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Tip or Technique

Using the AT and FOR Options with Relational Summary Functions

Product(s): IBM Cognos 8

Area of Interest: Report Design

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Contents

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1 Introduction

1.1 Purpose

This document outlines the use of the AT clause in summary functions. An example is also provided with step by step instructions on how to create a cross tab report that displays the totals and 'running-total' for a given measure.

1.2 Applicability

The following was built using IBM Cognos 8.1 MR2 Report Studio against the GO Sales and Retailers package.

1.3 Exclusions and Exceptions

This technique was built and tested against a relational database and has not been tested against an OLAP data source.

For dimensional data sources and models the OLAP functions are often more applicable than the tabular/relational functions that leverage the AT clause. For example, the running-total can be replaced with a combination of the total() member summary function applied to a member set such as one produced by the periodsToDate() function.

2 The FOR clause

Tabular summary functions used for relational reporting have several optional arguments that can be used to define how the summary function is to be applied. One of the more common elements is the FOR clause. For example, the total function syntax is:

```
total ( [ distinct ] expr [ auto ] )
total ( [ distinct ] expr for [ all | any ] expr { , expr } )
total ( [ distinct ] expr for report )
```

The first form shows the 'auto' operator applied within the total function. This operator is optional and is the default action if a FOR clause isn't used. This default behaviour will determine the level of aggregation from the current context of the data item to define how the values will be rolled up. So if the data item is placed in a footer or header then the lower level groupings or detail values will be rolled up and the total will be computed with only the higher level groupings.

The 'for report' option allows a fact data item to be rolled up over the entire data set. The effect is that the individual groups within the data are ignored and all the records are rolled up into a single summary value.

The final syntax form allows you specify the data items that will be used when computing the aggregate. In essence it allows you to roll values up to a higher level of grouping and use that summarized value at lower levels in your report.

The sample list report below will better illustrate the behaviour of the FOR clause. The report is grouped on Order year and Order month and displays Product line at the lowest level of detail. The Quantity column shows the default total aggregation of the data item from the model.

Order year	Order month	Product line	Quantity	total([Quantity] auto)	total([Quantity] for report)	total([Quantity] for [Order year], [Order month])	total([Quantity] for [Order month])
2004	1	Camping Equipment	9,800	9,800	2,215,354	24,896	105,860
		Golf Equipment	714	714	2,215,354	24,896	105,860
		Outdoor Protection	9,938	9,938	2,215,354	24,896	105,860
		Personal Accessories	4,444	4,444	2,215,354	24,896	105,860
	1		24,896	24,896	2,215,354	24,896	105,860
	2	Camping Equipment	11,398	11,398	2,215,354	29,672	87,770
		Golf Equipment	470	470	2,215,354	29,672	87,770
		Outdoor Protection	13,520	13,520	2,215,354	29,672	87,770
		Personal Accessories	4,284	4,284	2,215,354	29,672	87,770
	2		29,672	29,672	2,215,354	29,672	87,770
	3	Camping Equipment		12,514	2,215,354	55,143	206,874
		Golf E...			2,215,354		
		...Protection	2,912	2,912		44,798	113,342
		Personal Accessories	7,608	7,608	2,215,354	44,798	113,342
	11		44,798	44,798	2,215,354	44,798	113,342
	12	Camping Equipment	29,098	29,098	2,215,354	56,498	127,526
		Golf Equipment	3,088	3,088	2,215,354	56,498	127,526
		Mountaineering Equipment	9,298	9,298	2,215,354	56,498	127,526
		Outdoor Protection	5,428	5,428	2,215,354	56,498	127,526
		Personal Accessories	9,586	9,586	2,215,354	56,498	127,526
	12		56,498	56,498	2,215,354	56,498	127,526
2006			863,918	863,918	2,215,354	28,564	87,770
Summary			2,215,354	2,215,354	2,215,354	24,896	87,770

As we can see, the expression using the auto operator follows the same rollup rules as the model item and is rollup up according to the nested groupings in the report.

The expression using 'for report' displays the overall summary value as we would expect regardless of whether the data item is being used in a footer or at the lowest level of detail in the report.

