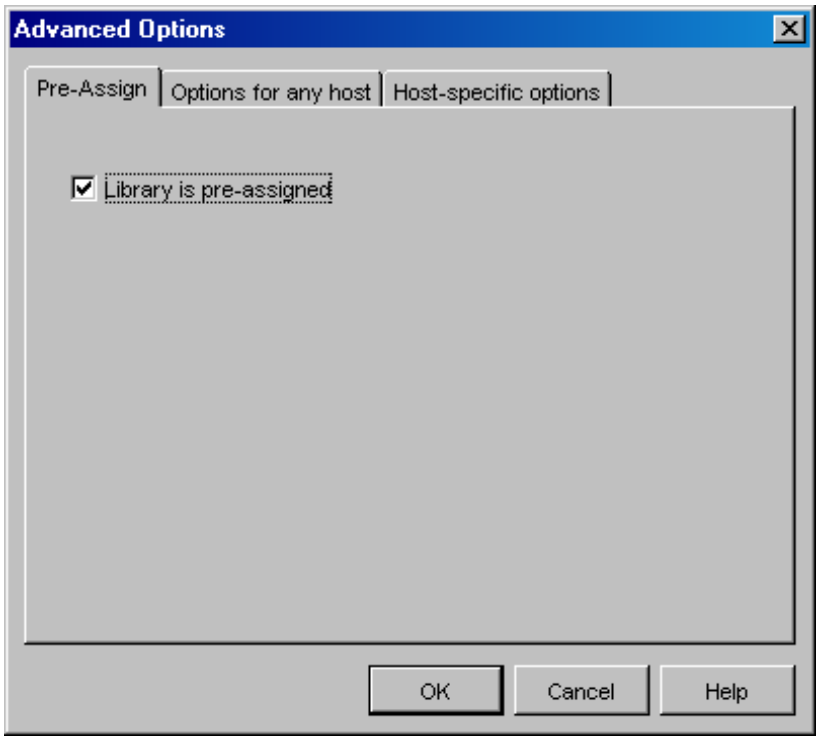


- For an existing library, open the **SAS Libraries** folder and right-click the desired library. Select **Properties** from the drop-down menu, and then select the **Options** tab in the properties dialog box.

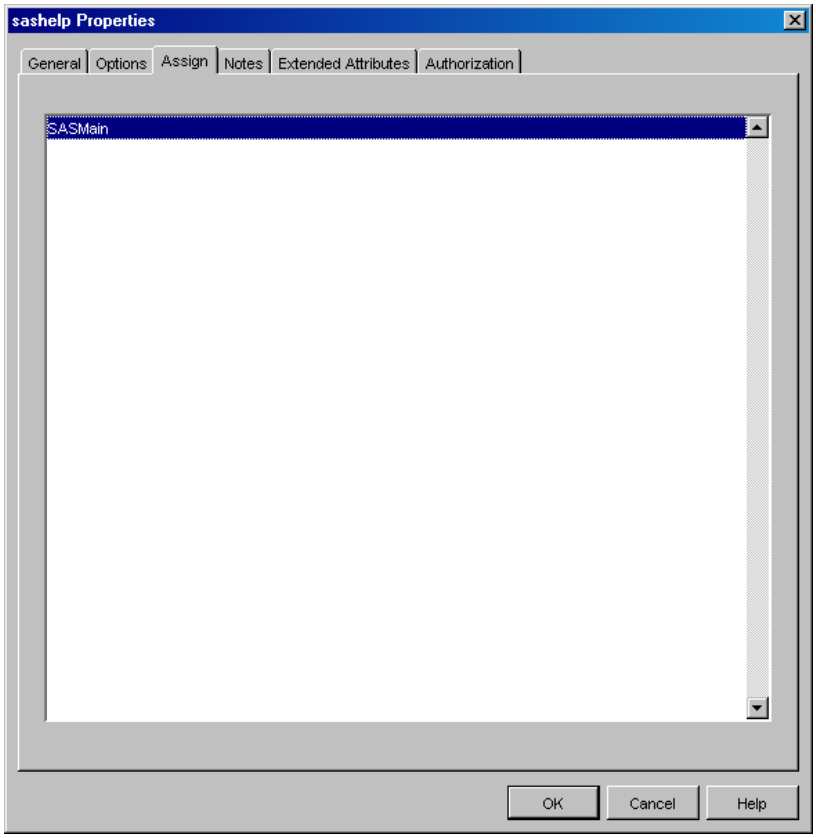


2 Click **Advanced Options**.

3 Select the **`Library is pre-assigned`** check box on the **`Pre-Assign`** tab in the Advanced Options dialog box.



4 On the **Assign** tab of the properties dialog box or the server selection page of the New Library Wizard, ensure that the selected application server is the server container that contains your OLAP server.



5 Click **OK** in the properties dialog box, or finish entering information in the wizard.

6 Restart the OLAP server.

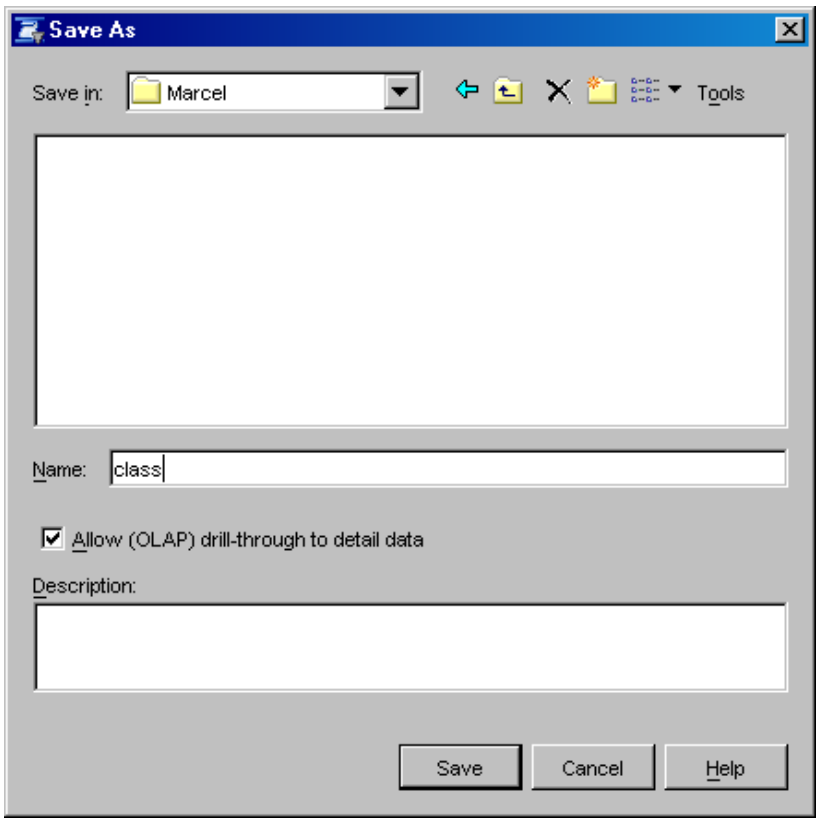
Note: If you want to enable users to view column labels when they drill through to detail data, then before you restart the server, complete the steps in "Make the Column Labels of Drill-Through Tables Available" on page 19. △

The selected library is assigned after the selected OLAP server starts. After the OLAP server starts, ensure that the library is pre-assigned to the correct SAS OLAP server.

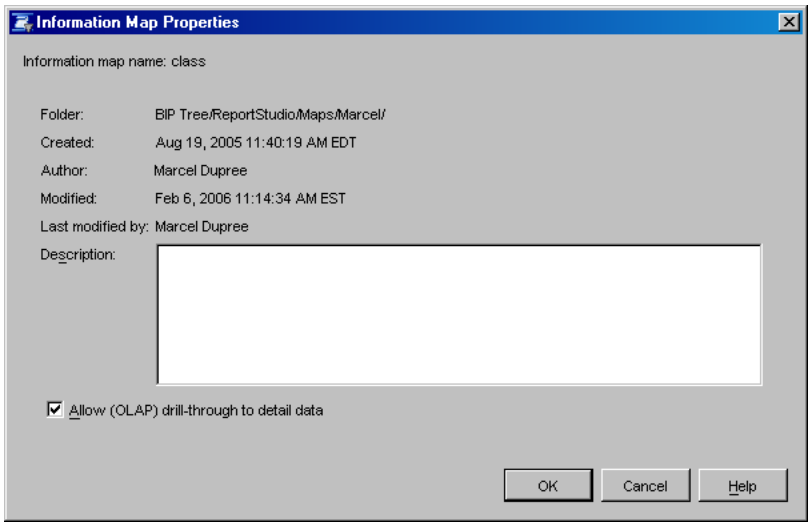
Make Detail Data Available to an Information Map

In order for an information map to produce a report that has drill-through capabilities, an option must first be set in the information map. You can set this option in one of two ways:

- When you save a new information map, select the **`Allow (OLAP) drill-through to detail data`** check box in the Save As dialog box before you save the information map.



- For an existing information map, open the information map, right-click it, and then select **`Properties`** from its drop-down menu. Select the **`Allow (OLAP) drill-through to detail data`** check box on the **`Definition`** tab in the Information Map Properties dialog box.



Make the Column Labels of Drill-Through Tables Available

Tip

If you want to view column labels when you drill through to detail data for a cube, then you must set an option in Server Manager (in SAS Management Console) to make the column labels available.

