# 9   Calculated Members and Embedded Summaries

## 9.1  Chapter Outline

The crosstab seemed like a pretty useful report object prior to Crystal Reports 2008. Then with the release of Crystal Reports 2008 we saw a two new features  called Embedded Summaries and Calculated Members.

It took us some time to understand this powerful new feature.  We hope you find this explanation useful.

In this chapter we will discuss what calculated members and embedded summaries are and have a look at the new functions needed to make them work.

## 9.2  What is a Embedded Summary?

In the previous chapter we demonstrated that you could have more than one summary inside the crosstab.  You could even summarise a formula or running total inside the Crosstab.

If you wanted to show the accumulation or variance between the two summaries, it was quite easy to create a formula to add or subtract those fields and then summarise that inside the crosstab,

The problem comes when you want to  calculate a ratio of the summary fields inside the crosstab.A ratio cannot be calculated prior to the crosstab doing it's summary processing.

However, the summaries are avalable to the new Crosstab functions.  We can use these to create an embedded summary inside the crosstab.

An embedded summary is a new summary in the cell.  It can calculate using any other cell/summary in the crosstab.  We will do an example of this shortly.

## 9.3  What is a Calculated Member?

A crosstab groups the rows and columns by the fields you select.  Each column or Row is related to a value in the retrieved data.

Sometimes you might want to combine several non adjacent columns or rows and create a summary for thise combined value.

A calculated member is a new row or column.  You control where it appears and what value is calculated for that new member of the crosstab.

To create a calculated member you also need to use some of the new crosstab functions in Crystal Reports 2008/11.

If you are not using one of those versions, you can skip this chapter.

## 9.4  New Crosstab Functions

The new crosstab functions discussed here were a new feature in Crystal Reports 2008.  They include a collection of poqwerful new functions. These appear in the Formula Editor under the Grid Value Section. There are a several that are really important.

**CurrentRowIndex**
**CurrentColumnIndex**
**CurrentSummaryIndex**
These return a number indicating the current row, column and summary of the cell. The Top Left cell has a row and column index of 0. If you have more than one summary in the cell, the first summary index is 0, the next is 1, etc..

**GetRowPathIndexOf(RowPath)**
**GetColumnPathIndexOf(ColumnPath)**
You can use these functions to identify what row or column contain a certain value. These functions will return a -1 if the path isn't found. If you want to add up the Paris and Darwin column values in your crosstab grid you would need to use the function

```
ColumnPathIndexOf("Paris")
```

This will identify the Paris column in this report.

**GridValueAt(rowindex, columnindex, summaryindex)**

This will return the actual value of the summary in that cell in the crosstab. Combine this function with the ones above, and you can then create a new calculated member in the crosstab,

```
GridValueAt(CurrentRowIndex, GetColumnPathIndexOf("Paris"), 0)
```

This will return the value of the Paris summary for the current column. You could then add this to the Darwin value to get a combined total for your report.

**GridRowColumnValue(Group)**

This returns the string value of the row or column for the current field. The group must be one of the alias fields used in the crosstab. You can specify these in the Customise Style section of the Crosstab expert.

**GetRowGroupIndexOf(RowIndex)**
**GetColumnGroupIndexOf(ColumnIndex)**
These functions identify the group level within the crosstab. Level 0 is the grand total. You could also combine this with the GridRowColumnValue(Group) function above to set the location of your calculated member. Using the example above, we can insert our "Combined" group at.

```
GetColumnGroupIndexOf(CurrentColumnIndex)=1 and

GridRowColumnValue("City") = "Paris"
```

## 9.5  Exercise: Percentage Summary in a Crosstab

Before we dive into the complexities of Embedded Sumaries we should look at Percentage Summaries in a Crosstab.  Several of the examples we have seen of Embedded Summaries demonstrate a simple percentage, and ignore the easier way to calculate this in a crosstab.

- Open the 5-10 Crosstab by Year report we worked on earlier today.

- Select the Crosstab and Right Click to open the Crosstab Expert

- Insert the Activity Cost into the Summary Fields a second Time.