When we get to the 'for [Order year],[Order month]' we begin to see some of the capabilities of the FOR clause. In this expression the Product line values are rolled up to the given grouping of Order year and Order month. This allows us to report the summary values within the context of the detail Product line records. This kind of operation is particularly useful when calculating some percent of base type expressions where the lower level values are compared to the value of a sub-total or grand total (although the percentage function can also be used in many cases).

Notice though that for the 'for [Order year], [Order month]' calculation the summary footers for the Order year and overall summary are not the same as the overall summary in the prior calculations. At these footers the Order month (and also Order year for the overall summary) are not within the current scope. The result of the total function with this FOR clause is that many values are returned at these higher grouping levels and the first of the many values is displayed in the footer cell.

The final calculation in the above report sets the FOR clause to 'for [Order month]'. Here the Order year is not being included in our expression. The result is that the Quantity measure is rolled up for the Order month only and the Order year is not used to group the data. In the result set we have data for 2004, 2005, and 2006 and each year has months 1 through 12. The value that we see for month 1 above is the total Quantity from January 2004,January 2005, and January 2006 because the data is grouped by month only when the total is calculated. This type of calculation would allow us to break from the existing groupings in the report compare the monthly sales Quantity to the sales over all time (calculated using 'for [Product line]').

3   The AT clause

The AT clause plays a role in some of the more advanced summary functions such as rank or any of the running aggregates such as running-total. What the AT clause allows you to do is to specify that the measure used in the summary function should be rolled up before the function is applied. The list of columns specified in the AT clause defines what level of grouping should be used when rolling up the measure prior to calculation.

For example, in the report below there are two calculations using the AT clause: [running-count AT], and [running-maximum AT]. These calculations use the following expressions:

```
running-count([Quantity] at [Order year], [Order month] for [Order
year])
```

and

```
running-maximum([Quantity] at [Order year], [Order month] for
[Order year])
```

Order year	Order month	Product line	Quantity	running-count AT	running-maximum AT
2004	1	Camping Equipment	9,800	1	24,896
		Golf Equipment	714	1	24,896
		Outdoor Protection	9,938	1	24,896
		Personal Accessories	4,444	1	24,896
	1		**24,896**	**1**	**24,896**
	2	Camping Equipment	11,398	2	29,672
		Golf Equipment	470	2	29,672
		Outdoor Protection	13,520	2	29,672
		Personal Accessories	4,284	2	29,672
	2		**29,672**	**2**	**29,672**
	3	Camping Equipment	12,514	3	55,142
		Golf Equipment	1,938	3	55,142
		Outdoor Protection	34,594	3	55,142
		Personal Accessories	6,096	3	55,142
	3		**55,142**	**3**	**55,142**
	4	Camping Equipment	17,962	4	68,598
		Golf Equipment	2,098	4	68,598
		Outdoor Protection	40,946	4	68,598
		Personal Accessories	7,592	4	68,598
	4		**68,598**	**4**	**68,598**
	5	Camping Equipment	11,524	5	68,598
		Golf Equipment	1,804	5	68,598
		Outdoor Protection	33,504	5	68,598
		Personal Accessories	5,648	5	68,598
	5		**52,480**	**5**	**68,598**

The 'at [Order year], [Order month]' specifies that the Quantity should be aggregated to the grouping of Order year and Order month before the running-count or running-maximum is calculated.

The result of the running-count shows that the AT clause generates a smaller data set over which the running aggregates are applied. The running-count shows 1 for January 2004 because there is only one aggregated value for the year and month combination. Without the AT clause the running-count would be applied to the lowest level of detail and the summary value for January 2004 would be 4, the count of the Quantity values for each Product line.

The running-maximum shows us some of the utility of the AT clause. The results show that instead of evaluating the running-maximum on the set of the lowest level Quantity values we are evaluating the maximum for the summarized Quantity at the month level instead of for each Product line.

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4 Displaying a running-total in a Crosstab

Here we will leverage the FOR and AT clauses to create a report similar to the one shown below, where the measure is displayed as a total for the nested dimension as well as a running total for the months of the report.