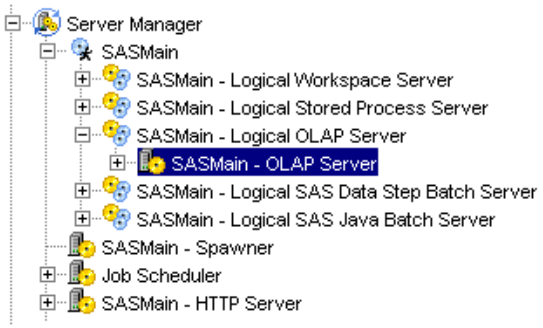
Note: This option is set for the physical OLAP server, so the setting applies to all the cubes that are assigned to that server. △

Technique

Before you can make column labels available, you must first ensure that SAS 9.1.3 Service Pack 4 is installed and then upgrade the metadata for any existing metadata repositories. For more information, see "Upgrading Repository Metadata" in the Metadata Manager Help in SAS Management Console.

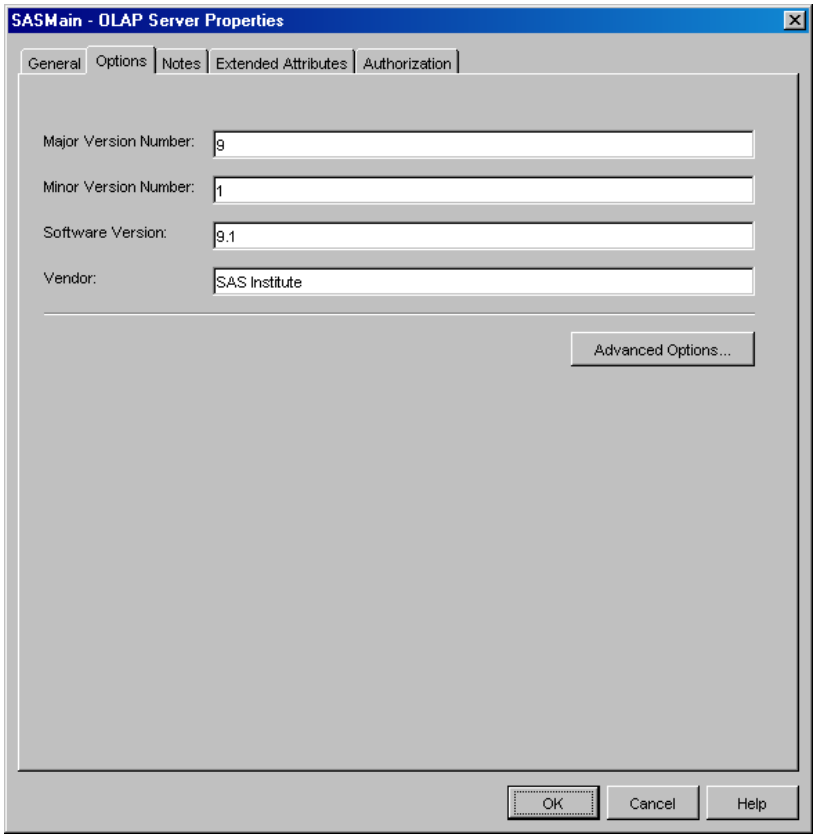
After the metadata is upgraded, complete the following steps to make the column labels of drill-through tables available:

1 In the navigation tree for Server Manager, find the node that represents your physical OLAP server.

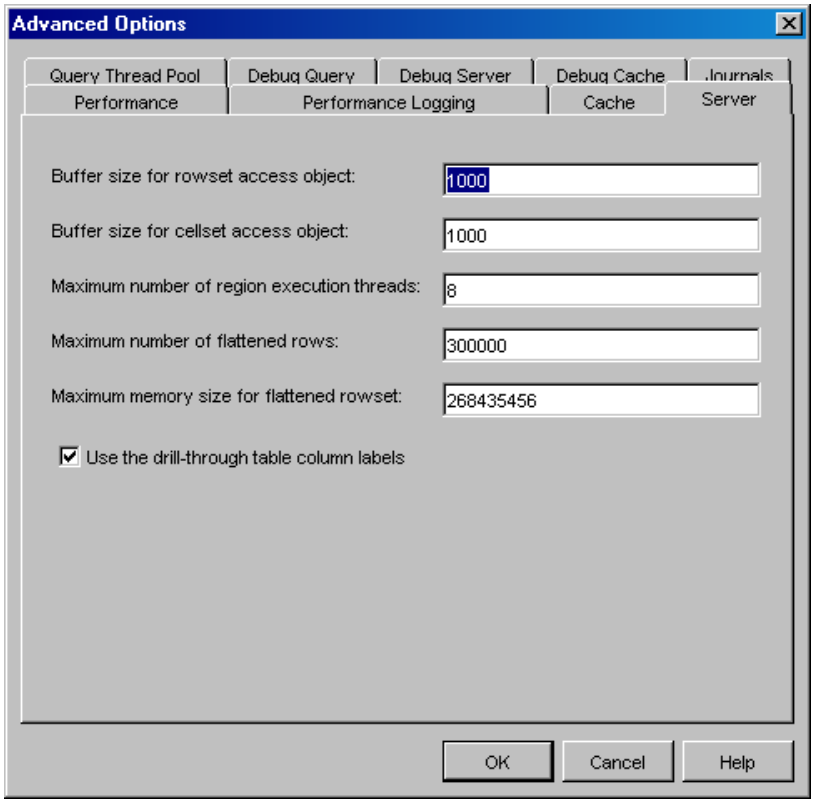


2 Select the server, and then select **File ▸ Properties** from the menu bar.

3 In the properties dialog box, select the **`Options`** tab, and then click **`Advanced Options`**.



4 In the Advanced Options dialog box, select the **`Server`** tab, and then select the **`Use the drill-through table column labels`** check box.



5 Click **`OK`** to save the setting.

6 Restart the OLAP server.

Display Detail Data for a Large Cube

Tip

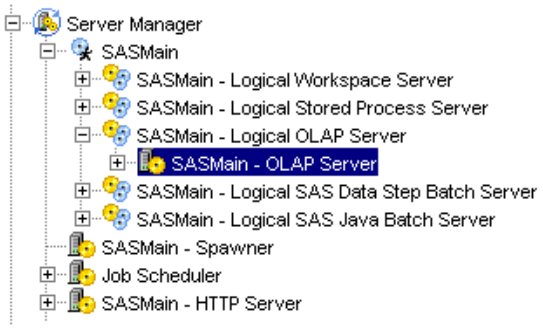
If your cube contains an extremely large amount of detail data, then in order to view that data from within SAS Information Map Studio, you might need to increase the Java heap size for SAS Information Map Studio or increase the maximum number of drill-through rows that your SAS OLAP Server can handle.

Technique

For information about increasing the heap size, see “Increase the Java Heap Size for SAS Information Map Studio” on page 25.

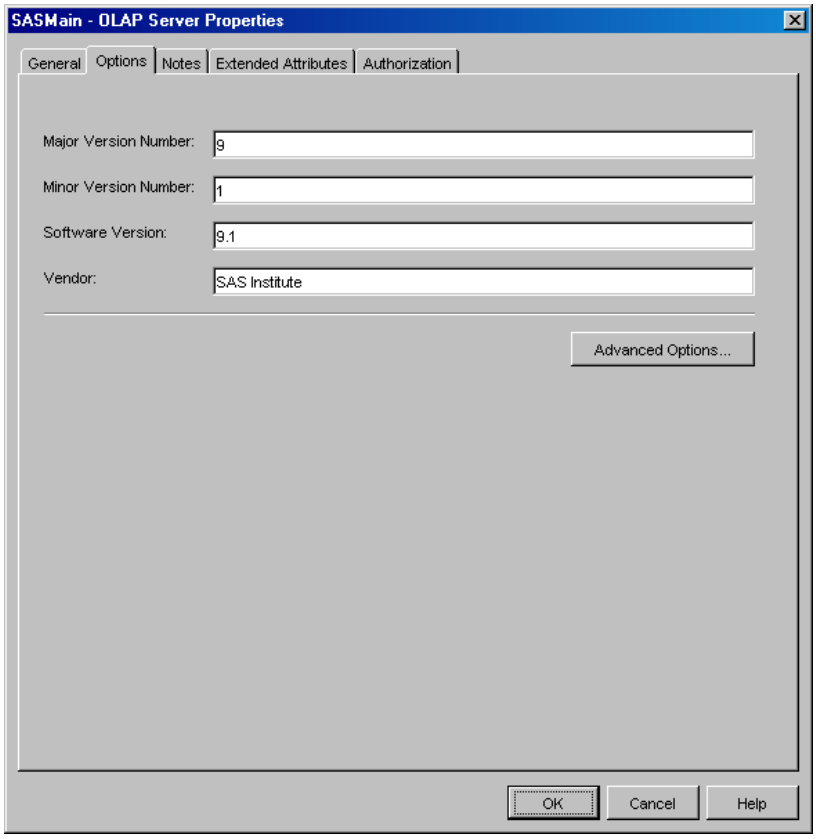
To increase the number of drill-through rows that your OLAP server can handle, you can change an OLAP server definition setting in Server Manager (in SAS Management Console) by completing the following steps. (The default number of drill–through rows that can be displayed by a query is 300,000 rows.)

