Using Functions, Formulas and Calculations in Web Intelligence

BusinessObjects Enterprise XI 3.0

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About this guide

chapter 1

The *Using Functions, Formulas and Calculations in Web Intelligence* guide provides detailed information on the advanced calculation capabilities in Web Intelligence. It also provides a syntax reference to the Web Intelligence functions and operators.

The guide presents this information generically, without reference to the Web Intelligence interface. For information on how to work with calculation-related features in your Web Intelligence documents (for example, how to add a variable or a formula to a report), see *Performing On-Report Analysis With Web Intelligence*, *Building Reports with the Java Report Panel* and *Web Intelligence Rich Client User's Guide*.

Using standard and custom calculations

chapter 2

Using standard and custom calculations in your reports

You can use standard calculation functions to make quick calculations on the data in Web Intelligence reports. If standard calculations are not sufficient for your needs, you can use the Web Intelligence formula language to build custom calculations.

Standard calculations

You can use standard calculation functions to make quick calculations on the data in Web Intelligence reports. The following standard calculations are available:

Calculation	Description
Sum	Calculates the sum of the selected data.
Count	Counts all rows for a measure object or count distinct rows for a dimension or detail object.
Average	Calculates the average of the data.
Minimum	Displays the minimum value of the selected data.
Maximum	Display the maximum value of the selected data.

Calculation	Description
Percentage	Displays the selected data as a percentage of the total. The results of the percentage are displayed in an additional column or row of the table. **Note:** Percentages are calculated for the selected measure compared to the total results for that measure on the table or break. To calculate the percentage of one measure compared to another measure, you need to build a custom calculation.
Default	Applies the default aggregation function to a standard measure, or the database aggregation function to a smart measure.

When you apply a standard calculation to a table column, the calculation result appears in a footer in the column. Web Intelligence adds a footer for the result of each calculation if you apply multiple calculations to the same column.

Using formulas to build custom calculations

Custom calculations allow you to add additional calculations to your report beyond its base objects and the standard calculations provided by Web Intelligence.

You add a custom calculation by writing a formula that Web Intelligence evaluates when you run the report. A formula can consist of base report variables, functions, operators and calculation contexts.

A custom calculation is a formula that can consist of report objects, functions and operators. Formulas have a calculation context that you can specify explicitly if you choose.

Example: Showing average revenue per sale

If you have a report with Sales Revenue and Number Sold objects and you want to add revenue per sale to the report. The calculation `[Sales Revenue]/[Number Sold]` gives this value by dividing the revenue by the number of items sold in order to give the revenue per item.

Related Topics

- *What are calculation contexts?* on page 24

Using variables to simplify formulas

If a formula is complex you can use variables to simplify it. By using variables you break a complex formula down into manageable parts and make it much easier to read, as well as making building formulas much less error-prone.

You can use previously-created variables in a formula in exactly the same way as you use other report objects. Variables appear in the formula editor under the “Variables□? folder.

You can type this variable name into a formula or drag the variable to the Formula toolbar as you would for any report object.

Example: Create a formula to return a statistical variance

Variance is a statistical term. The variance of a set of values measures the spread of those values around their average. Web Intelligence has the function Var() that calculates the variance in one step, but manual calculation of variance provides a good example of how to simplify a complex formula using variables. To calculate the variance manually you need to:

- calculate the average number of items sold
- calculate the difference between each number of items sold and the average, then square this value
- add up all these squared differences
- divide this total by the number of values - 1

You have a report showing numbers of items sold by quarter and you want to include the variance. Without the use of variables to simplify it, this formula is as follows:

```
Sum((([Quantity sold] - Average([Quantity sold] ForEach
[Quarter]) In Report)*([Quantity sold] - Average([Quantity
sold] ForEach [Quarter]) In Report)) In [Quarter])/(Count
([Quantity sold] ForEach [Quarter]) - 1)
```

This formula is clearly unwieldy. By using variables you can simplify it to:

```
Sum ([Difference Squared])/[Number of Observations] - 1)
```

which is much easier to understand. This simplified version of the formula gives you a high-level view of what the formula is doing, rather than plunging you into the confusing details. You can then examine the formulas of the variables referenced in the high-level formula to understand its component parts.