	Quantity	1	2	3	4	5	6	7	8	9	10	11	12	Total
2004	Camping Equipment	9,800	11,398	12,514	17,962	11,524	15,644	15,876	10,412	15,836	30,812	15,238	14,806	181,822
	Golf Equipment	714	470	1,938	2,098	1,804	1,864	1,168	792	2,364	2,594	1,730	1,376	18,912
	Outdoor Protection	9,938	13,520	34,594	40,946	33,504	34,042	37,772	27,464	19,914	7,264	8,466	7,226	274,650
	Personal Accessories	4,444	4,284	6,096	7,592	5,648	7,308	8,036	4,720	8,882	17,620	5,652	6,040	86,322
	Total	24,896	29,672	55,142	68,598	52,480	58,858	62,852	43,388	46,996	58,290	31,086	29,448	561,706
	Running Total	24,896	54,568	109,710	178,308	230,788	289,646	352,498	395,886	442,882	501,172	532,258	561,706	
2005	Camping Equipment	15,150	14,688	22,480	32,580	20,024	30,160	22,008	22,666	32,608	55,218	19,210	19,802	306,594
	Golf Equipment	1,312	1,026	4,292	6,132	2,172	5,194	2,232	1,504	3,072	7,448	2,266	2,068	38,718
	Mountaineering Equipment	5,632	3,978	11,304	19,354	10,174	15,634	10,720	9,044	12,596	26,770	6,072	8,284	139,562
	Outdoor Protection	9,214	5,636	21,728	23,818	12,894	22,868	20,938	20,996	12,220	13,142	3,130	4,598	171,182
	Personal Accessories	7,330	4,206	9,212	15,638	8,488	13,260	11,308	8,140	14,190	28,294	6,780	6,828	133,674
	Total	38,638	29,534	69,016	97,522	53,752	87,116	67,206	62,350	74,686	130,872	37,458	41,580	789,730
	Running Total	38,638	68,172	137,188	234,710	288,462	375,578	442,784	505,134	579,820	710,692	748,150	789,730	
2006	Camping Equipment	21,460	14,970	36,056	37,458	24,566	34,066	27,804	24,542	28,750	76,102	22,946	29,098	377,818
	Golf Equipment	1,550	946	4,962	6,674	2,828	3,580	2,632	1,298	5,106	6,492	2,614	3,088	41,770
	Mountaineering Equipment	5,422	3,696	15,762	20,880	11,516	16,354	13,350	10,060	11,978	35,362	8,718	9,298	162,396
	Outdoor Protection	6,164	2,692	11,768	14,376	10,624	14,720	12,370	11,080	10,334	9,554	2,912	5,428	112,022
	Personal Accessories	7,730	6,260	14,168	18,732	9,162	17,098	12,376	11,718	14,664	40,810	7,608	9,586	169,912
	Total	42,326	28,564	82,716	98,120	58,696	85,818	68,532	58,698	70,832	168,320	44,798	56,498	863,918
	Running Total	42,326	70,890	153,606	251,726	310,422	396,240	464,772	523,470	594,302	762,622	807,420	863,918	

4.1 Layout and Design

Open Report Studio using the 'GO Sales and Retailers' sample package and create a new cross tab report using the following definition:

- Columns: [gosales_goretailers].[Orders].[Order month]
- Rows: [gosales_goretailers].[Orders].[Order year]
- Nested Rows: [gosales_goretailers].[Products].[Product line]
- Measure: [gosales_goretailers].[Orders].[Quantity]

The result should look like the following:

Quantity		<#Order month#>	<#Order month#>
<#Order year#>	<#Product line#>	<#1234#>	<#1234#>
	<#Product line#>	<#1234#>	<#1234#>
<#Order year#>	<#Product line#>	<#1234#>	<#1234#>
	<#Product line#>	<#1234#>	<#1234#>

Select [Product line] in the cross tab and select 'Total' from the 'Aggregate' Σ▾ drop down icon in the toolbar. This will create the first regular summary that will perform the simple total of the Quantity across all the individual Product lines.

Repeat the process to create a second summary row for Product line[1]. This second entry will be used to generate the running-total aggregate.