1 In the navigation tree for Server Manager, find the node that represents your physical OLAP server.

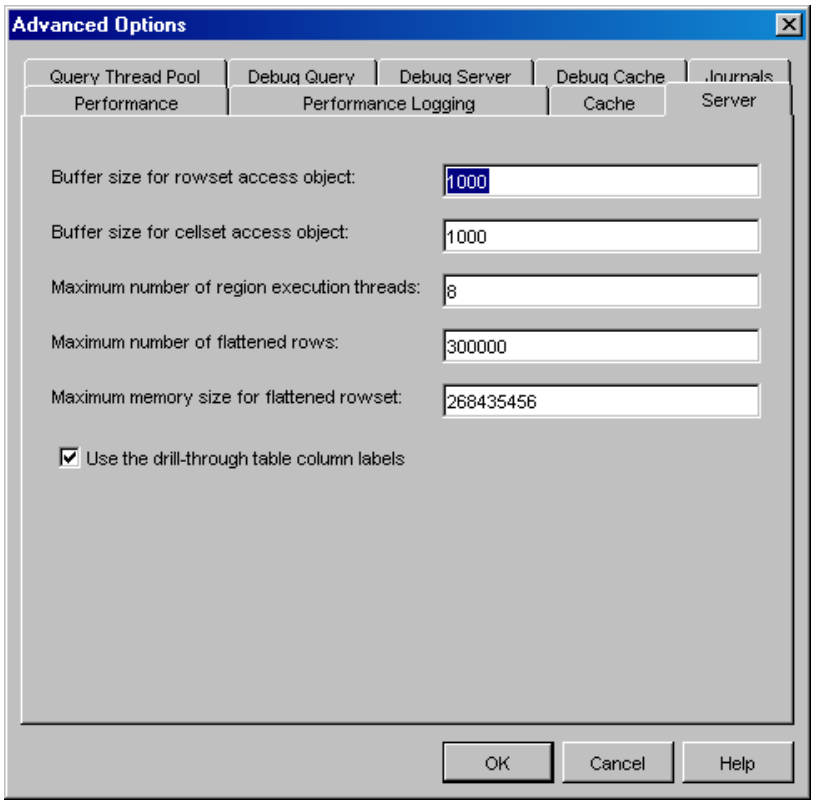


2 Select the server, and then select **File ▶ Properties** from the menu bar.

3 In the properties dialog box, select the **`Options`** tab, and then click **`Advanced Options`**.



4 In the Advanced Options dialog box, select the **`Server`** tab, and then enter the desired value for the **`Maximum number of flattened rows`** field.



5 Click **`OK`** to save the setting.

Increase the Java Heap Size for SAS Information Map Studio

Tip

If your data source contains an extremely large amount of data, then you might need to increase the Java heap size for SAS Information Map Studio.

Technique

The default maximum heap size for SAS Information Map Studio 3.1 is 1024MB. To increase the heap size for SAS Information Map Studio, you can change the settings for its minimum heap size (**-Xms**) and maximum heap size (**-Xmx**) by completing the following steps:

1. In the installation directory for SAS Information Map Studio, locate the mapstudio.ini file.
2. Open the file using a text editor.
3. Locate the line that begins with **CommandLineArgs**.
4. Locate the following parameters and change the values:

   `-Xms`*n*`m|g -Xmx`*n*`m|g`

   In these parameters, ***n*** is the number of megabytes or gigabytes, **m** represents megabytes, and **g** represents gigabytes.
5. Save the file before starting SAS Information Map Studio.

CHAPTER
3

Tips for Creating Information Maps

Create a Filter with a Measure, Category, or Column

Tip

When you create a filter in SAS Information Map Studio, you can specify category data items, measure data items, and table columns in the filter expression. Use the following criteria to determine which of those items to use in the filter expression:

- To filter aggregated data, create a measure data item, and then use that data item in the filter expression.

  Note: If you use a measure data item in a SAS Information Map Studio filter, then that filter will not be available in SAS Web Report Studio. In SAS Web Report

Studio, if you want to use a filter that references a measure data item, then you must create the filter within a report in SAS Web Report Studio. △

- To filter individual data values, create a category data item from the column, and then use the category data item in the filter expression, or use a table column in the filter expression.
- To hide a filter from SAS Web Report Studio users, use only table columns in the filter expression because SAS Web Report Studio does not display filters that are based solely on table columns.

For step-by-step instructions for creating filters, see the SAS Information Map Studio Help.

Technique

Background

The contents of a filter expression determine the type of SQL statements that are generated for the filter.

- If you specify a measure data item (whose values are by definition aggregated) in a filter expression, then the SQL query that is generated for the filter will contain a HAVING clause, which means that the filter is evaluated after the data items in the query are aggregated.
- If you specify a category data item or table column (whose values are not aggregated) in a filter expression , then the SQL query that is generated will contain a WHERE clause, which means that the filter is evaluated before the data items in the query are aggregated. A HAVING clause is generated only if you apply an aggregate function to a category data item or table column in the filter expression. In that case, because the category data item or table column is aggregated, the SQL that is generated will contain a HAVING clause.

The following sections describe scenarios where filters are created with a measure data item, a category data item, and a table column. Two data sources are used:

- a transaction table (ORDER_FACT) that contains sales transactions for a company's products. The table includes the following columns:
  - Product_ID
  - Employee_ID
  - Order_Date
  - Total_Retail_Price
  - CostPrice_Per_Unit
  - Quantity
- a products table (PRODUCT_DIM) that contains information about the company's products. The table includes the following columns:
  - Product_ID

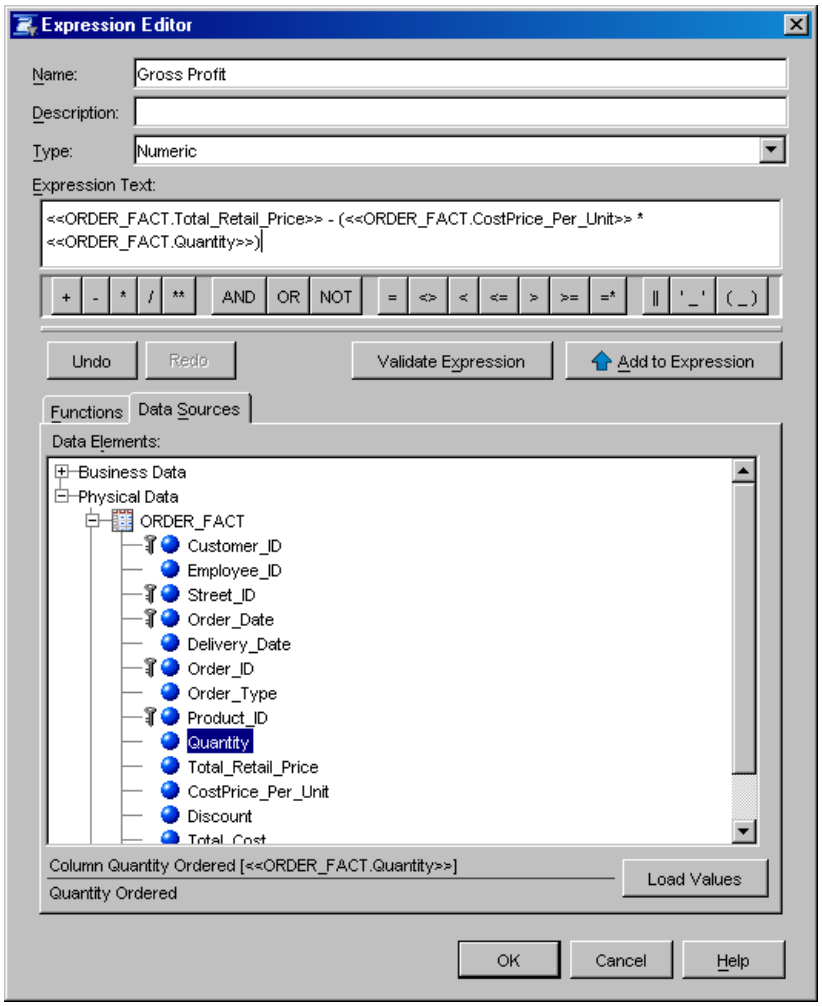
- Product_Name

ORDER_FACT is inner joined to PRODUCT_DIM on the Product_ID column.

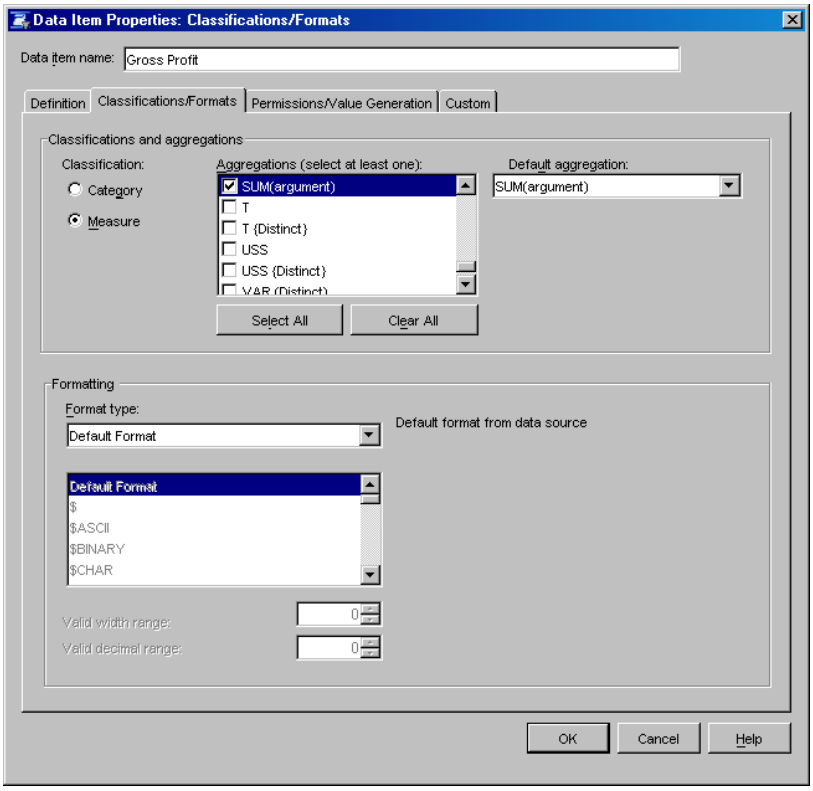
The Product Name and Order ID category data items have been created from the Product_Name column in PRODUCT_DIM and the Order_ID column in ORDER_FACT.

