# Calculated Members

The term *calculated member* refers to the creation of any MDX object through a calculation. The calculated member can be part of the Measures dimension where a simple MDX expression such as addition or subtraction of two or more base measures results in a new measure. Such calculated members on the Measures dimension are referred to as *calculated measures* . You can also create calculated members on other dimensions by specifying an MDX expression. These members are simply referred to as calculated members. To create a calculated member, click the Calculations tab of the cube editor. This takes you to the Calculations view, as shown in Figure 6 - 22 . The Calculations view contains three window panes: Script Organizer, Calculation Tools, and Script.

The Script Organizer window pane shows the names of the calculation objects of the cube. Various types of calculations can be created in the Calculations view such as calculated members and calculated measures. You can apply a name to a subset of dimension members. This is referred to as a *named set* . In addition to calculated members and named sets, you can define a script containing complex MDX expressions to perform complex business logic calculations. If you right - click within the Script Organizer you can see the selections to create a calculated member, named set, or a script command. These operations can also be performed by clicking the buttons in the toolbar as indicated in Figure 6 - 22 . You create calculated measures in this chapter. The creation of script commands and named sets are detailed in Chapters 9 and 10 .

The Calculation Tools pane contains three pages: Metadata, Functions, and Templates. The Metadata view is identical to the Measure Groups pane you have become familiar with in the Cube Designer ' s Browser page. It shows the measures and dimensions of the current cube. The Functions view shows all the MDX functions along with a template of the arguments needed for each function. In the Templates view you can see templates for some common calculations used in certain applications such as budgeting and financial.

The Script window pane shows the details of calculation scripts. The default view of the Script window is called the Form View. It can also be toggled to a different view called the Script View. In the Form View, the Script Organizer pane will be visible and you can see the calculations of each object in the Script window pane. If the Script window is switched to the Script View (using the appropriate button as shown in Figure 6 - 22), all the calculations are shown as a single script and the Script Organizer pane becomes invisible. You can toggle between the two views by clicking the icons shown in Figure 6 - 22 or by selecting the option through the menu item Cube Show Calculations In, which contains options for Script or Form views.
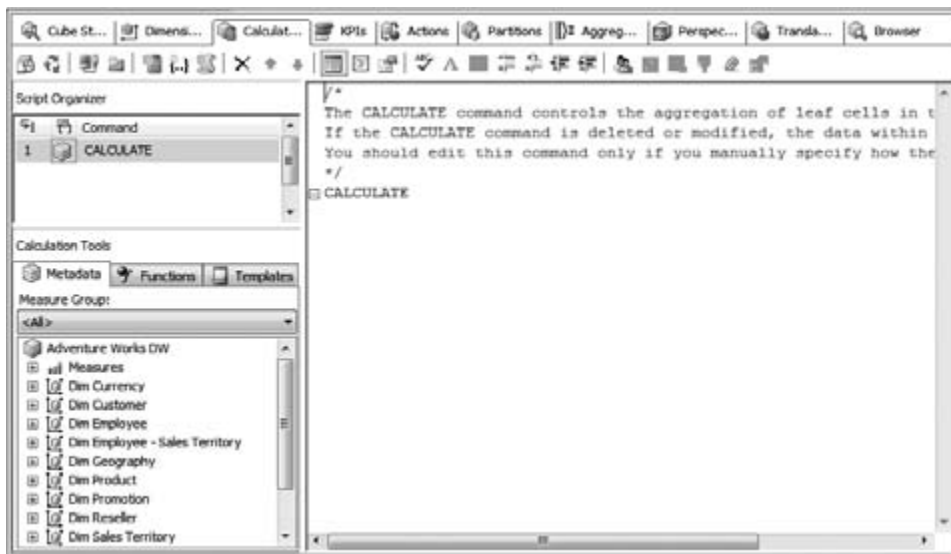

All commands and selections available in Analysis Services 2008 are accessible via keyboard controls. You can switch between the three panes of the Script tab of the Cube Designer using the F6 function key