For example, the formula references the variable Difference Squared, which itself references the variable Average Sold. By examining the formulas of Difference Squared and Average sold, you can drill down into the formula to understand the details of what it is doing.

Working with functions

A custom calculation sometimes contains report objects only, for example `[Sales Revenue]/[Number of Sales]`. Calculations can also include functions in addition to report objects.

A function receives zero or more values as input and returns output based on those values. For example, the `Sum` function totals all the values in a measure and outputs the result. The formula `Sum([Sales Revenue])` outputs a total of sales revenues. In this case, the function input is the Sales Revenue measure and the output is the total of all Sales Measures.

Related Topics

- *Web Intelligence function and formula operators* on page 181
- *Web Intelligence functions* on page 50

Including functions in cells

The text in report cells always begins with '=' . Literal text appears in quotation marks, while formulas appear without quotation marks. For example, the formula Average([Revenue]) appears in a cell as `=Average([Revenue])`. The text "Average Revenue?" appears as `="Average Revenue?"`

You can use text alone in a cell, or mix formulas and text by using the '+' operator. If you want a cell to display the average revenue preceded by the text "Average Revenue:", the cell text is as follows: `="Average Revenue: " + Average([Revenue])`

Note the space at the end of the text string so that the text and the value are not placed directly side-by-side in the cell.

Function syntax

To use a function you need to know its name, how many input values it requires and the data types of these input values. You also need to know the type of data that the function outputs.

For example, the Sum function takes a numerical object as input (for example a measure showing sales revenue) and outputs numeric data (the sum of all the values of the measure object).

Here is the syntax of the Abs function:

```
num Abs(number)
```

This syntax tells you that the Abs function takes a single number as input and returns a number as output.

The Formula Editor displays the function syntax when you select the function.

Examples of functions

Example: Showing prompt input with the UserResponse function

You have a report showing Year, Quarter and Sales revenue. The State object also appears in the report data, although it is not displayed. When

the user runs the report they are presented with a prompt and they must choose a state. You want to show the state that they have chosen in the report title. If your data provider is called “eFashion□? and the text in the prompt is “Choose a State□?, the formula for the title is:

```
"Quarterly Revenues for " + UserResponse( "eFashion";"Choose
 a State")
```

The report is as follows:

Quarterly Revenues for Illinois

Year	Quarter	Sales revenue
2001	Q1	$256,454
	Q2	$241,458
	Q3	$107,006
	Q4	$133,306
2001	**Total**	**$738,223.80**

Year	Quarter	Sales revenue
2002	Q1	$334,297
	Q2	$254,722
	Q3	$230,573
	Q4	$331,067
2002	**Total**	**$1,150,658.80**

Year	Quarter	Sales revenue
2003	Q1	$255,658
	Q2	$354,724
	Q3	$273,186
	Q4	$250,517
2003	**Total**	**$1,134,085.40**

Example: Calculating a percentage using the Percentage function

Web Intelligence has the Percentage function for calculating percentages. This function calculates the percentage of a number in relation to its surrounding context. For example, the following table shows revenues by year and quarter. The percentage column contains the formula `Percentage ([Sales Revenue])`.

Year	Quarter	Sales revenue	Percentage
2001	Q1	$2660700	0.07
2001	Q2	$2279003	0.06
2001	Q3	$1367841	0.04
2001	Q4	$1788580	0.05
2002	Q1	$3326172	0.09
2002	Q2	$2840651	0.08
2002	Q3	$2879303	0.08
2002	Q4	$4186120	0.12
2003	Q1	$3742989	0.1
2003	Q2	$4006718	0.11
2003	Q3	$3953395	0.11
2003	Q4	$3356041	0.09
		Sum:	**1**

In this case the function calculates each revenue as a percentage of the total revenue. The surrounding context is the total revenue; this is the only revenue figure that is relevant outside the breakdown by year and quarter in the table.

If the report is split into sections by year, the surrounding context outside the table becomes the total revenue in the section.