Example Scenario: Filter Data After Aggregating

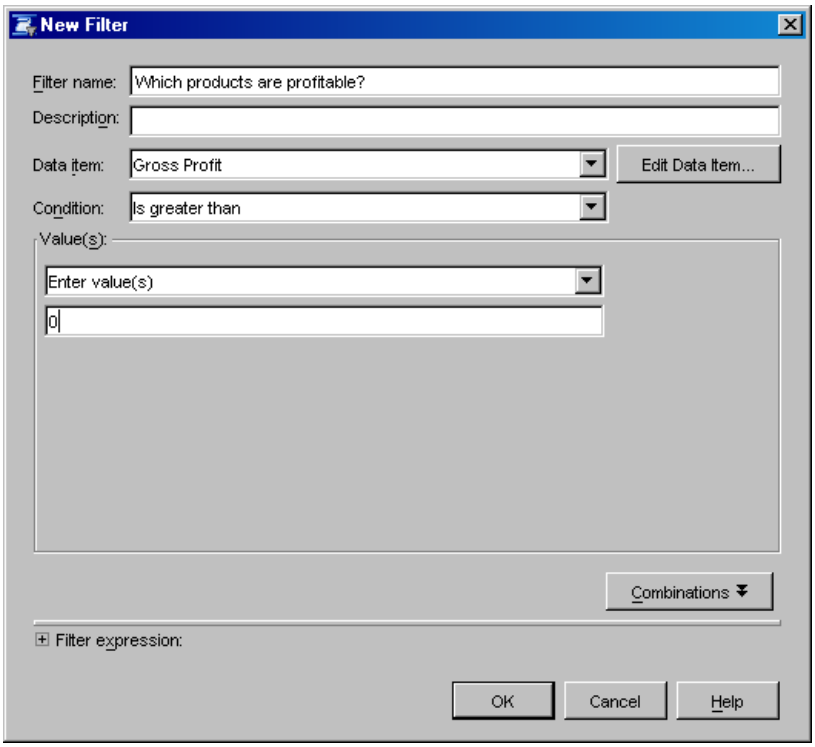
You want to determine which of your company's products are profitable. Click **`Edit`** on the **`Definition`** tab in the Data Item Properties dialog box to open the Expression Editor dialog box. Use the Total_Retail_Price, CostPrice_Per_Unit, and Quantity columns to create a Gross Profit measure data item that calculates the gross profit from product sales.



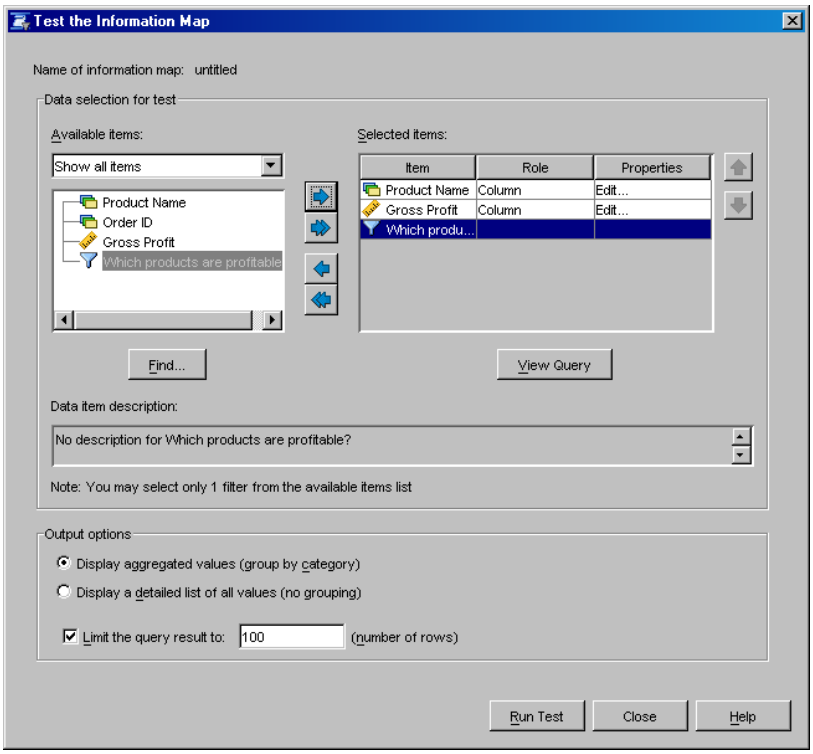
On the **`Classifications/Formats`** tab in the Data Item Properties dialog box, select **`Measure`** as the classification of the data item and **`SUM(argument)`** as the aggregate function.



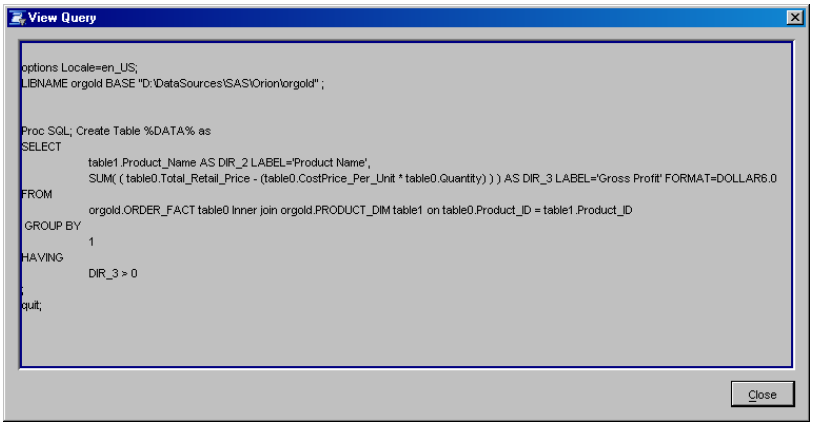
After you create the data item, create a filter that checks to see if a product's gross profit is greater than 0. Because you want to evaluate an aggregated value (the gross profit for all transactions for a product), use the Gross Profit measure data item in the filter expression.



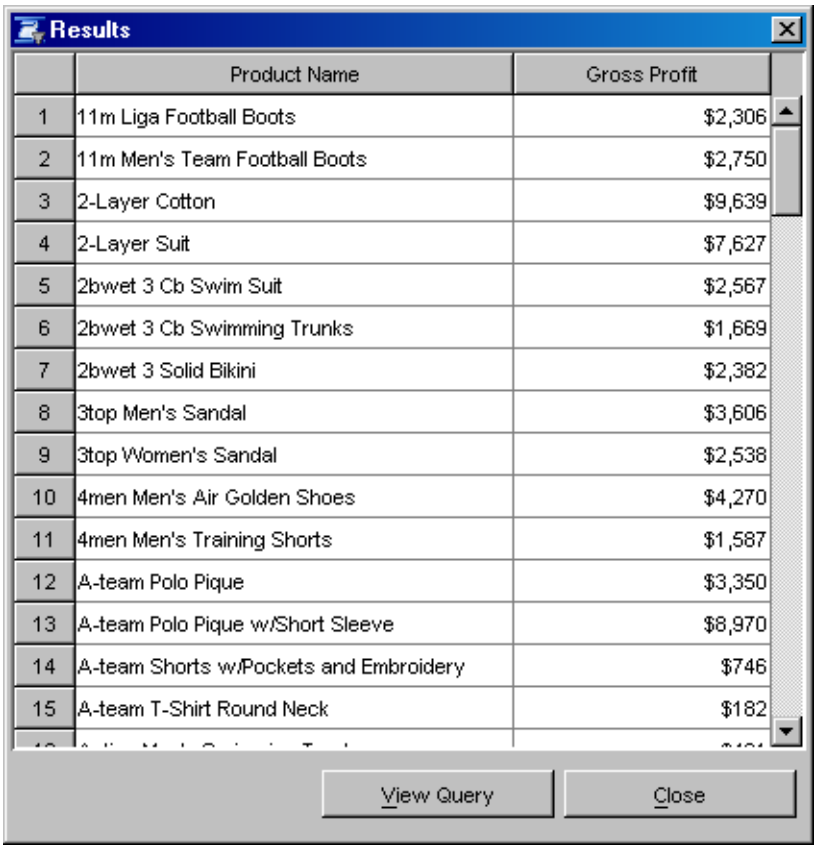
Select the Product Name data item, the Gross Profit data item, and the filter for a test query.



