Crystal Analysis Professional

Dr. MDX Illustrates SUMS and Other Simple Calculations

Dr. MDX Overview

Dr. MDX is a regular column in the Developer Zone section of the Crystal Decisions web site. Every two weeks the Doctor answers a reader's MDX problem and suggests some solutions.

MDX, short for Multi Dimensional Expressions, is a query language for accessing data from OLE DB for OLAP (ODBO) compliant servers, such as Microsoft SQL Server Analysis Services.

Column Overview

Most people have their first encounter with MDX when they want to add calculations to their OLAP cubes or reports. These can start off being quite straightforward, but can rapidly grow in sophistication, as more analysis is required. **This column aims to introduce calculated members, help understand why they are necessary and show how to define them.**

About Calculated Members

Calculated members are required whenever a value you need in your report is not available in your OLAP cube. You have two choices about where to define the calculated member.

- In the cube
- In the report

Calculated members defined in the cube are available from any report in any MDX tool. The downside is that you need administrator privileges to define the calculation, usually through the SQL Server Analysis Manager, and the cube needs to be re-processed.

Defining calculations in the report means that the result is available immediately and anyone can do it, but the calculation is only available in that report.

The examples in these columns can be used to define calculations in either the cube, or a reporting tool such as Crystal Analysis Professional.
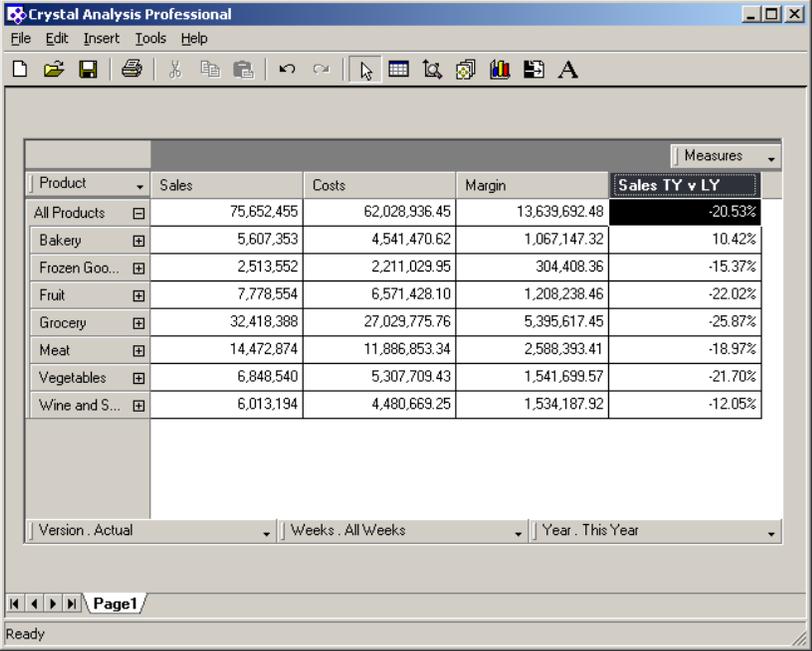
Simple Calculations

To get us started, let's look at a requirement from a fictional supermarket group, SuperSmart, Inc. Their store managers want to see the percentage change in sales between this year and last year. We will illustrate ways to achieve this using the Crystal Samples 'Sales Reports' cube and Crystal Analysis Professional.

Which Dimension To Use?

One of the first questions is usually 'which dimension should the calculation be added to?' The answer is 'it depends'.

It is tempting to create all calculations on the measures dimension. In fact they are often referred to as calculated measures, hinting that there is no choice. In fact, any dimension in SQL Server can have calculated members defined, both in the cube and in a reporting tool. So how do you choose which dimension to use?

Figure 1 shows the result of adding our comparison to the measures dimension. I could add this calculation to the measures dimension, as shown in **Figure 1.**

Figure 1: Comparison calculation defined on the measures dimension

This fits the immediate requirement, but fails if the requirement then changes to comparing Sales, Costs and Margin in both years. To satisfy the new requirement I could just replicate the calculation for each measure. However, this is prone to errors and is not really general enough.

The alternative is to create the calculation on a different dimension, the years dimension in this case. The result is shown in **Figure 2.**

Figure 2: Comparison calculation defined on the Year dimension

Now you can see the comparison for each measure, or indeed any slice you take through the cube. The key point here is that it is *years* that are being compared, not sales. This suggests that the year dimension being the correct place for the calculation.

Defining the Calculation

Simple MDX calculations like this are pretty straightforward. To generate the calculation in **Figure 2** the calculation is:

(**[This Year]** - **[Last Year]**) / **[Last Year]** * 100

To add this calculation using Crystal Analysis Professional, simply right click on the year dimension and choose Add calculated member... . This will display the calculated member dialog, allowing you to define the calculation as shown in **Figure 3**.