2001

Year	Quarter	Sales revenue	Percentage
2001	Q1	$2660700	0.33
2001	Q2	$2279003	0.28
2001	Q3	$1367841	0.17
2001	Q4	$1788580	0.22
		Sum:	**1**

If the Percentage cell is placed outside the table but still inside the section, the surrounding context becomes the total revenue. In this case the Percentage function calculates the total revenue for the section as a percentage of the total overall revenue.

2001	0.22

Year	Quarter	Sales revenue
2001	Q1	$2660700
2001	Q2	$2279003
2001	Q3	$1367841
2001	Q4	$1788580

2002	0.36

Year	Quarter	Sales revenue
2002	Q1	$3326172
2002	Q2	$2840651
2002	Q3	$2879303
2002	Q4	$4186120

Example: Calculating a percentage using the Sum function

You can gain more control over the context in which a percentage is calculated by using the Sum function rather than the Percentage function. If you divide one figure in a set of figures by the total of those figures, you get its percentage of the total; for example, the formula [Sales Revenue]/Sum([Sales Revenue]) gives the sales revenue as a percentage of the total revenue.

In the following table the Percentage of Total column has the formula:

```
[Sales revenue]/(Sum([Sales revenue] In Report))
```

and the Percentage of Year column has the formula:

```
[Sales revenue]/(Sum([Sales revenue] In Section))
```

2001

Year	Quarter	Sales revenue	Percentage of Total	Percentage of Year
2001	Q1	$2660700	0.07	0.33
2001	Q2	$2279003	0.06	0.28
2001	Q3	$1367841	0.04	0.17
2001	Q4	$1788580	0.05	0.22

These formulas take advantage of the extended syntax keywords Report and Section to instruct the Sum function to calculate the overall total revenue and yearly revenue respectively.

Related Topics

- *Modifying the default calculation context with extended syntax* on page 34

Simplifying a variance formula with variables

Variance is a statistical term. The variance of a set of values measures the spread of those values around their average. Web Intelligence has the function Var() that calculates the variance in one step, but manual calculation of variance provides a good example of how to simplify a complex formula using variables. To calculate the variance manually you need to:

- calculate the average number of items sold
- calculate the difference between each number of items sold and the average, then square this value
- add up all these squared differences
- divide this total by the number of values - 1

You have a report showing numbers of items sold by quarter and you want to include the variance. Without the use of variables to simplify it, this formula is as follows:

```
Sum((([Quantity sold] - Average([Quantity sold] ForEach [Quar
ter]) In Report)*([Quantity sold] - Average([Quantity sold]
ForEach [Quarter]) In Report)) In [Quarter])/(Count ([Quantity
 sold] ForEach [Quarter]) - 1)
```

which is clearly unwieldy.

Creating the variance formula

There are several steps involved in creating a variance formula. You encapsulate each of these steps in a variable. The variables you create are:

- average number of items sold
- number of observations (that is, the number of separate values of the number of items sold)
- difference between an observation and the average, squared

- sum of these differences divided by the number of observations - 1

The variable formulas are as follows:

Variable	Formula
Average Sold	Average([Quantity Sold] In ([Quarter])) In Report
Number of Observations	Count([Quantity Sold] In ([Quarter])) In Report
Difference Squared	Power(([Quantity sold] - [Average Sold]);2)
Variance	Sum([Difference Squared] In ([Quarter]))/([Number of Observations] - 1)

The final formula is now

```
Sum ([Difference Squared])/[Number of Observations] - 1)
```

which is much easier to understand. This simplified version of the formula gives you a high-level view of what the formula is doing, rather than plunging you into the confusing details. You can then examine the formulas of the variables referenced in the high-level formula to understand its component parts.

For example, the formula references the variable Difference Squared, which itself references the variable Average Sold. By examining the formulas of Difference Squared and Average sold, you can drill down into the formula to understand the details of what it is doing.

Web Intelligence function and formula operators

Operators link the various components in a formula. Formulas can contain mathematical, conditional, logical, function-specific or extended syntax operators.

Mathematical operators

Mathematical operators are familiar from everyday arithmetic. There are addition (+), subtraction (-), multiplication (*), division (/) operators that allow you to perform mathematical operations in a formula. The formula `[Sales Revenue] - [Cost of Sales]` contains a mathematical operator, in this case subtraction.