The SQL query that is generated should look similar to the following display:

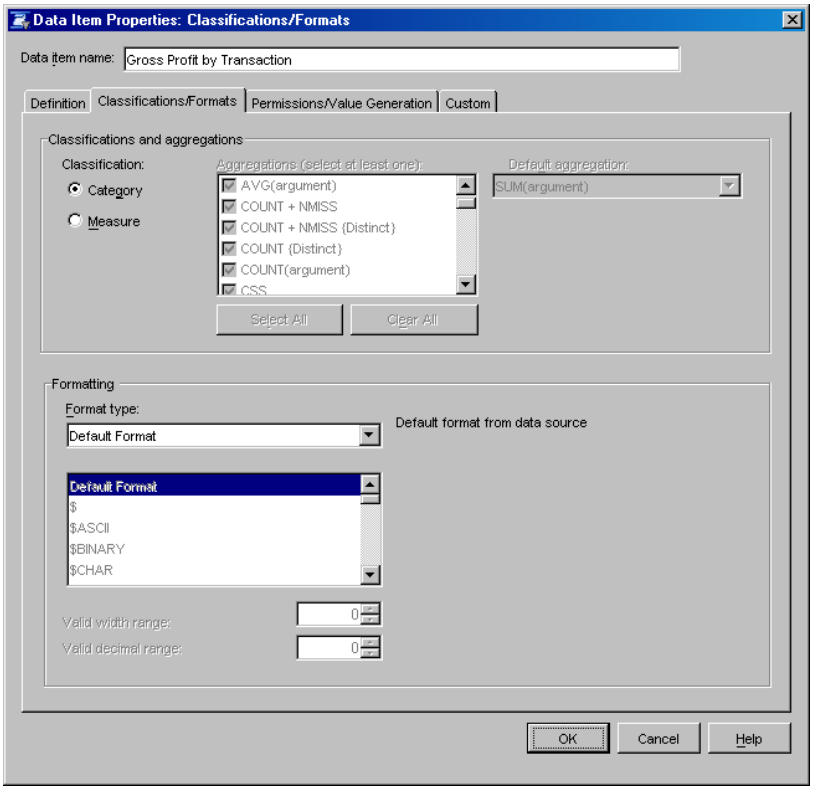


And the result set would be similar to the following:

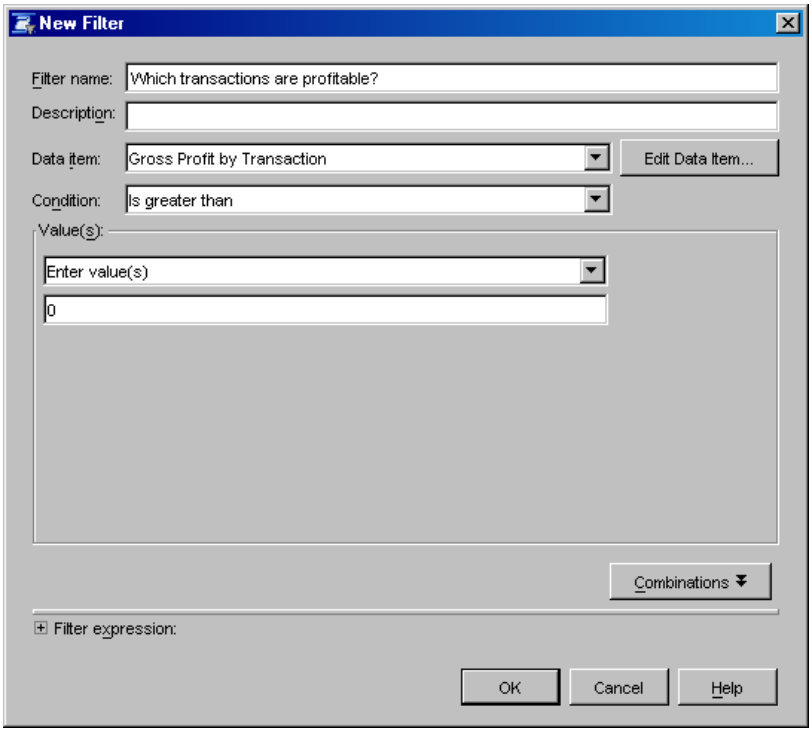


Example Scenario: Filter Data Before Aggregating

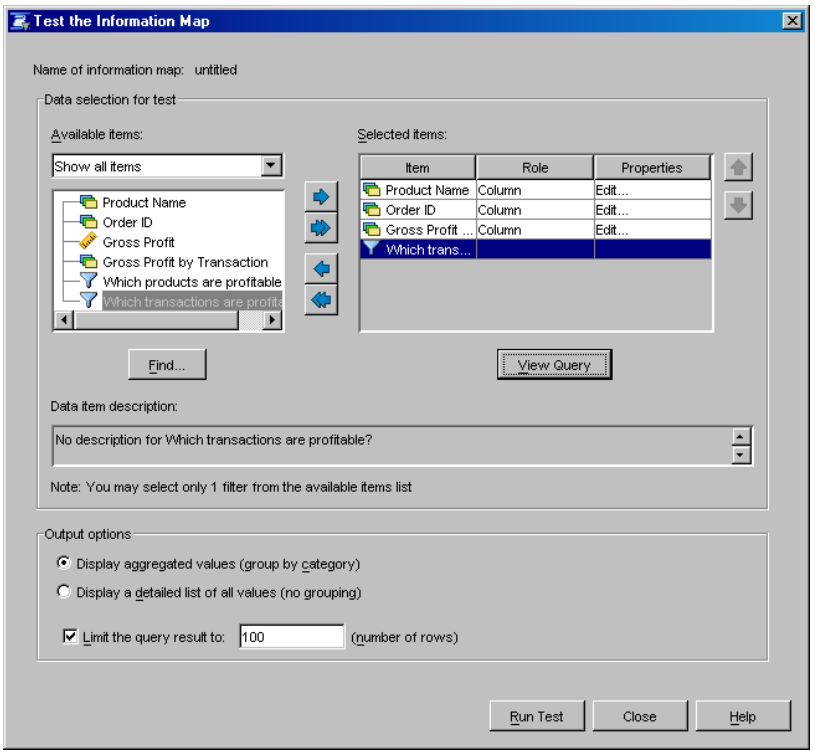
Now you want to evaluate the gross profit per sales transaction. So create a Gross Profit by Transaction measure data item that contains the same expression as the Gross Profit measure data item. But on the **`Classifications/Formats`** tab, select **`Category`** as the classification of the data item.



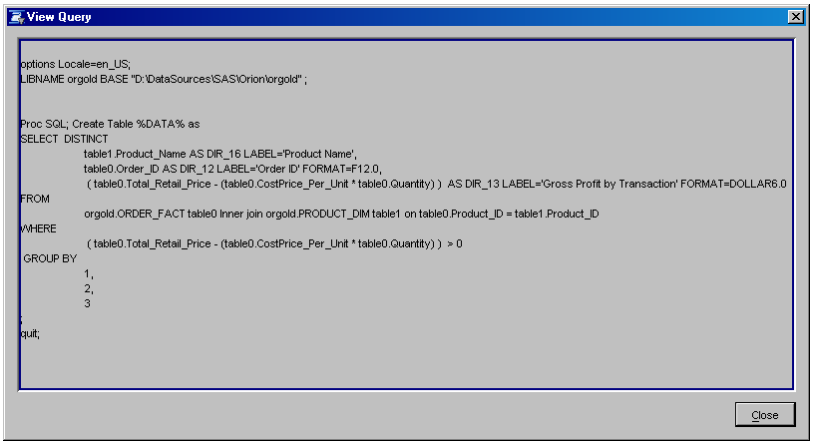
Create the same filter as in the previous example, but use the category data item instead of the measure data item because you do not want to filter the aggregated values.



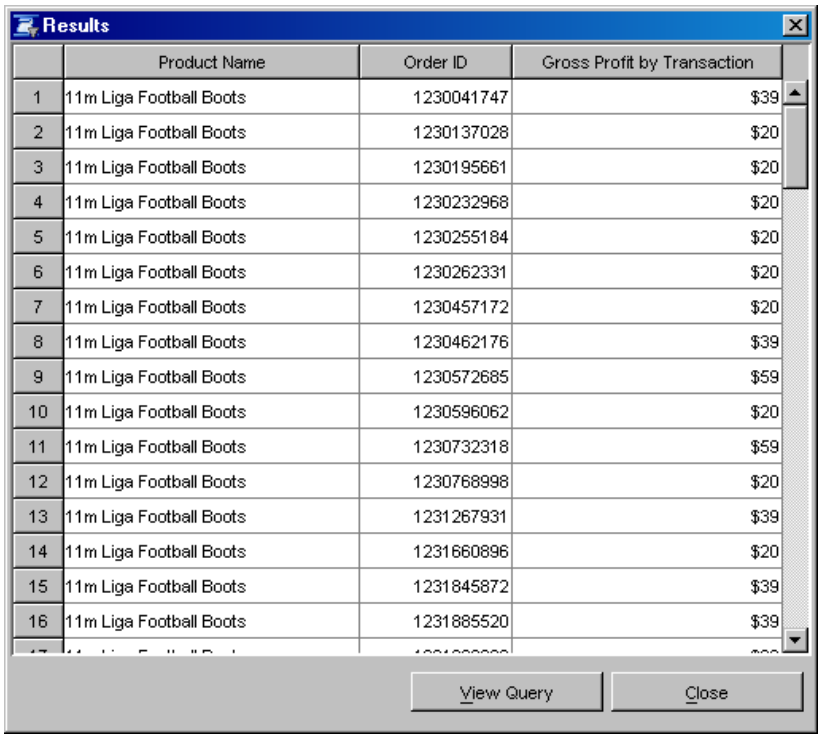
Select the Product Name data item, the Order ID data item, the Gross Profit by Transaction data item, and the filter for a test query.



