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Making Cube Drill-Through-To-Detail More Detailed

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ABSTRACT

SAS[®] Web Report Studio has long offered the ability to view the specific observations from the underlying data that make up an aggregate value in the cube. However, you can use the functionality of WRS to look at that same detail data that is associated with an OLAP cube by using report linking.

This paper describes how you can set up a parameterized report using the SAS Web Report Studio prompting framework to link OLAP data to its source data. The paper shows how to set up a report that drills into a specific level on a dimension in an OLAP report. From that level, you can immediately go to the aggregated data as well as apply totaling and formatting to the flattened detail report.

INTRODUCTION

The ability to link reports together enables you to make a choice between drilling to a simple, standard detail display of OLAP data and drilling to a customized, enhanced version of OLAP data.

Typically, a user can highlight a cell, column, or row that contains specific hierarchical values and select the option to **View Detail**. The user will see a simple listing of the underlying detail data used to construct the cube (Figure 1).

Unfortunately the user has little to no ability to interact with or format detail data. Large detail data can be cumbersome and awkward to read. Additionally, if there is an unusually large amount of detail data, "View Detail" may require a significant amount of memory to produce the detailed report. Alternately, linking reports can save memory.

Figure 1: Typical **View Detail** Display

The typical report user often wants to interact with information. The user wants to understand and see trends and patterns in the detail data. For example, the user might want to know the total of a particular numeric column, to graphically display the values over a period or for a specific location, or to format values.

This paper describes how to create a target report that can be linked to a source report containing a cross tabulation object using data from an OLAP cube. After that link has been established, great options for exploration and formatting potential can be unleashed to the user.

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DETAIL FOR CUBE DATA

It is important to understand the data used to build the OLAP cube. In this case, common.MAILORDERDEMO is the source data being used to build the MAILORDERCUBE cube. The MAILORDER cube will be used in our source report to display hierarchical data in the cross-tabulation object. The MAILORDERDEMO table will be used in our target report to display flat data in the listing object.

```
PROC OLAP
DATA=common.MAILORDERDEMO
CUBE=MAILORDERCUBE
PATH="OLAP_CUBE_PATH"
DESCRIPTION="Cube Description Here"
WORKPATH="WORK_TEMP";
```

DEFINING THE CUBE SOURCE INFORMATION MAP

The first step is to create an information map that accesses the data in the cube. We will select those elements that we want displayed on the source report (Figure 2)
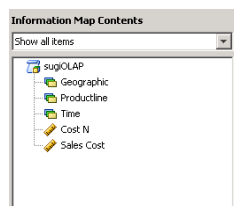

Figure 2: Contents of the Cube Source Information Map

DEFINING THE TARGET DETAIL INFORMATION MAP

The next step is to create an information map to add data that will be used in the target report for both display and to establish a link between the two reports. As mentioned earlier, this information map must reference the relational table that contains the data used to build the cube.

1. Make sure that you have started SAS Information Map Studio
2. Open a new information map.
3. In the SAS Information Map Studio main window, select the tab in the Resources pane.
4. In the **Show** drop-down list, select **Tables**.
5. Make sure that the SAS Application Server node that your tables are associated with is expanded.
6. Expand the Common library node that contains the tables that you want to add as data sources.
7. Select the MAILORDERDEMO table and drag it to the Selected Resources pane to add it as a data source (Figure 3).
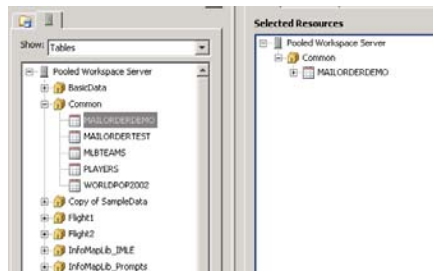

Figure 3: Select the Relational Table Source for the Target

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8. Select the "**Design**" tab to define the data items from the MAILORDERDEMO data source that will be used for either display in the target report or will be used to link the MAILORDERDEMO relational table to the MAILORDER cube.

