

The Expert's Guide to Cross-Tabs in Crystal Reports

Addendum for Grid functions and features.

Adding rows or columns that do fixed calculations:

All Crystal versions starting with v12 (CR 2008) allow you to insert an individual row or column anywhere in the Cross-tab. This column can do calculations based on the other rows or columns in the cross-tab. The calculation can refer to rows or columns that have a specific row or column name (like Sales) or to columns that have a relative position to the calculation (like 2 columns to the left).

For example, if you have rows for Gross Sales and Cost of Goods Sold you could insert a row for Net Sales that takes the difference between these two rows. If you specify these rows by name, then they are used in the calculation even if these rows are moved up and down by changes in the other rows of the cross-tab. Or, lets say you have 12 monthly columns. You could insert a new column so that it compares the value of the column to its left to the value of the column that is three columns to the left (the prior month).

First let's demonstrate columns specified by name, since these are almost automatic to implement. Once they are created you can see the features that make them work.

Exercise 1

Open starter report that I have included. Notice that there are two countries and each is subdivided into six shipping methods. I want to add a row that adds together FedEx and UPS and gives me a new row labeled "Express Delivery" - but only within the US.

Right-click on the "FedEx" row heading within the USA group and select "Calculated Member" and within that "Select USA -> FedEx as first value". Click OK on the message. At this point nothing in the Cross-tab changes but the Cross-tab will remember that choice. Now right-click on the UPS heading (again in USA) and select "Calculated Member" and notice that there are four new choices. These allow you to use the selected values for adding, subtracting, multiplying or dividing. Select the "Sum" of the two values and note the following changes.

- 1) A new row appears titled simply "Sum". We will change that later.
- 2) This row has the sum of the two selected rows added together. Note that this row only exists in the USA group and doesn't appear in the Canada group. Note also that this row does not change the values in the grand total row since these numbers are already included.

Now to see what is happening. Right-click on the word SUM and select "Calculated Member" then "Edit Header Formula". What you will see is a string formula that you can use to control what is printed here. Replace the word "Sum" with "All Express" and then Save and Close. Note the change in the header formula.

Right-click on the words "All Express" and select "Calculated Member" then "Edit Insertion Formula". Remove the middle part that says:

and `GridRowColumnValue("Customer.Country") = "USA"`

Note that the "All Express" line now appears in both groups, but in both cases it is showing the total from the USA group. It is currently using fixed positions rather than relative positions.

Right-Click on the upper summary value (the Count value) just to the right of the "All Express" label, under UPS (either country). Select "Calculated Member" and "Edit Calculation Formula". Make the following two changes to make the formula relative to the current Country group:

replace:

`GetRowPathIndexOf("USA", "FedEx")`

with:

`GetIndexOf("Orders.Ship Via", "FedEx")`

replace:

`GetRowPathIndexOf("USA", "UPS")`

with:

`GetIndexOf("Orders.Ship Via", "UPS")`

The "GetRowPathIndexOF" function specifies both levels of this two-level cross-tab, which returns one specific row no matter where you are. In contrast the "GetIndexOF" function specifies only one level. When you leave a level unspecified in a multi-level cross-tab, Crystal will default to the current level. This returns a value relative to the cell doing the calculation. So by specifying "FedEx" in the last example I get the Fedex value within the current country, not the one from the literal country "USA".

Once you have this calculation working in the first summary fields (the Count value) you can copy the entire formula and replace the same formula in the lower summary value (the Sum). Because the formula uses "CurrentSummaryIndex" the lower summary calculation will automatically use the values from the bottom of the cells while the upper formula uses the values from the top of the cells.

At this point your cross-tab should look like the one in the attached Starter Exercise 1.rpt.

A few words of caution:

1) If you specify a value you have to make an exact and even *case sensitive* match to the literal value in the cross-tab. If you misspell the literal or if the specified value doesn't exist in one of the groups then the entire report stops with an error message saying that the value is "out of range". You can prevent this by checking for existence of the value first, like this:

if GetIndexOf("Orders.Ship Via","FedEx") > 0 then ...

This works because when there is no Fedex row the index will be -1, and the formula can skip the calculation.

2) When a new row is first created it will have the same number of summary rows as the existing rows. But if you then add another summary field to the cross-tab (after adding the new row) the new row will have a new empty space where the new summary positions would go. It will not add new summary positions in that space and I could not find a way to force it to create new summary positions in the empty space. The only option seems to be deleting the calculated row and adding it back in again once you have added the needed number of summary fields.

So calculated rows can have fewer summary positions than the rest of the cross-tab, but these rows will still have the same depth as the other rows. The extra space will be blank. It also means that deleting a summary field within the cross-tab expert will delete the corresponding summary positions in all calculated rows.

3) Calculated values in a manual row must have the same data type as the corresponding summary field in the regular cells. They will also share the same formatting attributes. If you need the manual row to return values of a different data type or in a different format then you must use the "Display String" property to generate and format the values.

One surprising related behavior. If the first summary field in your cross-tab is a Count or Distinct Count than any calculating you do that is in the corresponding first position will be forced to be an integer value. If the actual calculation doesn't return an integer Crystal will truncate (not round) the calculated value so it is an integer. If you want your value rounded instead of truncated then you can use the round function within the row calculation (i.e. before Crystal will truncate it). But to get decimals you would have to use a display string.