The SQL that is generated should look similar to the following display:



And the result set would be similar to the following:

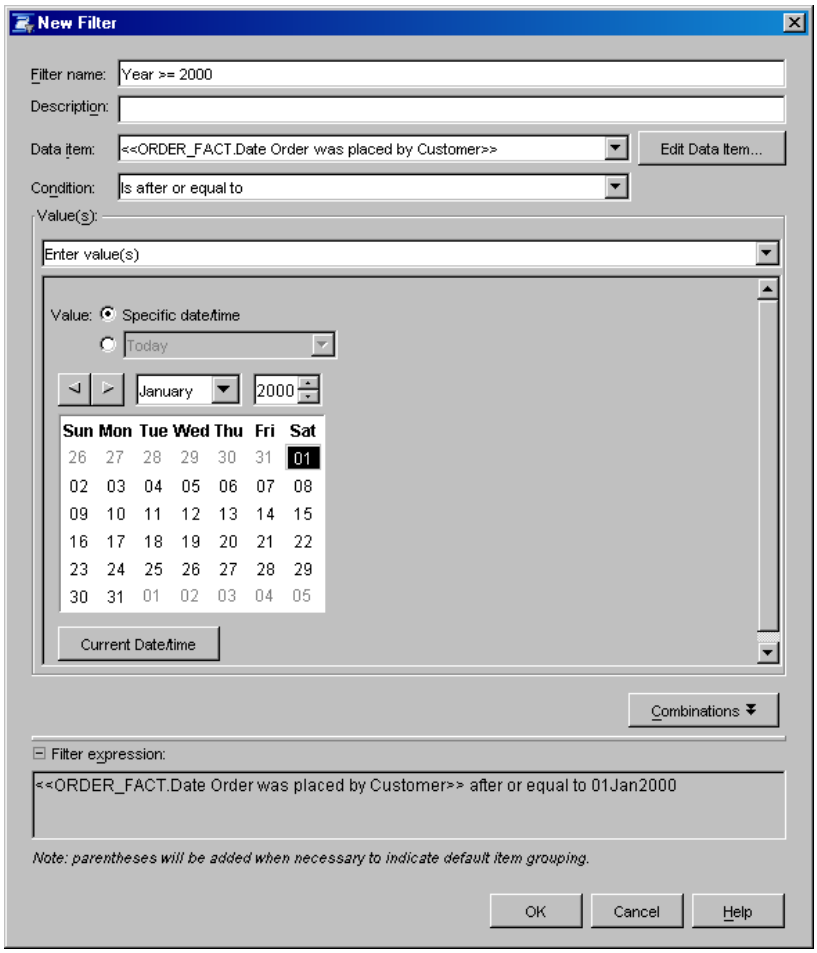


Example Scenario: Hide a Filter from SAS Web Report Studio

You want to apply a prefilter that prevents anyone who uses the ORDER_FACT table from viewing transactions that occurred before the year 2000. And, you do not want your SAS Web Report Studio users to use this filter because it will already be applied as a prefilter.

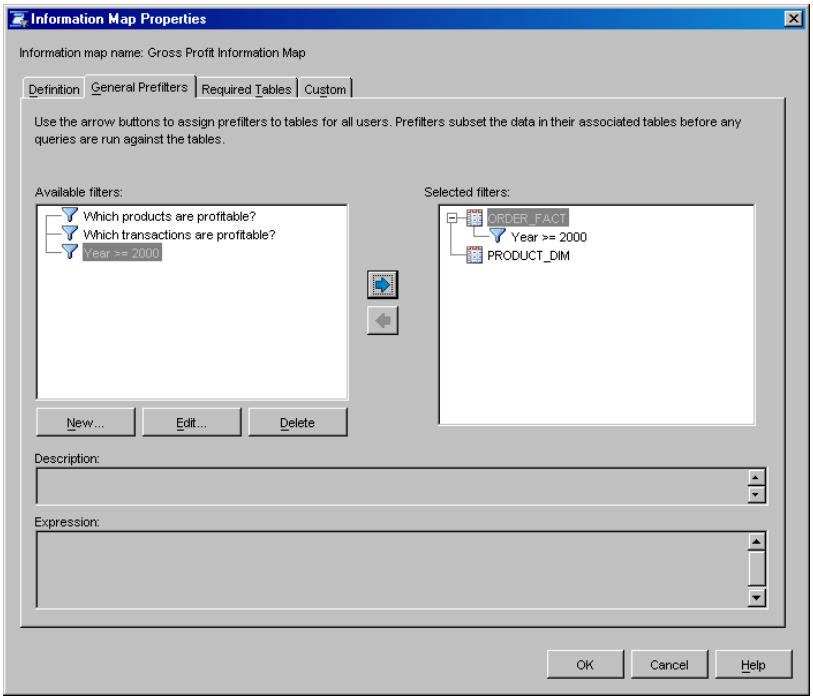
To create a filter that screens order dates, click **`Edit Data Item`** in the New Filter dialog box to select the Order_Date table column as the value of the **`Data item`** field. Then in the **`Value(s)`** section, select the date that you want to filter against.

Note: The New Filter dialog box displays the table column's label ("Date Order was placed by Customer") instead of its name. △



Then assign the filter to prefilter the ORDER_FACT table.

Note: For step-by-step instructions for assigning prefilters, see the SAS Information Map Studio Help. △



When SAS Web Report Studio users open this information map, this filter will not be displayed to them. And, any time that the ORDER_FACT table is used in a query, the data will be pre-screened to include orders only from year 2000 and after.

Use a SAS Stored Process with an Information Map

Tip

In order to use a SAS Stored Process with an information map, the information map must use the same data source as the stored process, and the stored process must be selected for the information map.

Technique

A stored process that is associated with an information map is executed before any of the queries that are generated from that information map. This processing order enables you to use SAS tools such as the DATA step or the macro language to process the data that will be used as input for the information map.

Preprocessing data often involves subsetting or updating the data on a per-user basis (for example, when a user is prompted to enter parameter values). For this reason, it is often helpful to use the Work library of the SAS Workspace Server to store temporary copies of data that has been preprocessed for a particular user.

After you create a stored process (using either SAS Data Integration Studio, SAS Enterprise Guide, or the steps in "Make SAS Programs Available as SAS Stored Processes for Information Maps" on page 6), complete the following steps to use the stored process with an information map:

1 Ensure that the stored process is defined to run on a *workspace server*; a stored process that runs on a stored process server cannot be used by an information map.

   Note: If you use input parameters with the stored process, then be aware that the workspace server supports single selection parameters only. (For information about using input parameters, see "Use SAS Stored Process Input Parameters with an Information Map" on page 43.) △

2 View your stored process's source code (SAS program). Ensure that the following statement is inserted immediately after your global (%GLOBAL) macro variable declarations:

```
*ProcessBody;
```

   This comment statement is required when the SAS program references macro variables (global or reserved) and the stored process runs on a workspace server.

3 Ensure that each table that your stored process outputs to is defined in the metadata repository. A table and its library must be defined in metadata before the table can be used as a data source for an information map. Complete the following steps to define an output table and its library to the metadata repository:

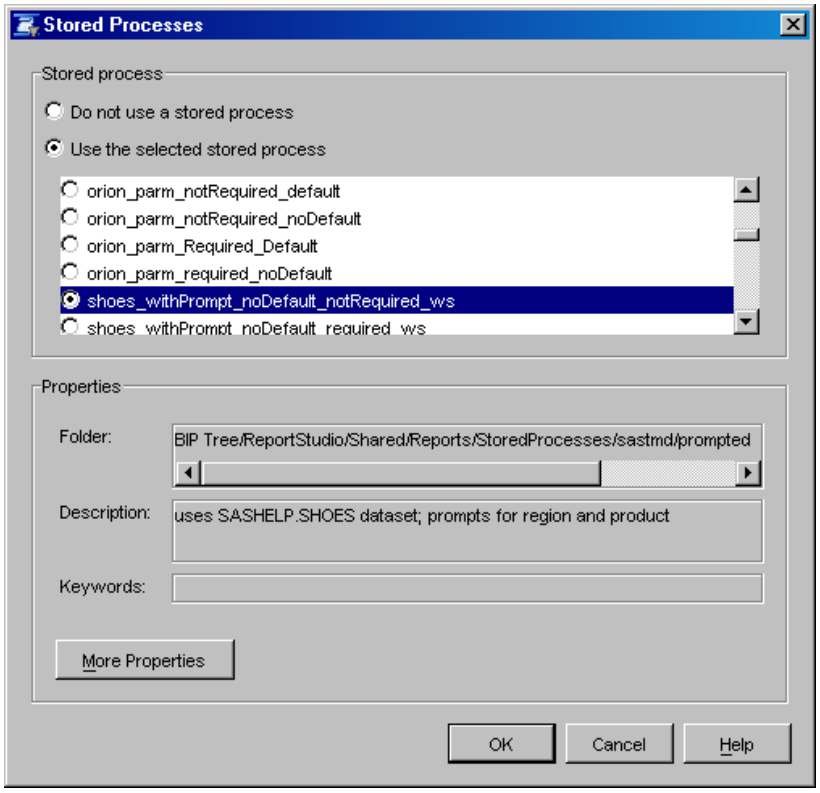
   a If an output table does not physically exist, then run the stored process one time to create the table and to store it in a permanent library. The table that is created must contain header information about the columns and their attributes; rows are not required.

      Note: For this step, ensure that the source code outputs to a permanent library and not a temporary library. If you want the stored process to use a temporary library (such as Work), you can temporarily change the source code to reference a permanent library and then change back to a temporary library after you complete this table creation step. △

   b Use either Data Library Manager (in SAS Management Console), SAS Data Integration Studio, or the SAS Metadata LIBNAME Engine to define the output table and its library to the metadata repository. When you specify the libref for the library definition, use the one that you specified in the source code.

4 Ensure that the data source that you specify for the information map is the table that your stored process outputs to. For example, if your stored process output is written to the RESULT_SET table in the STPOUT library, then you must use that table as the data source for your information map.

5 From the SAS Information Map Studio menu bar, select **Tools ▶ Stored Processes**, and then select the desired stored process in the Stored Processes dialog box.