9. In the Selected Resources pane, expand MAILORDERDEMO and select relevant data items (Figure 4). For a report link to work properly, we must construct a prompted filter to establish the link to pass matched hierarchical data elements to the columns in the relational data. Therefore, we must select data elements needed to construct that link.
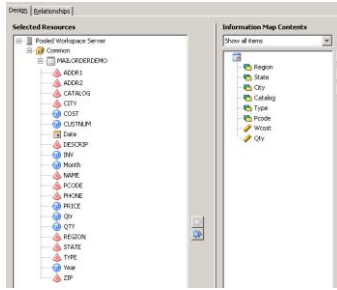

Figure 4: Relevant Relational Data Items

10. In this case, some of the data elements needed are Year, Qtr. and Month. However, in the cube, the date values are character-formatted values. As you can see the relational table, Year is defined as numeric. (Figure 5).
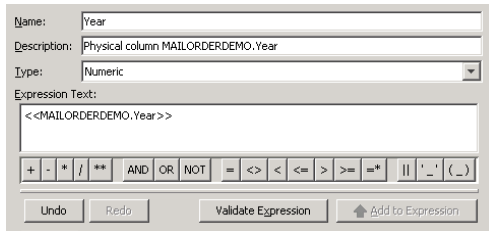

Figure 5: Year Value in the Relational Target

11. We must ensure that data elements that are used to link reports are the same type (character or numeric) and the same length. Therefore, we must define a calculated data item in the information map that defines time data elements as character fields. We must convert the numeric Year data element to a character Year data element (Figure 6).
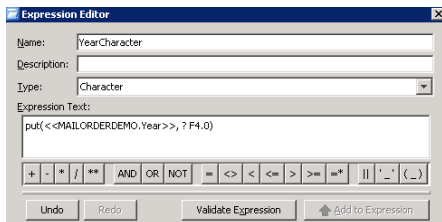

Figure 6: Converting Numeric Value to Character

12. The Year value passed from the source report is longer than the converted Year character value in the target information. Therefore, we must pad leading spaces into the expression to ensure that there is a match in type and length (Figure 7).
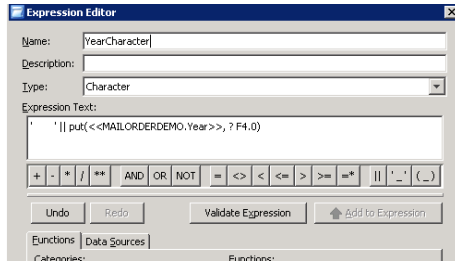
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Figure 7: Padding Space to Ensure a Match in Length

13. In the previous steps, we identified all data fields needed for display and linking. We also insure that the data fields are compatible in type and length. Now, we must define the link between the two data sources. This link is established by defining a prompted filter. To create a prompted filter, open the "Edit Filter" dialog box and enter a character value that contains the value of the cube source (Figure 8).
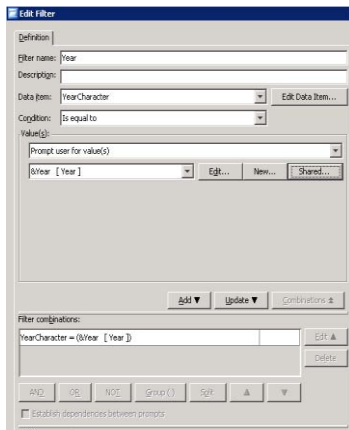