Calculating Sums

Sums, or adding numbers together, are some of the most common requirements. In MDX you can either use the '+' operator or the MDX **Sum** function:

Sum(«Set»[, «Numeric Expression»])

Let's look at some examples using the Foodmart 2000 cube. Suppose I want to know the half-year values for 'Unit Sales' in the stores. I would have to sum the values for Q1 and Q2 and the values for Q3 and Q4. In this case the following calculation can be added to the **Time** dimension:

Sum({[Time].[1997].[Q1],[Time].[1997].[Q2]})

I would then add a similar calculation in Q3 and Q4. **Figure 4** shows the Crystal Analysis Professional calculation expert with this calculation defined, while the result is shown in **Figure 5**.
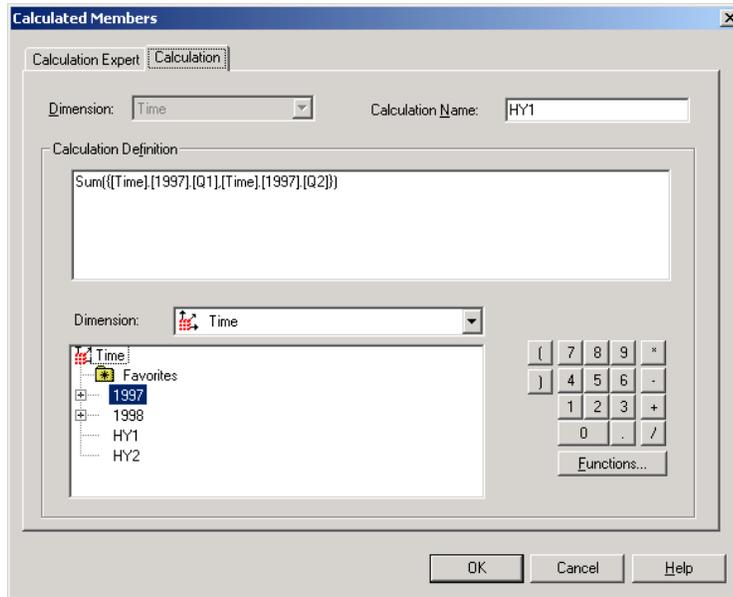

Figure 4: Sum calculation defined in the Crystal Analysis Professional calculation expert
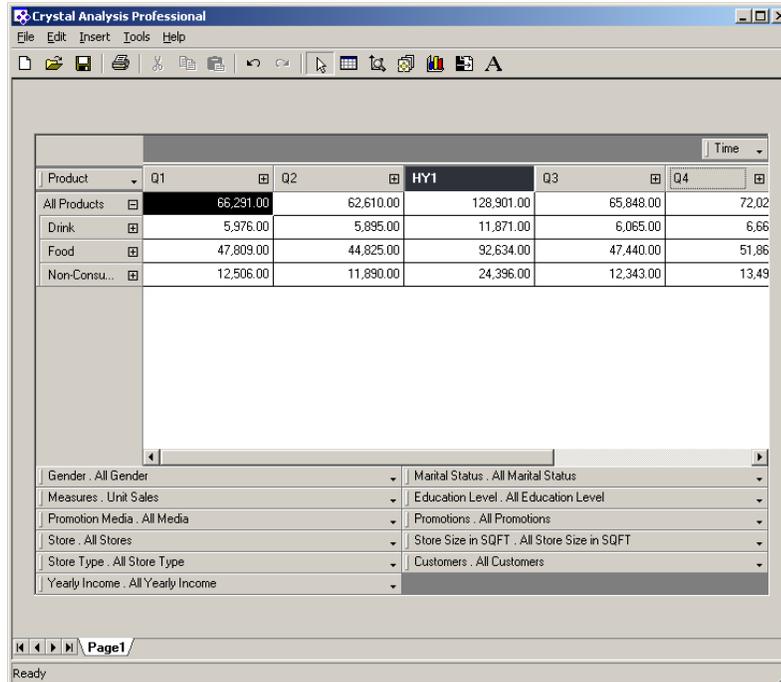

Figure 5: Worksheet showing half-year results.

Finding More Information

For more information on Crystal Analysis Professional and the Crystal Decisions family of business intelligence products, please visit:

- http://www.crystaldecisions.com/products

- http://support.crystaldecisions.com

- http://www.crystaldecisions.com/products/dev_zone

Contacting Crystal Decisions for Technical Support

We recommend that you refer to the product documentation and that you visit our Technical Support web site for more resources.

Self-serve Support:

http://support.crystaldecisions.com/

Email Support:

http://support.crystaldecisions.com/support/answers.asp

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