6 Click **OK** to associate the stored process with the information map and to exit the Stored Processes dialog box.

When a query that is generated from the information map is executed, the associated stored process will run before the query code is processed.

For more information about stored processes, see "SAS Stored Processes" in the *SAS 9.1.3 Integration Technologies: Developer's Guide* at **`http://support.sas.com/rnd/itech/doc9/dev_guide/stprocess/index.html`**.

Use SAS Stored Process Input Parameters with an Information Map

Tip

If you use a SAS Stored Process with an information map, and you want the stored process to prompt your report user for information, then add an input parameter for each value that you want to prompt for.

Technique

If your stored process's source code (SAS program) references macro variables that you want to use for prompting a user for values, then complete the following steps:

1. Add an input parameter for a macro variable if you want to prompt a user for a value for that variable. Use either BI Manager (in SAS Management Console), SAS Data Integration Studio, or SAS Enterprise Guide to add input parameters to the stored process.
2. Associate the stored process with an information map. To associate the stored process with an information map, see "Use a SAS Stored Process with an Information Map" on page 40.

When a query that is generated from this information map is executed, the stored process will first prompt the user for parameter values before the query is run.

For more information about stored processes and stored process input parameters, see "SAS Stored Processes" in the *SAS 9.1.3 Integration Technologies: Developer's Guide* at **`http://support.sas.com/rnd/itech/doc9/dev_guide/stprocess/index.html`**.

Use a Table Alias

Tip

Use an alias to support a recursive join or an alternate join between a pair of tables.

Technique

Background

When you insert an alias, you insert an additional logical representation of a table that is already referenced by an information map. The following examples describe scenarios where you would want to insert multiple logical representations of a given table:

Example Scenario: Recursive Join

You insert an Employee table that includes the Employee_ID, Employee_Name, and Manager_ID columns. Then you insert an additional logical representation of the Employee table so that you can create a relationship between Manager_ID and Employee_ID to get the manager's name for each employee.

Example Scenario: Alternate Joins between a Pair of Tables

You insert an Order table that includes the Origin_Location and Destination_Location columns, and a Geography table that stores country values in its Location column. In order to compare origin countries with destination countries, you create a relationship between each location column in the Order table and its own respective logical representation of the Geography table. The equivalent SQL code would look like the following example:

```
FROM
Order INNER JOIN Geography
            ON Order.Origin_Location = Geography.Location
      INNER JOIN Geography as Geography_Alias
            ON Order.Destination_Location = Geography_Alias.Location
```

Create Conditional SQL Code

Tip

The Expression Editor in SAS Information Map Studio enables you to create conditional SQL code for your relational data items.

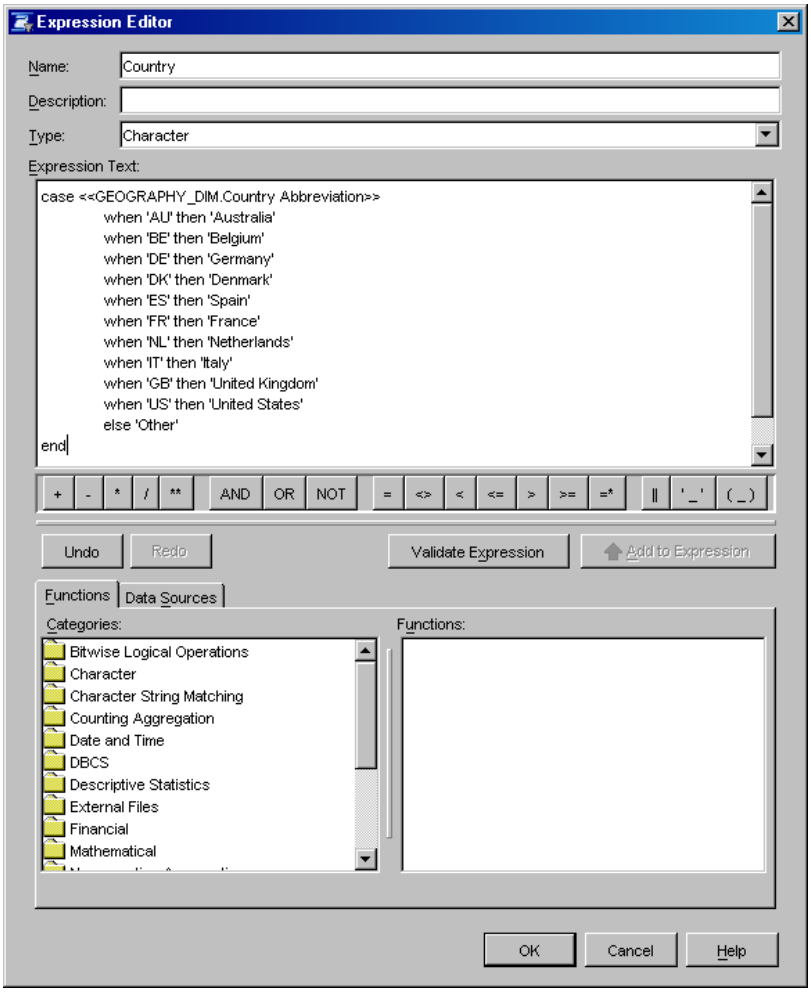
Technique

You can use a CASE statement in a relational data item's expression to perform conditional processing on the data item's values. The steps in the following example describe how to create a relational data item that converts the abbreviations for country names to their full names:

1. In SAS Information Map Studio, open the relational information map that you want to work with.
2. From the menu bar, select **Insert ▶ Data Item**.
3. In the **Type** field, select **Character**.
4. On the **Definition** tab in the Data Item Properties dialog box, click **Edit** to open the Expression Editor dialog box.
5. In the **Expression Text** area, enter the following expression:

```
case <<GEOGRAPHY_DIM.Country Abbreviation>>
        when 'AU' then 'Australia'
        when 'BE' then 'Belgium'
        when 'DE' then 'Germany'
        when 'DK' then 'Denmark'
        when 'ES' then 'Spain'
        when 'FR' then 'France'
        when 'NL' then 'Netherlands'
        when 'IT' then 'Italy'
        when 'GB' then 'United Kingdom'
        when 'US' then 'United States'
        else 'Other'
 end
```

In this expression, the table name is GEOGRAPHY_DIM, and the column label is Country Abbreviation.



6 Click **`Validate Expression`** to check for errors in the expression.

7 Click **`OK`** to apply the expression to the data item and to exit the Expression Editor dialog box.

8 Click **`OK`** to finish creating the data item and to exit the Data Item Properties dialog box.

Create Data Items from Hierarchies

Tip

If you use the **Physical Data** pane in the SAS Information Map Studio main window to "automatically" create a data item from a hierarchy (using either the arrow buttons in the window or the **Insert** option on the hierarchy's drop-down menu), then when the MDX code is generated for a query, the data item resolves to the set of members from the first level below the All level of that hierarchy.

If you want a hierarchy data item to resolve to something other than the first level's members, then you can use the Expression Editor to customize the data item's expression.

Technique

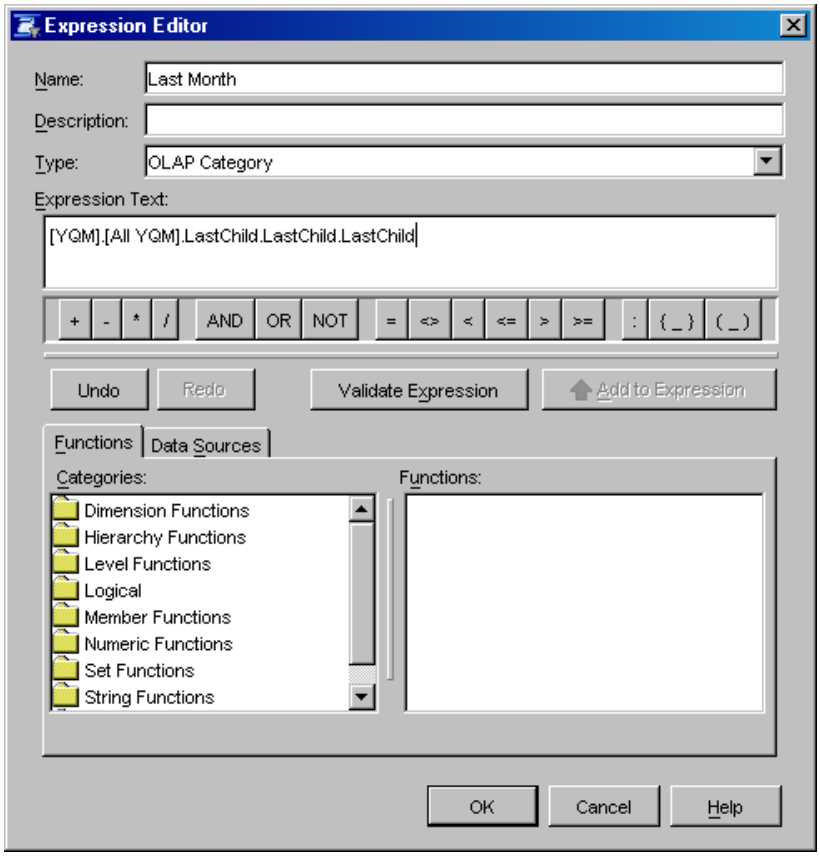
The steps in the following example describe how to create a category data item that represents the last-month member of a Year-Quarter-Month hierarchy named YQM:

1. In SAS Information Map Studio, open the information map that you want to work with.
2. From the menu bar, select **Insert ▶ Data Item**.
3. On the **Definition** tab in the Data Item Properties dialog box, click **Edit** to open the Expression Editor dialog box.