Figure 8: Edit Filter Dialog Box

14. In the Value(s) section, select **Prompt user for value(s)** from the drop-down list and create a new prompt. This will open the "Edit Prompt" dialog box. Then, complete these steps:

    a. In the **Name** field on the **General** tab, enter the name of the character field name.
    b. In the **Displayed text** field, you can enter a free form text message such as `Select region`.
    c. Select the **Prompt Type and Values** tab. In the **Prompt type** drop-down list, **Text** is preselected for you because this filter must be based on character values.
    d. From the **Method for populating prompt** drop-down list, select **User selects values from a static list.**
    e. From the **Number of values** drop-down list, select **Multiple values**.
    f. Select the **All Possible Values** check box.
    g. Click the **Get Value** button. This open the Get Values dialog box, where you should select all values (Figure 9).
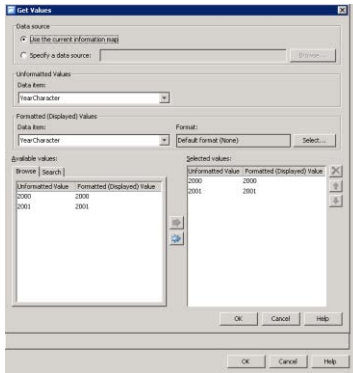
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Figure 9: Get Values Dialog Box

h.   The **List of values** box is now populated with all of the possible values in the Region data field. At this
     point, **(all possible values)** should be selected as the default value (Figure 10).
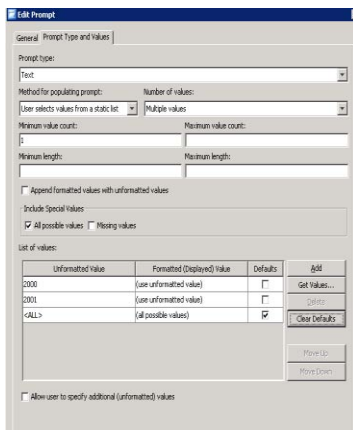

Figure 10: Edited Prompt Definition

i.   Continue defining prompted filters for each source and target data element that is needed to link the cube
     source report to the relational target report. In this case, we have a cube source that contains three
     hierarchies—Geographic, ProductLine, and Time. The Geographic hierarchy contains three levels—Region,
     State, and City (Figure 11). These levels are defined in the relational target data. ProductLine contains
     three levels—Catalog, Type, and PCode. Time contains three levels—Year, Qtr. and Month. Prompted
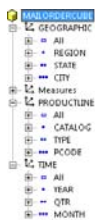   filters must be created for each level of each hierarchy.

Figure 11: Hierarchy and Level Definitions

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j. The completed relational target map should contain the data fields that should be displayed, converted numeric values (Year, Qtr. and Month), and the prompted filters for each hierarchy and level in the information map containing the cube data source (Figure 12).
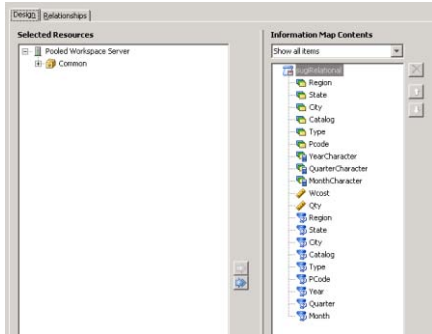

Figure 12: Completed Target Information Map

DEFINING THE TARGET DETAIL REPORT

The next step is to create a report that uses the target information map. This report should contain those elements of the detail data that you wish to have displayed or elements that are needed to accurately link the two reports.

1. Make sure that you have started SAS Web Report Studio.

2. Create a new report.

3. Select those items that you wish to have displayed from the detail data (Figure 13).

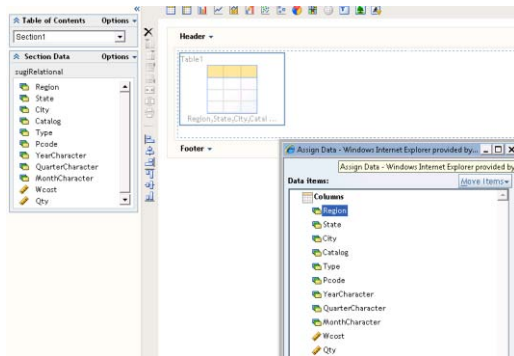
Figure 13: Selected Data Elements in the Detail Target Report

4. Select all of the prompted filters that were created in the target information map. Remember we have defined the prompted filter to link each data element in the cube by hierarchy and level. After you have selected and opened the Section Filters dialog box, select all of the section filters to link the two reports (Figure 14).