- Select the new summary and change it to be a percentage summary of the Rows.

- Preview and Save your report.

- Note the % formatting is applied automatically.
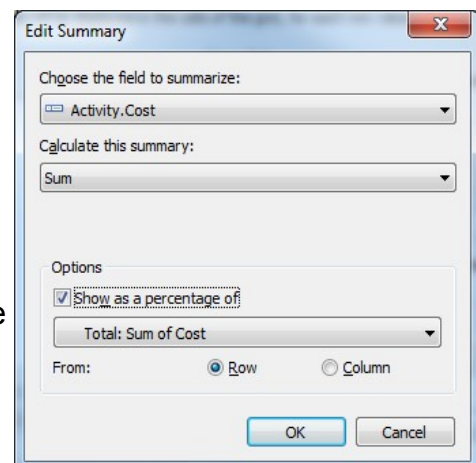
## 9.6  Exercise: Embedded Summary in a Crosstab

The new  crosstab grid functions can be used to create an Embedded Summary in the crosstab. An embedded summary is a new value in a cell in the crosstab, rather than a new row or column. Several examples we have seen using this calculate a simple percentage value, but as we showed in the previous example, this is easily handled with a simple percentage summary.

There are a couple of Crosstab functions we find useful here. To retrieve the first summary from the cell use this as your starting point:

```
GridValueAt (CurrentRowIndex, CurrentColumnIndex ,0 )
```

First we need to have a pair of values to compare in the crosstab.  We would like to display a daily revenue rate for each contractor by city.  So what numbers do we need to calculate this?

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We already have the revenue for that year for each contractor for each city.  So we then need to calculate how many days they worked to generate that revenue.

As they can work on several different activities in a day, we need to create a formula to exclude the time values from the Start Time field and we can distinct Count that date to work out the day count.

Create A Formula of Start Date of

```
Date({Activity.StartTime})
```

Use the Crosstab Expert to Insert this into the crosstab and set the summary to Distinct Count.  You now have a 3rd summary in your crosstab, but note the Grid Functions idendify them  with an index of  0, 1 and 2.

We want to divide Summary 0 (Total Cost) by Summary 2 (Date Distinct Count)

- Right Click on the Crosstab and select the menu item  Advanced Calculations, Embedded Sumary

- You don't have any embedded summaries in the crosstab yet, so click the "New" Button.  This will open the formula editor.

- Enter a New formula of

```
if GridValueAt (CurrentRowIndex, CurrentColumnIndex ,2 )
=0 then 0 else

GridValueAt (CurrentRowIndex, CurrentColumnIndex ,0 ) /

GridValueAt (CurrentRowIndex, CurrentColumnIndex ,2 )
```

- (The If clause is to protect against the divisor (Day Count) being 0 and it should be  standard for any formulas that do division)
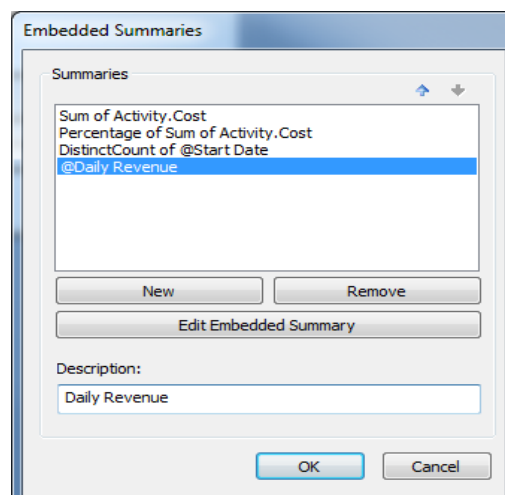


- Back in Embedded Summaries form you can now Rename the new Embedded Summary to Daily Revenue

- With all these summaries we should really label them.  Use the Crosstab Expert and on the Customize tab, tick the box that says "Show Labels"

- Rename the labels to show Revenue, % of Year, Working Days and Daily Revenue for the four summaries.

- The 100% in the total Row and bottom right cell don't make a lot of sense so suppress the printing of those two objects.  If you delete them, you will also delete them from the main grid, and we don't want that.