Note:
When used with character strings, the '+' operator becomes a string concatenation operator. That is, it joins character strings. For example, the formula "John" + " Smith" returns "John Smith".

Conditional operators

Conditional operators determine the type of comparison to be made between values.

Operator	Description
=	Equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
<>	Not equal to

You use conditional operators with the If function, as in:

```
If [Revenue]>10000 Then "High" Else "Low"
```

which returns "High" for all rows where the revenue is greater than or equal to 10000 and "Low" for all other rows.

Logical operators

The Web Intelligence logical operators are `And`, `Or`, `Not`, `Between` and `Inlist`. Logical operators are used in boolean expressions, which return `True` or `False`.

Context operators

Context operators form part of extended calculation syntax. Extended syntax allows you to define which dimensions a measure or formula takes into account in a calculation.

Function-specific operators

Some Web Intelligence functions can take specific operators as arguments. For example, the `Previous` function can take the `Self` operator.

All functions use `)` and `(` to enclose function arguments. Functions that accept multiple parameters use `;` to separate the parameters.

Understanding calculation contexts

chapter 3

What are calculation contexts?

The calculation context is the data that a calculation takes into account to generate a result. Web Intelligence, this means that the value given by a measure is determined by the dimensions used to calculate the measure.

A report contains two kinds of objects:

- Dimensions represent business data that generate figures. Store outlets, years or regions are examples of dimension data. For example, a store outlet, a year or a region can generate revenue: we can talk about revenue by store, revenue by year or revenue by region.
- Measures are numerical data generated by dimension data. Examples of measure are revenue and number of sales. For example, we can talk about the number of sales made in a particular store.

Measures can also be generated by combinations of dimension data. For example, we can talk about the revenue generated by a particular store in 2005.

The calculation context of a measure has two components:

- the dimension or list of dimensions that determine the measure value
- the part of the dimension data that determines the measure value

The calculation context has two components:

- The input context
- The output context

Related Topics

- *The input context* on page 24
- *The output context* on page 25

The input context

The input context of a measure or formula is the list of dimensions that feed into the calculation.

The list of dimensions in an input context appears inside the parentheses of the function that outputs the value. The list of dimensions must also be

enclosed in parentheses (even if it contains only one dimension) and the dimensions must be separated by semicolons.

Example: Specifying an input context

In a report with Year sections and a block in each section with Customer and Revenue columns, the input contexts are:

Report part	Input context
Section header and block footers	Year
Rows in the block	Year, Customer

In other words, the section headers and block footers show aggregated revenue by Year, and each row in the block shows revenue aggregated by Year and Customer (the revenue generated by that customer in the year in question).

When specified explicitly in a formula, these input contexts are:

```
Sum ([Revenue] In ([Year]))

Sum ([Revenue] In ([Year];[Customer]))
```

That is, the dimensions in the input context appear inside the parentheses of the function (in this case, Sum) whose input context is specified.

The output context

The output context causes the formula to output a value is if it is placed in the footer of a block containing a break.

Example: Specifying an output context

The following report shows revenue by year and quarter, with a break on year, and the minimum revenue calculated by year:

Year	Quarter	Sales revenue
	Q1	$2660699.50
	Q2	$2279003.00
	Q3	$1367840.70
	Q4	$1788580.40
2001		
	Min:	**$1367840.70**

Year	Quarter	Sales revenue
	Q1	$3326172.20
	Q2	$2840650.80
	Q3	$2879303.00
	Q4	$4186120.00
2002		
	Min:	**$2840650.80**

Year	Quarter	Sales revenue
	Q1	$3742988.90
	Q2	$4006717.50
	Q3	$3953395.30
	Q4	$3356041.10
2003		
	Min:	**$3356041.10**

What if you want to show the minimum revenue by year in a block with no break? You can do this by specifying the output context in a formula. In this case, the formula looks like this:

```
Min ([Revenue]) In ([Year])
```

That is, the output context appears after the parentheses of the function whose output context you are specifying. In this case, the output context tells Web Intelligence to calculate minimum revenue by year.