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Figure 14: Section Filters Dialog Box

5.   It is important to remember that each prompted filter contains a level in the hierarchy. For example, for the Geographic hierarchy, there are three levels—Region, State, and City. It is a good idea to group and order the levels so that they appear on the prompt filter in the same order that they were built in the cube (Figure 15).
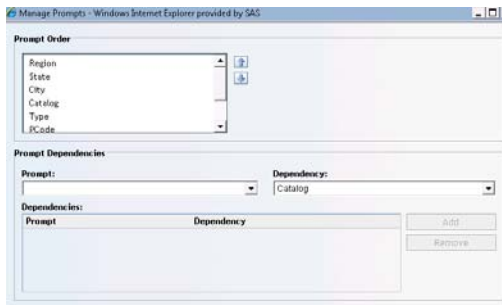
Figure 15: Order of Level Prompts for Section Filter

6.   Because we use the prompted filters to link the two reports, it is important to combine the multiple filters using an AND condition (Figure 16).

Figure 16: Filter Combinations

7.   It is best that you use "All Possible Values" for all prompts when you save the report. This will store "All Possible Values" as the default value in the report definition. The practice will prevent inaccurate data if a particular hierarchy level is not passed in report linking.

8.   It is also wise to define "Write Metadata" deny for your report consumers. This will prevent users from unknowingly saving the target report with values other than "All possible values" for the prompt. It will also suppress the "you have not changed this report" message when the report consumer returns to the OLAP source report.

DEFINING SOURCE REPORT

The next step is to create a report that uses the source information map that is based on the cube data.

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1. Make sure that you have started SAS Web Report Studio.

2. Create a new report.

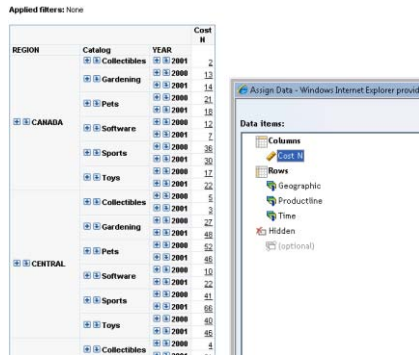3. Select those items that you wish to have displayed from cube data (Figure 17).

Figure 17: Cube Source Report

4. After the source report is created, define the link to the target by right-clicking the report object and selecting **Report Linking** to open the Report Linking dialog box.

   To link to an existing report, complete these steps:

   a. Select the **Include Report Links** check box to confirm that you want to create a report link.

   b. Select the link destination of an existing report. Select the existing relational target report that was created in the previous step.

   c. Click **Set Up Destination Report** to open the Set Up Destination Report dialog box. Assign each data item that represents a hierarchy/level combination in the source to a prompted filter in the target report. Each prompted filter in the target report should match its associated hierarchy/level element in the source report (Figure 18).
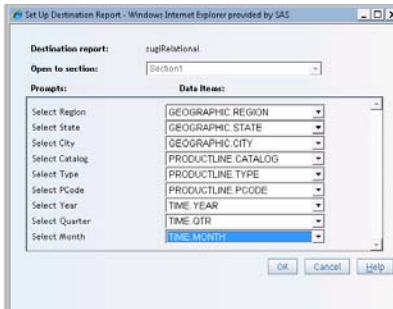
Figure 18: Destination Report Link Definition

5. Since we have defined a link between the source and target reports based on the hierarchy/level data elements that compose a cell selection, we can now initiate our link (Figure 19). To illustrate the link values that are being passed to the target report, we will use the data element Region as our example. If we select 2 in the first row, we pass GEOGRAPHIC.REGION.CANADA to the Region prompt, PRODUCTLINE.CATALOG.COLLECTIBLES to the Product prompt, TIME.YEAR.2001 to the Year prompt for completion of the link to the target report. The default value of "All Possible Values" is applied to the remaining hierarchy/level combinations.