Quantity		<#Order month#>	<#Order month#>
<#Order year#>	<#Product line#>	<#1234#>	<#1234#>
	<#Total(Product line)1#>	<#1234#>	<#1234#>
	<#Total(Product line)#>	<#1234#>	<#1234#>
<#Order year#>	<#Product line#>	<#1234#>	<#1234#>
	<#Total(Product line)1#>	<#1234#>	<#1234#>
	<#Total(Product line)#>	<#1234#>	<#1234#>

Change the data item expression[2] for the [Total(Product line)] field from

```
total(currentMeasure within detail [Product line])
```

to

```
running-total([Quantity] at [Order year], [Order month] for [Order
year])
```

Here we have defined, using the AT clause, that the running total to should use the summarized Quantity values for the intersection of Order year and Order month. This means that the query will roll up the Product line values before computing the running-total. The FOR clause specifies that the running-total will be evaluated across the months within each individual year rather than across both years and months.

Select [Order month] in the cross tab and select 'Total' from the 'Aggregate' Σ ˙ drop down icon in the toolbar. This will define the overall summary column as below.

Quantity		<#Order month#>	<#Total(Order month)#>
<#Order year#>	<#Product line#>	<#1234#>	<#1234#>
	<#Total(Product line)1#>	<#1234#>	<#1234#>
	<#Total(Product line)#>	<#1234#>	<#1234#>
<#Order year#>	<#Product line#>	<#1234#>	<#1234#>
	<#Total(Product line)1#>	<#1234#>	<#1234#>
	<#Total(Product line)#>	<#1234#>	<#1234#>

The report layout is now complete. The following section will walk through some of the formatting steps.

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[1] Rather than using the Aggregate button we could have also inserted a Calculation from the Insertable Objects panel. However, to obtain the same formatting we would have had to perform a few extra steps to apply the appropriate class properties to the crosstab member and the crosstab member fact cells for the new calculation.
[2] Note that the running-total is a tabular/relational summary and as such cannot be used with OLAP style constructs such as currentMeasure.

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4.2   Formatting

Select the cell intersection of <#Total(Order month)#> and <#Total(Product line)#> and in the properties pane, change the Define Contents property to 'Yes'. This allows us to override the cell and leave the intersection blank where the total of the running-total is not applicable.

Quantity		<#Order month#>	<#Total(Order month)#>
<#Order year#>	<#Product line#>	<#1234#>	<#1234#>
	<#Total(Product line)1#>	<#1234#>	<#1234#>
	<#Total(Product line)#>	<#1234#>	
<#Order year#>	<#Product line#>	<#1234#>	<#1234#>
	<#Total(Product line)1#>	<#1234#>	<#1234#>
	<#Total(Product line)#>	<#1234#>	

With the report specification unlocked, select the <#Total(Order month)#> text item and change the Source Type property from 'Member Caption' to 'Text' and then change the Text property to read 'Total'.

Select the <#Total(Product line)1#> text item and change the Source Type property from 'Member Caption' to 'Data Item Label' and then change the Label property of the [Total(Product line)1] to be 'Total'.

The difference between the Text and Data Item Label settings is that Data Item Label can be reused wherever the data item is used in a report while a Text item stands alone and would need to be recreated if the same text is required elsewhere. For our purposes one method is as good as the other.

Select the <#Total(Product line)#> text item and change the Source Type property from 'Member Caption' to 'Text' and then change the Text property to read 'Running Total'.

Quantity		<#Order month#>	Total
<#Order year#>	<#Product line#>	<#1234#>	<#1234#>
	Total	<#1234#>	<#1234#>
	Running Total	<#1234#>	
<#Order year#>	<#Product line#>	<#1234#>	<#1234#>
	Total	<#1234#>	<#1234#>
	Running Total	<#1234#>	

5   Conclusion

The FOR and AT clauses come in very handy when calculating summary functions outside the current scope of a data item. The FOR clause allows us to specify what grouping context the summary function will be evaluated for and the AT clause allows us to define how the values will be grouped and aggregated before a summary function is applied.

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These options extend the tabular summary functions and allow for considerably more complex reports to be created from a relational model.

For OLAP style reporting using dimensional models there are other features and functions available that are better suited to leveraging the hierarchical structure of a dimensional data source. Please refer to the additional materials available within the product documentation and within the collection of Proven Practice documents for additional details on these capabilities.