- Your report should look like

**Revenue of Contractor by Year**                              Printed on 03-Mar-201

|         |               | 2009 | 2010 | 2011 | 2012 | Total |
|---------|---------------|------|------|------|------|-------|
| Chris   | Revenue       | $31,869 | $35,523 | $35,217 | $33,863 | $136,472 |
|         | % of Year     | 13.89% | 13.93% | 13.91% | 13.85% | 13.90% |
|         | Working Days  | 259 | 261 | 260 | 250 | 1,030 |
|         | Daily Revenue | $123.04 | $136.10 | $135.45 | $135.45 | $132.50 |
| Denise  | Revenue       | $23,535 | $26,329 | $26,374 | $26,075 | $102,314 |
|         | % of Year     | 10.26% | 10.33% | 10.42% | 10.66% | 10.42% |
|         | Working Days  | 130 | 130 | 130 | 130 | 520 |
|         | Daily Revenue | $181.04 | $202.53 | $202.88 | $200.58 | $196.76 |
| Hinemoa | Revenue       | $28,503 | $31,585 | $31,312 | $30,108 | $121,508 |
|         | % of Year     | 12.43% | 12.39% | 12.37% | 12.31% | 12.37% |
|         | Working Days  | 233 | 235 | 234 | 225 | 927 |
|         | Daily Revenue | $122.33 | $134.41 | $133.81 | $133.81 | $131.08 |

- Save Your Report.

## 9.7  Exercise: Calculated Member in a Crosstab

A Calculated Member is a NEW row or Column in your Crosstab with values calculated from other cells in the grid.

In our exercise here, we want to combine the values from Darwin and Paris and add them into a new row called Export.  We want that new row to appear after the Paris Row and to include all the current four summaries already calculated in the grid.

- Select the report we used in the previous exercise.  Remember it now has four summary fields included one embedded summary.

- Use the Crosstab Expert to change the Row field to Customer.City.

- This has reset the labels in the crosstab.  Set them back to the previous values of  Revenue, % of Year, Working Days and Daily Revenue

- Select the Crosstab and Right Click to select the Advanced Calculations/ Calculated Member menu item.

That will display the form you see below.
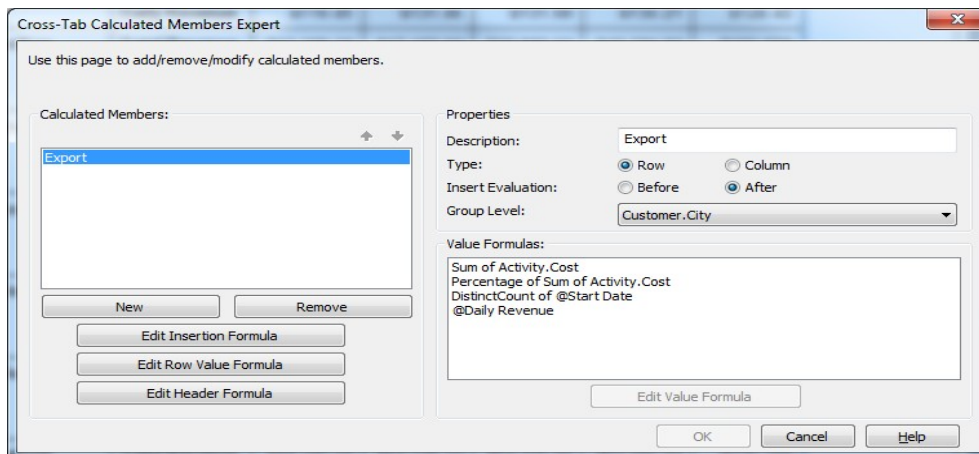


- Click New to create your new calculated member. You then give it a Description and select what group level you want it to appear in.

- Make sure you Select a Type of "Row" and Insert Evaluation of "After".  This says our new Calculated Member will be a new Row and will appear after the Insertion Formula.