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Figure 19: Initiate Link to Target Report

6. You will notice that when the Prompts dialog box is displayed, it contains each hierarchy/level data element automatically filled in from the cell selection. In this case CANADA was displayed in the source report, and it is included in the "Selected" pane in the prompted filter dialog box (Figure 20).

Figure 20: Prompted Filter Dialog Box

7. The result is a relational report that displays only the detail records for the cell value that you selected (Figure 21)

Applied filters: Catalog equal to Collectibles **AND** (City equal to (all possible values) **AND** MonthCharacter equal to (all possible values) **AND** Pcode equal to (all possible values) **AND** QuarterCharacter equal to (all possible values) **AND** Region equal to CANADA **AND** Type equal to (all possible values)) **AND** YearCharacter equal to 2001 **AND** State equal to (all possible values)

Region	State	City	Catalog	Type	Pcode	YearCharacter	QuarterCharacter	MonthCharacter	Wcost	Qty
CANADA	ON	Alliston	Collectibles	Animals	CC4400	2001	4	11	$22.00	1
CANADA	PQ	Kirkland	Collectibles	Figures	CC2500	2001	3	9	$43.00	4

Figure 21: Result of Cell Selection from Source

8. Because we have defined all of the levels in the hierarchical data element, if you drill or expand in the source report (Figure 22), the target will maintain the correct connection with the drilled or expanded cell (Figure 23).

Figure 22: Drill Down on the Hierarchy Data Element of Time

Applied filters: Catalog equal to Collectibles **AND** (City equal to (all possible values) **AND** MonthCharacter equal to (all possible values) **AND** Pcode equal to (all possible values) **AND** QuarterCharacter equal to 3 **AND** Region equal to CANADA **AND** Type equal to (all possible values)) **AND** YearCharacter equal to 2001 **AND** State equal to (all possible values)

Region	State	City	Catalog	Type	Pcode	YearCharacter	QuarterCharacter	MonthCharacter	Wcost	Qty
CANADA	PQ	Kirkland	Collectibles	Figures	CC2500	2001	3	9	$43.00	4

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Figure 23: Result of Drill Up Cell from Source

9.   If ALL prompts have been satisfied, the prompt screen is bypassed. If any prompts are left unsatisfied, the prompt screen will display and you will simply need to click "View Report"

SHOWING MORE ABOUT THE DETAIL

Now that the basic source and target reports have been built, you are ready to build more detail in the target report. The full power and functionality of SAS Web Report Studio is open to you in performing that task.

It is now possible for you to select the full feature set within the List object itself. For example:

To show or hide totals for list tables, complete these steps:

1. Right-click on the list table, and then select **Total** to open the Total dialog box.

2. Select the **Totals** check box.

To add a percentage of total calculation to a table, complete these steps:

1. Right-click on the table, and then select **Percent of Total** to open the Percent of Total dialog box.

2. In the **For measure** drop-down list, select a measure for the calculation.

3. In the **Show percent of** drop-down list, select the **Column Total** option.

You have now added a total for the record of your cell selection as well as a percentage of total (Figure 24). This is not possible on the simple **View Detail** option of the cube source report.

Applied filters: Catalog equal to Collectibles **AND** (City equal to (all possible values) **AND** MonthCharacter equal to (all possible values) **AND** Pcode equal to (all possible values) **AND** QuarterCharacter equal to (all possible values) **AND** Region equal to CANADA **AND** Type equal to (all possible values)) **AND** YearCharacter equal to 2001 **AND** State equal to (all possible values)

Region	State	City	Catalog	Type	Pcode	YearCharacter	QuarterCharacter	MonthCharacter	Wcost	Percent of Column	Qty
CANADA	ON	Alliston	Collectibles	Animals	CC4400	2001	4	11	$22.00	33.85%	1
CANADA	PQ	Kirkland	Collectibles	Figures	CC2500	2001	3	9	$43.00	66.15%	4
Total									**$65.00**	**100.00%**	**5**

Figure 24: Detail Report with Totals and Percentage of Totals

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It is possible to add other objects to illustrate and determine trends in the detail (Figure 25).