*or by making the appropriate selection via menu items.*

Calculated Measures

Calculated measures are the most common type of calculated members created in a cube. In your project you have the measures Sales and Product Cost in the two measure groups, Fact Internet Sales and Fact Reseller Sales. An important question to ask about any business concerns profits gained. Profits gained is the difference between total sales and cost of goods sold. In the Adventure Works DW cube you have Sales through the Internet as well as through resellers. Therefore you need to add these two sales amounts to calculate the total sales of products. Similarly, you need to calculate the total product cost by adding the costs of products sold through the Internet and resellers. Two calculated measures must be formed to perform these operations. Once you have created these two calculations, you can calculate the profit. Follow these steps to create the calculated measure for profit:

1. Right - click in the Script Organizer pane and select New Calculated Member, as shown in Figure 6 - 23 . An object called Calculated Member is created. The Script window now shows several text boxes for you to specify the name of the calculation, the MDX expression for the calculated member, and other properties for the calculated member.
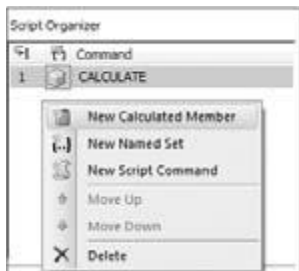
2. Specify the name of the calculated member as [Total Sales Amount] in the Script window. In the Expression text box you need to type the MDX expression that will calculate the Total Sales Amount. As mentioned earlier, the Total Sales Amount is the sum of sales from the sales amounts in the Fact Internet Sales and Fact Reseller Sales measure groups. Drag and drop these measures from the Metadata window and add the MDX operator " + " between these measures as shown in Figure 6 - 24 .
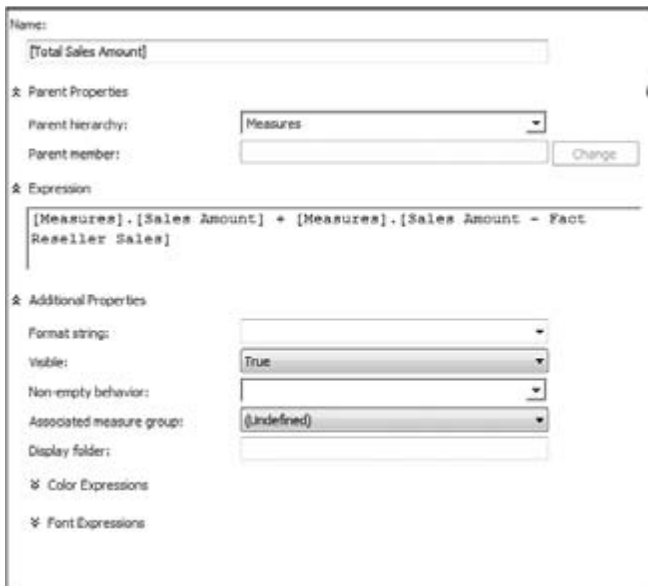
3. For cost of goods sold, create a new calculated member called [Total Product Costs] using a method similar to the one described in step 2 but with appropriate Product Cost measures from the two measure groups.

4. Create a calculated member called [Profit]. The MDX expression to evaluate Profit is the

difference of the calculated measures you have created in steps 2 and 3. Enter the MDX expression [Measures].[Total Sales Amount] – [Measures].[Total Product Costs] in the Expression text box as shown in Figure 6 - 25 . Since Measures is a special dimension, we do not necessarily have to precede the measure name with [Measures].

5. You have the option of specifying certain additional properties for the calculated measures you have created based on an MDX expression. By default all the calculated measures created are visible. You can specify color, font, and format strings for the calculated measures based on certain conditions. For example, if you want to highlight the profit in red if the amount is less than one million dollars and in green if it is greater than or equal to one million, you can do so by specifying the appropriate background color for the calculated member.

6. Enter the following MDX expression for the Color Expressions Back color: in the Script Window.

iif ([Measures].[Profit] < 1000000, 255 /*Red*/,
65280 /*Green*/)

This MDX expression uses the IIF function. This function takes three arguments. The first argument is an expression that should evaluate to true or false. The return value of the IIF function is either the second or the third argument passed to the function. If the result of the expression is true, the IIF function returns the second argument; if the expression is false, it returns the third argument. The first argument passed to the IIF function is to see if the profit is less than one million. The second and third arguments passed to the function are the values for the colors red and green. The values for the colors can be selected by clicking the color icon next to the background color text box.