4 In the **Type** field, select **OLAP Category**.

5 In the **Expression Text** area, enter the following expression:

```
[YQM].[All YQM].LastChild.LastChild.LastChild
```



6 Click **Validate Expression** to check for errors in the expression.

7 Click **OK** to apply the expression to the data item and to exit the Expression Editor dialog box.

8 Click **OK** to finish creating the data item and to exit the Data Item Properties dialog box.

Glossary

access control
a method of controlling the type of access that each user has to data, to metadata, or to an application's functionality.

aggregate function
a function that summarizes data and produces a statistic such as a sum, an average, a minimum, or a maximum.

alias
(1) a logical representation of a physical table as it is defined in the metadata repository. An information map can use multiple aliases to represent the same table. (2) a name that is used in an information map to refer to a logical representation of a table. Each table that is a data source for an information map is a logical representation of a table and each logical representation must have a unique name.

catalog
See SAS catalog.

category
a data item whose distinct values are used to group measure data items, using an applied aggregate function.

classification
an attribute of data items that determines how they will be processed in a query. Data items can be classified as either categories or measures.

cube
a set of data that is organized and structured in a hierarchical, multidimensional arrangement. A cube includes measures, and it can have numerous dimensions and levels of data.

data item
in an information map, an item that represents either physical data (a table column, an OLAP hierarchy, or an OLAP measure) or a calculation. Data items are used for building queries. Data items are usually customized in order to present the physical data in a form that is relevant and meaningful to a business user.

data source
the physical data (cube or table), as it is defined in a SAS Metadata Repository, that an information map consumer can query through an information map. The metadata for the physical data provides SAS Information Map Studio with the information that it needs in order to access the physical data.

DBMS (database management system)
a software application that enables you to create and manipulate data that is stored in the form of databases.

detail data
nonsummarized (or partially summarized) factual information that pertains to a single area of interest, such as sales figures, inventory data, or human-resource data.

dimension
a group of closely related hierarchies. Hierarchies within a dimension typically represent different groupings of information that pertains to a single concept. For example, a Time dimension might consist of two hierarchies: (1) Year, Month, Date, and (2) Year, Week, Day. See also hierarchy.

d rill-through
the ability to retrieve and display to a user the detail data from which the summarized data in a cube is derived, when that detail data is stored in a separate data table.

drill-through table
a view, data set, or other data file that contains data that is used to define a cube. Drill-through tables can be used by client applications to provide a view from processed data into the underlying data source.

expression
a combination of data elements, literals, functions, and mathematical operators. An expression can be used to derive a value or to specify a condition that determines whether or how data is processed.

filter
in an information map, criteria that subset data. When a query is generated from an information map, the filter is converted to a query-language statement (for example, an SQL WHERE clause).

format
a pattern that SAS uses to determine how the values of a variable or data item should be written or displayed. SAS provides a set of standard formats and also enables you to define your own formats.

global macro variable
a macro variable that can be referenced in either global or local scope in a SAS program, except where there is a local macro variable that has the same name. A global macro variable exists until the end of the session or program.

heap
an area of memory that is allocated and released dynamically.

hierarchy
an arrangement of members of a dimension into levels that are based on parent-child relationships. Members of a hierarchy are arranged from more general to more specific. For example, in a Time dimension, a hierarchy might consist of the members Year, Quarter, Month, and Day. In a Geography dimension, a hierarchy might consist of the members Country, State or Province, and City. More than one hierarchy can be defined for a dimension. Each hierarchy provides a

navigational path that enables users to drill down to increasing levels of detail. See also member, level.

information map
a collection of data items and filters that describes and presents data in a form that is relevant and meaningful to a business user. A user of a query and reporting application such as SAS Web Report Studio can easily build a business report by using the parts of an information map as the building blocks for queries.

inner join
a join between two tables that returns all of the rows in one table that have one or more matching rows in the other table.

join
(1) the act of combining data from two or more tables in order to produce a single result set. (2) a specification that describes how you want data from two or more tables to be combined. The specification can be in the form of Structured Query Language (SQL) programming code, or it can be done interactively through a software user interface.

level
an element of a dimension hierarchy. Levels describe the dimension from the highest (most summarized) level to the lowest (most detailed) level. For example, possible levels for a Geography dimension are Country, Region, State or Province, and City.

libref (library reference)
a short name for the full physical name of a SAS library. In the context of the SAS Metadata Repository, a libref is associated with a SAS library when the library is defined in the metadata repository.

login
a combination of a user ID, a password, and an authentication domain. Each login provides access to a particular set of computing resources. In a SAS metadata environment, each login can belong to only one individual or group. However, each individual or group can own multiple logins.

macro variable
a variable that is part of the SAS macro programming language. The value of a macro variable is a string that remains constant until you change it. Macro variables are sometimes referred to as symbolic variables.

MDX (multidimensional expressions) language
a standardized, high-level language that is used for querying multidimensional data sources. The MDX language is the multidimensional equivalent of SQL (Structured Query Language).

measure
(1) a data item whose values are aggregated (unless otherwise specified) and which can be used in computations or analytical expressions. Typically, these values are numeric. (2) a special dimension that usually represents numeric data values that are analyzed.

member
a name that represents a particular data element within a dimension. For example, September 1996 might be a member of the Time dimension. A member can be either unique or non-unique. For example, 1997 and 1998 represent unique members in the Year level of a Time dimension. January represents non-unique members in the Month level, because there can be more than one January in the Time dimension if the Time dimension contains data for more than one year.

metadata
data about data. For example, metadata typically describes resources that are shared by multiple applications within an organization. These resources can include software, servers, data sources, network connections, and so on. Metadata can also be used to define application users and to manage users' access to resources. Maintaining metadata in a central location is more efficient than specifying and maintaining the same information separately for each application.

metadata LIBNAME engine
the SAS engine that processes and augments data that is identified by metadata. The metadata engine retrieves information about a target SAS data library from metadata objects in a specified metadata repository.

metadata server
a server that provides metadata management services to one or more client applications. A SAS Metadata Server is an example.

OLAP (online analytical processing)
a software technology that enables users to dynamically analyze data that is stored in cubes.

physical data
data values that are stored on any kind of physical data-storage media, such as disk or tape.

prefilter
in an information map, a mandatory filter that pre-screens and subsets the data in its associated table before any other part of a query is run. The two types of prefilters are authorization-based prefilters and general prefilters. An authorization-based prefilter applies to a specific user or group, and a general prefilter applies to all users.

prompt
a parameter that enables a user to enter a value at run time.

query
a set of instructions that requests particular information from one or more data sources.

relationship
the association, between tables in an information map, that generates a database join in a query.

SAS application server
a server that provides SAS services to a client. In the SAS Open Metadata Architecture, the metadata for a SAS application server specifies one or more server components that provide SAS services to a client.

SAS catalog
a SAS file that stores many different kinds of information in smaller units called catalog entries. A single SAS catalog can contain several different types of catalog entries.

SAS Information Map
See information map.

SAS library
a collection of one or more files that are recognized by SAS and that are referenced and stored as a unit. SAS libraries can be defined in a SAS Metadata Repository to provide centralized definitions for SAS applications.

SAS Metadata Repository
a repository that is used by the SAS Metadata Server to store and retrieve metadata. See also SAS Metadata Server.

SAS Metadata Server
a multi-user server that enables users to read metadata from or write metadata to one or more SAS Metadata Repositories.

SAS OLAP Server
a SAS application server that provides access to multidimensional data. The data is queried using the multidimensional expressions (MDX) language.

SAS program
a group of SAS statements that guide SAS through a process or series of processes in order to read and transform input data and to generate output. The DATA step and the procedure step, used alone or in combination, form the basis of SAS programs.

SAS statement
a string of SAS keywords, SAS names, and special characters and operators that instructs SAS to perform an operation or that gives information to SAS. Each SAS statement ends with a semicolon.

SAS Stored Process
a SAS program that is stored on a server and which can be executed as requested by client applications. SAS Information Maps can use only SAS Stored Processes that run on a SAS Workspace Server.

SAS system option
an option that affects the processing of an entire SAS program or interactive SAS session from the time the option is specified until it is changed. Examples of items that are controlled by SAS system options include the appearance of SAS output, the handling of some files that are used by SAS, the use of system variables, the processing of observations in SAS data sets, features of SAS initialization, and the way SAS interacts with your host operating environment.

SAS Workspace Server
a SAS application server that provides access to Foundation SAS features such as the SAS programming language and SAS libraries.

SQL (Structured Query Language)
a standardized, high-level query language that is used in relational database management systems to create and manipulate database management system objects.

stored process
See SAS Stored Process.

system option
See SAS system option.

table
a two-dimensional representation of data, in which the data values are arranged in rows and columns.

user-defined format
See format.

XML (Extensible Markup Language)
a markup language that structures information by tagging it for content, meaning, or use. Structured information contains both content (for example, words or numbers) and an indication of what role the content plays. For example, content in a section heading has a different meaning from content in a database table.

Index

L

M

O

P

R

S

T

U

W

Your Turn

If you have comments or suggestions about *SAS Information Map Studio 3.1: Tips and Techniques*, please send them to us on a photocopy of this page, or send us electronic mail.

For comments about this book, please return the photocopy to

SAS Publishing
SAS Campus Drive
Cary, NC 27513
E-mail: **yourturn@sas.com**

For suggestions about the software, please return the photocopy to

SAS Institute Inc.
Technical Support Division
SAS Campus Drive
Cary, NC 27513
E-mail: **suggest@sas.com**