Applied filters: Catalog equal to Gardening **AND** (City equal to (all possible values) **AND** MonthCharacter equal to (all possible values) **AND** Pcode equal to (all possible values) **AND** QuarterCharacter equal to (all possible values) **AND** Region equal to CANADA **AND** Type equal to (all possible values)) **AND** YearCharacter equal to 2001 **AND** State equal to (all possible values)

Region	State	City	Catalog	Type	Pcode	YearCharacter	QuarterCharacter	MonthCharacter	Wcost	Percent of Column	Qty
CANADA	AB	Calgary	Gardening	Hand Tools	GD1001	2001	1	2	$7.00	2.15%	1
CANADA	ON	Alliston	Gardening	Bulbs	GD2200	2001	2	5	$6.00	1.84%	3
CANADA	ON	Alliston	Gardening	Bulbs	GD2300	2001	2	5	$6.00	1.84%	3
CANADA	ON	Alliston	Gardening	Hand Tools	GD1200	2001	2	5	$9.00	2.76%	1
CANADA	ON	Alliston	Gardening	Hand Tools	GD1300	2001	2	5	$7.00	2.15%	4
CANADA	ON	Burlington	Gardening	Seeds	GD4300	2001	1	3	$1.50	0.46%	1
CANADA	ON	Don Mills	Gardening	Power Tools	GD3200	2001	2	5	$36.00	11.04%	1
CANADA	ON	Ottawa	Gardening	Hand Tools	GD1600	2001	4	11	$4.00	1.23%	1
CANADA	ON	Ottawa	Gardening	Power Tools	GD3300	2001	2	4	$100.00	30.67%	4
CANADA	ON	Toronto	Gardening	Bulbs	GD2200	2001	1	2	$6.00	1.84%	2
CANADA	ON	Toronto	Gardening	Hand Tools	GD1100	2001	2	6	$6.00	1.84%	1
CANADA	ON	Toronto	Gardening	Power Tools	GD3200	2001	2	4	$36.00	11.04%	1
CANADA	PQ	Kirkland	Gardening	Power Tools	GD3300	2001	2	5	$100.00	30.67%	1
CANADA	PQ	Montreal	Gardening	Seeds	GD4300	2001	4	11	$1.50	0.46%	3
Total									$326.00	100.00%	27

Applied filters: Catalog equal to Gardening **AND** (City equal to (all possible values) **AND** MonthCharacter equal to (all possible values) **AND** Pcode equal to (all possible values) **AND** QuarterCharacter equal to (all possible values) **AND** Region equal to CANADA **AND** Type equal to (all possible values)) **AND** YearCharacter equal to 2001 **AND** State equal to (all possible values)

Wcost

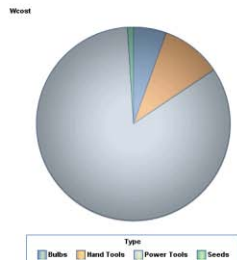Type
☐ Bulbs ☐ Hand Tools ☐ Power Tools ☐ Seeds

Figure 25: Detail Reporting Using Both Graphical and Listing Objects

CONCLUSION

Although the simple **View Detail** function in the cross tabulation object is easy and provides quick access to the detail data that built the cube, the report-linking functionality offers more options for displaying and analyzing detail. Taking the time to define and link hierarchical data elements to the detail table will provide the full reporting power of SAS Web Report Studio for viewing detail data.

RECOMMENDED READING

SAS Institute Inc. 2010. *SAS Web Report Studio 4.3: User's Guide*. Cary, NC: SAS Institute Inc. Available at http://support.sas.com/documentation.

CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author:

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