- There are several formulas you need to enter:

- The Insertion Formula is where you want the new member to appear.  The insertion formula is:

```
GetRowGroupIndexOf(CurrentRowIndex)=1 and

GridRowColumnValue("Customer.City") = "Paris"
```

- The Row Value and Header Formulas indicate the value for the Row and what value to display as the heading for the new  member.  In both cases these must be a string and we find it easier to use the same value.  Click on the "Edit Row Value" button and enter a formula of "Export".  Do the same for the "Edit Header Formula" button.

- You now need to select each of the Value formulas and you can then edit the value formula for each.  This is because some of the values in your calculated member might require slightly different approach.

- In this exercise, we can happily add the two rows in our crosstab into the new member.

- The Value formula for the Sum of Activity Cost is as follows:

```
GridValueAt(GetRowPathIndexOf ("Paris"),

     CurrentColumnIndex, 0) +

GridValueAt(GetRowPathIndexOf ("Darwin"),

     CurrentColumnIndex, 0)
```

- The Value formulas for the other summaries are very similar. You can copy and paste into the other three summaries and replace the ",0) with ",1", "2" and ",3" as that 3rd argument to the GridValueAt function indicates the summary number.

- Preview and Save Your Report.  It should look like

## Revenue of City by Year

| | | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| Darwin | Total Revenue | $31,042 | $34,441 | $34,239 |
| | % of Total | 13.53% | 13.51% | 13.52% |
| | Wokring Days | 259 | 261 | 260 |
| | Daily Revenue | $119.85 | $131.96 | $131.69 |
| Hamilton | Total Revenue | $42,298 | $47,152 | $46,881 |
| | % of Total | 18.44% | 18.49% | 18.51% |
| | Wokring Days | 259 | 261 | 260 |
| | Daily Revenue | $163.31 | $180.66 | $180.31 |
| Paris | Total Revenue | $41,061 | $45,405 | $45,115 |
| | % of Total | 17.90% | 17.81% | 17.82% |
| | Wokring Days | 259 | 261 | 260 |
| | Daily Revenue | $158.54 | $173.96 | $173.52 |
| Export | Total Revenue | $72,103 | $79,846 | $79,355 |
| | % of Total | 31.43% | 31.32% | 31.34% |
| | Wokring Days | 518 | 522 | 520 |
| | Daily Revenue | $278.39 | $305.92 | $305.21 |
| Springfield | Total Revenue | $40,322 | $44,644 | $44,330 |
| | % of Total | 17.58% | 17.51% | 17.51% |
| | Wokring Days | 259 | 261 | 260 |
| | Daily Revenue | $155.68 | $171.05 | $170.50 |

The key to making this work is the GridValueAt(row,column,summary) function which can retrieve any value in the crosstab.  Combine that with the CurrentRowIndex or CurrentColumn Index and you can identify how to calculate the summary for the new member of the grid.

Our exercise worked with a new Row in the Crosstab.  To create a new member that is a new column, use a similar approach, but select the "Column" on the Calculated Member form.  The Value Formula would look something like:

```
GridValueAt(CurrentRowIndex,
GetColumnPathIndexOf ("Paris"), 0) + (etc)
```

## 9.8  Where do you use Embedded Summaries?

If you require a calculation in your crosstab that adds or subtracts some database fields or formulas, then create a formula to do that calculation, and place that formula as a new summary in the crosstab.

If you want a ratio of one summary to the total at any group level within the crosstab, use a percentage summary.  You can select the direction (row or column) and the level above to use for the division.

However, if you want to multiply or divide any values inside a cell, you cannot use either of the above approaches.

You use a Calculated Member to calculated these ratios and multiples inside the crosstab cell.  There are other ways to do this with fields and formulas and with database techniques, but they are far more complicated.

## 9.9  Where do you use Calculated Members?

By default, every value for the field appears as a row or column heading in the crosstab.  Each record can appear in only one column/row combination.

A calculated member enables you to take the values from one or more columns or rows and combine them into a new row or column.  You have total control over what calculations are done on each summary

## 9.10　　Chapter Summary

Embedded Summaries and Calculated Members are advanced crosstab features that let you take even more control of your crosstab values and formatting.  Thye open up some interesting reporting solutions.