4) In my experiments I found that if I made many changes to the same Cross-tab I could corrupt the internal index numbering. This caused the row and column references to get reversed, generating odd errors regarding the data types of the fields. The only solution I found when this happened was to recreate the cross-tab groups or in some cases to recreate the entire cross-tab.

Relative Calculations:

To illustrate relative calculations we are going to add a column after each month to show the variance from the value of the month before. I don't want to see a variance column after the first month because there will be no prior month to compare. This also allows me to show you how to make an exception to the rule.

Exercise 2

You can start with either the original Starter report or continue with the one from the last exercise. Right-click on the column heading for the second month (August), and select "Calculated Member > Insert Column". Click OK on the message. This will create a new column to the right of that column. The new column will have a blank heading and all zeros.

Right click on the empty heading cell and select "Calculated Member > Edit Header Formula". Put a literal label there that is "Variance".

Now Right click on the cell below the heading cell (first summary) and select "Calculated Member > Edit Calculation Formula". Replace this formula with the function "CurrentRowIndex". This will show you the row number for each row and you will see that the first row is zero (not one). After that they are numbered consecutively.

Now Right click again on the cell below the heading cell and select "Calculated Member > Edit Calculation Formula". Change it to the function "CurrentColumnIndex". Save and close and note that the variance column will display its column number as two. The new column is number two because it is the third column (0, 1, 2). Again, the first summary column is number zero. The same is true for the summary index which counts the number of summary calculations in each cell. Since every cell in this cross-tab has 2 summaries they would be numbered 0 and 1.

Right click on the top cell and select "Calculated Member > Edit Insertion Formula. Change that formula to read:

`CurrentColumnIndex > 0`

We are saying to insert this new column to the right of every column except column 0 (the first column). We skip the first column because there is no prior month for comparison to the first column. When you save you should see the Variance column now appear after all months to the right, but not after the first column.

Now Right click again on the first summary field below the heading and select "Calculated Member > Edit Calculation Formula". Put in the following formula:

`GridValueAt (CurrentRowIndex, CurrentColumnIndex -1 , CurrentSummaryIndex) -
if CurrentColumnIndex = 2
then GridValueAt (CurrentRowIndex, CurrentColumnIndex -2 , CurrentSummaryIndex)
else GridValueAt (CurrentRowIndex,CurrentColumnIndex -3 , CurrentSummaryIndex)`

This looks complex, but isn't so bad when you break it down. The first line of the formula specifies the value from the current month. It says to use the current row but use the column one place to the left of the current column (index minus one). Then we give the coordinates for the prior month. We need an IF-THEN statement because the prior month is two columns to the left in August but it is three columns to the left in all of the other months. So you see that the CurrentColumnIndex has minus 2 and minus 3 in those lines.

You can copy the same formula to the second summary field. Because it uses the function CurrentSummaryIndex it knows that the top or first summary (index 0) corresponds to the top summary in each cell, while the bottom one (index 1) corresponds to the bottom of each cell.

At this point your cross-tab should correspond to Starter Exercise 2.rpt.

List of Grid Functions:

The exercises above illustrate what I consider to be the most useful functions in most situations. Below are all of the functions available with a brief description of what they do. Those without parentheses do not need any arguments. Those with parentheses require the arguments described in the example. For more information on these, including a full syntax example, refer to Crystal Reports Help.

GridRowColumnValue () -

Returns the Literal of the current Row/Column for comparison.

Use a Row field for Inserted Rows, Column field for Inserted Columns

i.e. if GridRowColumnValue ("Customer.Country") = "USA" then...

GridValueAt() – What is the summary value for a given set of coordinates

GridLabelAt ()- What label is the Nth value for a given row/column field

GetNumRows - how many rows are in the output (including total row)

GetNumColumns - how many columns are in the output (including total column)

GetNumColumnGroups - How many column levels exist (fields in the Column box)

GetNumRowGroups - How many row levels exist (fields in the Row box)

GetNumSummaries - How many summary fields exist (fields in the Summarized Fields box)

CurrentRowIndex – What is the current row of output in zero based index

CurrentColumnIndex - What is the current column of output in zero based index

CurrentSummaryIndex - What is the current summary row of output in zero based index

GetTotalValueFor ()

What is the total of the current Row or Column.

If you inserted a Row use the Row field name to get a value from the Total Row of this Column

If you inserted a Column use the Column field name to get values from the Total Column of this Row

GetIndexOf ("Customer.Country","USA")

Find the row number or column number of this cross-tab label

GetRowPathIndexOf () / GetColumnPathIndexOf ()

Give a literal or heirarchy of literals and get the corresponding row or column number:

GetRowPathIndexOf ('USA', 'FedEx')

GetColumnGroupIndexOf () / GetRowGroupIndexOf ()

What level is this group field?

Functions not illustrated:

GridLabelAt

GetNumRows

GetNumColumns

GetNumColumnGroups

GetNumRowGroups

GetNumSummaries

GetTotalValueFor

GetColumnGroupIndexOf ()

GetRowGroupIndexOf ()

Right click on Total label / select "Calculated Member > Insert Child

Right click on a summary and select "Insert Embedded Summary"

Display string for subtotal row?

if CurrentColumnIndex in [2,4,6,8,10]

then totext (CurrentFieldValue+.5,1,") & " %"

else totext (CurrentFieldValue,0,")