To see the effect of the calculations you have created:

7. Go to the Cube Browser tab.

8. Deploy the AnalysisServices2008Tutorial project to your Analysis Services instance.

9. As soon as the deployment is complete, switch to the Cube Browser tab and click the Reconnect button to get the updated metadata and data from the Analysis Services instance.

10. Expand the Measures folder to see the newly created calculated measures as shown in Figure 6 - 26 .

11. Drag and drop the measure Profit to the OWC detail area, hierarchy English Country Region name of the Dim Geography dimension on rows, and hierarchy Style of the Dim Product dimension on columns.

You will see the background color for the cells are either red or green based on the Profit value as shown in Figure 6 - 26 .
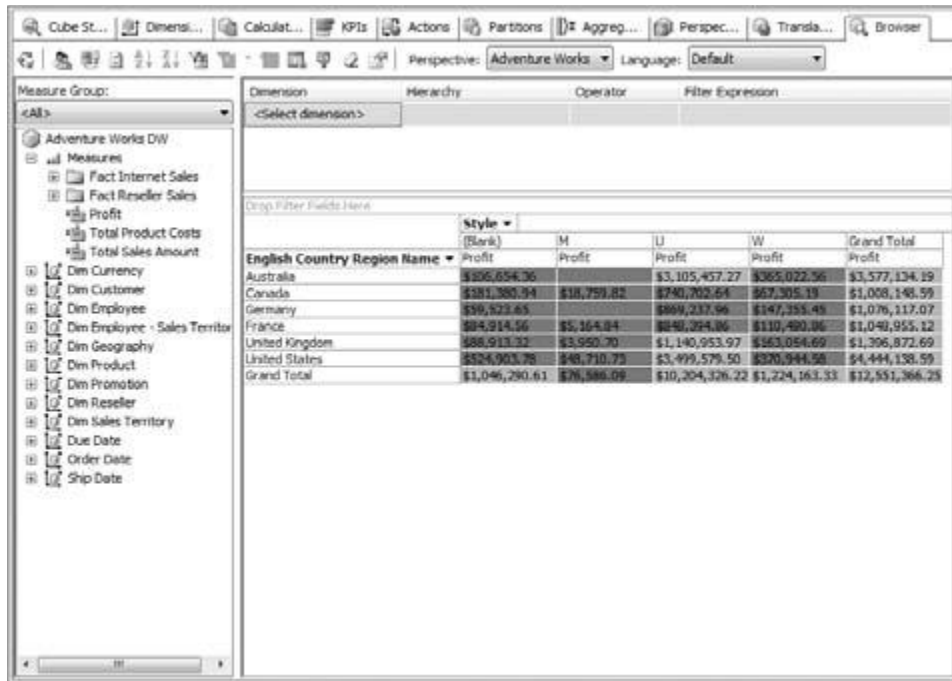
Querying Calculated Measures

You can query the calculated measures similar to other measures in the cube by referencing them by name. For example, if you want to query the calculated member Profit based on Model Name, you execute the following query:

SELECT [Measures].[Profit] on COLUMNS,
[Dim Product].[Model Name].MEMBERS on ROWS
FROM [Adventure Works DW]

If you want to retrieve all the measures in the cube instead of specifying each measure, you use [Measures].MEMBERS. However, calculated members are not returned in your query result when you specify [Measures].MEMBERS. You need to execute the following MDX query to retrieve the base measures along with the calculated members:

SELECT [Measures].ALLMEMBERS on COLUMNS,
[Dim Product].[Model Name].MEMBERS on ROWS
FROM [Adventure Works DW]

You have learned to enhance the Adventure Works DW cube by creating calculated measures and learned to set certain properties for the calculated measures via MDX expressions. The NonEmptyBehavior property for calculated measures is discussed in Chapter 15 .

Creating Perspectives

Analysis Services 2008 provides you with the option of creating a cube that combines many fact tables. Each cube dimension can contain several attributes and hierarchies. Even though the cube might contain all the relevant data for business analysis combined into a single object, the users of the cube might only be interested in sections of the cube. For example, you can have a cube that contains sales and budget information of a company. The Sales department is only interested in viewing sales - relevant data, whereas the users involved in budgeting or forecasting next year ' s revenue are only interested in budget - relevant sections of the cube. Typically, users do not like to see too much extra information. In order to accommodate this, Analysis Services 2008 provides you with the option of creating a view of a cube that only contains a subset of its objects, called a *perspective* .

In the Adventure Works DW cube you have two fact tables, FactInternetSales and FactResellerSales. To understand the behavior of perspectives, create a perspective for Internet Sales and a perspective for Reseller Sales. The following steps show you how to create new perspectives:

1. Click the Perspectives tab in the Cube Designer. You will see a column on the left showing the measures, dimensions, and calculated members as shown in Figure 6 - 27 .
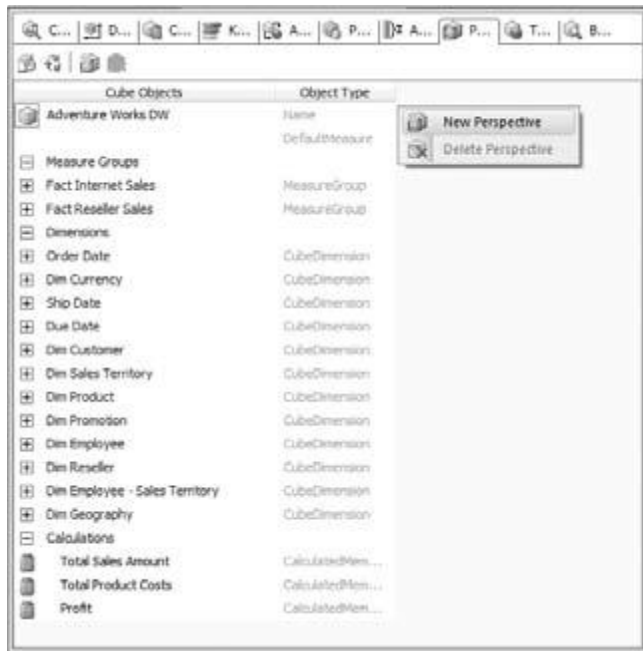
2. Right - click in the window pane and select New Perspective as shown in Figure 6 - 27 . You can also create a new perspective by clicking the New Perspective button in the toolbar. A new column with the name Perspective is created. You have a checkbox next to each object in the cube and these are selected by default. Rename the perspective Internet Sales. Deselect the Fact Reseller Sales measure group and the dimensions Dim Employee and Dim Reseller.

3. Create another perspective called Reseller Sales. Deselect the Fact Internet Sales measure group and the Dim Customer dimension.

Your Perspective window will now look similar to Figure 6 - 28 . Now deploy the project. BIDS sends the definitions for the new perspectives to the server. Perspectives are not new cubes on the server, but only a view of an existing cube object. Keep in mind that perspectives are represented as different cubes with the cube names represented as the perspective name when a client queries for the cube in a database.

translations for the cube. You see the effect of perspectives along with translations after learning how to create translations for a cube.

Creating Translations

Translations facilitate the display of data and metadata in a regional language. Unlike translations for dimensions, where a column from the relational table is specified as containing the translation for members of an attribute hierarchy, cube translations are specified for the cube ' s metadata objects. To create a new translation for the Adventure Works DW cube, do the following:

1. Click the Translations tab in the Cube Editor. Similar to the Perspective view, the left column shows the names of all the metadata objects in the default language. There is another column that indicates the object type, which indicates Caption because defining translations for a cube is only providing translated names for the metadata object names.

2. Right - click in the Translation window pane and select New Translation. You can also create a new translation using the New Translation button in the toolbar. In the Select Language dialog, select French (France) as the language and click OK. You now have a new column where you

can provide the translations of each object (measure, display folders, dimension name, attribute names). Specify the translations in French as shown in Figure 6 - 29 . (If you don ' t know French you can enter the translations in a language of your choice.) You can define translations for each metadata object in the cube such as measure names, measure group names, dimension names, perspective names, as well as calculated member names.

3. Deploy the project to your Analysis Services instance.
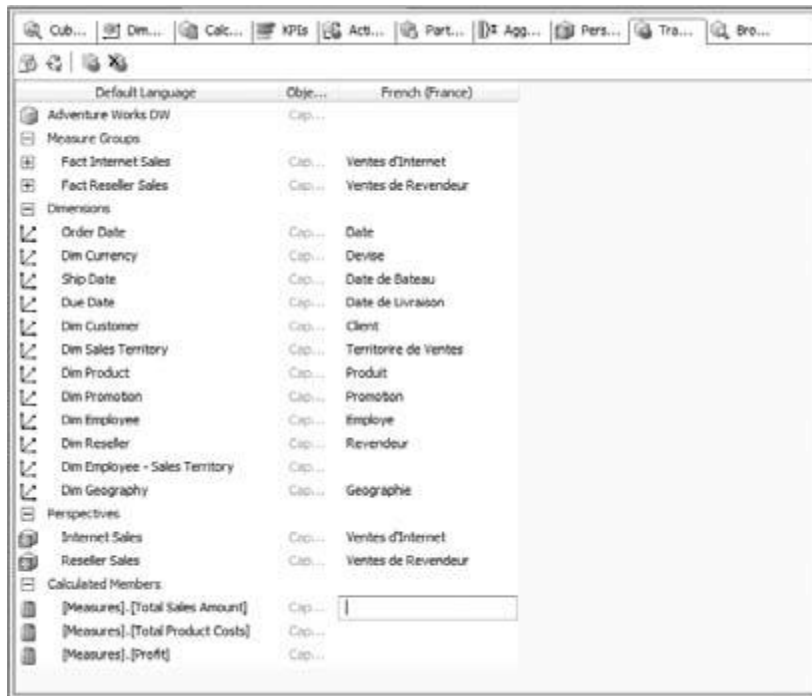
Browsing Perspectives and Translations

You have successfully created perspectives and translations for the Adventure Works DW cube. To see the effect, you need to be in the Browser tab of the Cube Designer. In the Browser, if you click the Perspective drop - down list box you will see three perspectives: Adventure Works DW (the default perspective that contains all cube objects), Internet Sales, and Reseller Sales. Select the Internet Sales perspective. If you expand the measures in the Measure Group window you will notice that all the measures relevant to the reseller are now not visible. Drag and drop the Sales Amount, English Product Name hierarchy in the Dim Product dimension, and the English Education hierarchy of the Dim Customer dimension to the OWC browser. You will see the sales amount data along with product names and education of customers as shown in Figure 6 - 30 .

To see the translated names in French you need to select the language French (France) in the Cube Browser. As soon as you select the French (France) language you will notice that all the metadata and data members for the hierarchies in the OWC automatically change to values in French for those objects where translations have been defined, as shown in Figure 6 - 31 . Thus you have created translated values in French for a French client who wants to analyze the same values, but who would be able to understand and interpret the results better in French than English. Each language has a corresponding id called the locale id. When you select a specific language in the Browser, BIDS connects to the server with the corresponding locale id for the language. Analysis Services automatically provides you with the metadata and data corresponding to the locale id whenever queries are sent to the server on the same connection.

overhead of maintaining the cubes in each language, Analysis Services 2008 provides you with the functionality through the perspectives and translations features.

Summary

You traversed the Cube Wizard for a second time in this book, but also at a different level of granularity and hopefully with more understanding of what was going on. You learned how to create calculated members and set properties concerning the display of those members; for example, different color foregrounds and backgrounds. And finally, you learned how to create and browse perspectives and translations. In the real world of business, you will have additional enhancement requirements to meet after running the Cube Wizard. These requirements may include creating calculated members on dimensions, creating cube scripts containing complex MDX expressions to meet your business needs, and adding Key Performance Indicators (KPIs), which will graphically represent the state of your business in real time. The Cube Designer contains additional tabs for KPIs and Actions. These features help enhance your cubes for business analysis. In addition to that, the Cube Designer helps in partitioning fact data, and defining aggregations, which in turn help you achieve improved performance while querying your UDM. These are covered in Chapter 9 , with additional coverage in other chapters

as well. In the next chapter you learn how to manage your Analysis Services databases using the SQL Server Management Studio.