If you add an additional column containing this formula to the block, the result is as follows:

Year	Quarter	Sales revenue	Min by Year
2001	Q1	$2660699.50	$1367840.70
2001	Q2	$2279003.00	$1367840.70
2001	Q3	$1367840.70	$1367840.70
2001	Q4	$1788580.40	$1367840.70
2002	Q1	$3326172.20	$2840650.80
2002	Q2	$2840650.80	$2840650.80
2002	Q3	$2879303.00	$2840650.80
2002	Q4	$4186120.00	$2840650.80
2003	Q1	$3742988.90	$3356041.10
2003	Q2	$4006717.50	$3356041.10
2003	Q3	$3953395.30	$3356041.10
2003	Q4	$3356041.10	$3356041.10

You can see that the Min By Year column contains the minimum revenues that appear in the break footers in the previous report.

Notice that in this example, the input context is not specified because it is the default context (Year, Quarter) for the block. In other words, the output context tells Web Intelligence which revenue by year and quarter to output. In full, with both input and output formulas explicitly specified, the formula looks like this:

```
Min ([Sales Revenue] In([Year];[Quarter])) In ([Year])
```

Explained in words, this formula tells Web Intelligence to “calculate revenues by year by quarter, then output the smallest of these revenues that occurs in each year□?.

What would happen if you did not specify the output context in the Min by Year column? In this case, these figures would be identical to the figures in the Sales Revenue column. Why? Remember that the default context in a block includes the dimensions in that block. The minimum revenue by year by quarter is the same as the revenue by year by quarter simply, because there is only one revenue for each year/quarter combination.

Default calculation contexts

Depending on where you place a measure or formula, Web Intelligence assigns a default calculation context to the measure.

Measures are semantically dynamic. This means that the figures returned by a measure depend on the dimensions with which it is associated. This combination of dimensions represents the calculation context.

Web Intelligence associates a default context with a measure depending on where the measure is placed. You can change this default context with extended syntax. In other words, you can determine the set of dimensions used to generate a measure. This is what is meant by defining the calculation context.

Example: Default contexts in a report

This example describes the default calculation context of the measures in a simple report. The report shows revenue generated by customers and is split into sections by year.

2005	Total:8000

Customer	Revenue
Harris	1000
Jones	3000
Walsh	4000
Total:	8000

Report total: 8000

The table below lists the calculation context of the measures in this report:

Measure	Value	Context
Report total	20000	Total of all revenue in the report
Section header total	8000	Year

Measure	Value	Context
Customer total	1000, 3000, 4000	Year;Customer
Block footer total	8000	Year

Related Topics

- *What are calculation contexts?* on page 24
- *Modifying the default calculation context with extended syntax* on page 34

Default contexts in a vertical table

A vertical table is a standard report table with headers at the top, data going from top to bottom and footers at the bottom. The default contexts in a down table are:

When the calculation is in the...	The input context is	The output context is
Header	The dimensions and measures used to generate the body of the block	All the data is aggregated then the calculation function returns a single value
Body of the block	The dimensions and measures used to generate the current row	The same as the input context
Footer	The dimensions and measures used to generate the body of the block	All the data is aggregated then the calculation function returns a single value

Example: Default contexts in a vertical table

The following table shows the default contexts in a vertical table:

Year	Quarter	Sales revenue	$36387203
2001	Q1	$2660700	$2660699.50
2001	Q2	$2278693	$2278693.40
2001	Q3	$1367841	$1367840.70
2001	Q4	$1788580	$1788580.40
2002	Q1	$3326172	$3326172.20
2002	Q2	$2840651	$2840650.80
2002	Q3	$2879303	$2879303.00
2002	Q4	$4186120	$4186120.00
2003	Q1	$3742989	$3742988.90
2003	Q2	$4006718	$4006717.50
2003	Q3	$3953395	$3953395.30
2003	Q4	$3356041	$3356041.10
	Sum:	**$36387203**	

Default contexts in a horizontal table

A horizontal table is like a vertical table turned on its side. Headers appear at the left, data goes left to right and footers appear at the right. The default contexts for a horizontal table are the same as those for a vertical table.

Default contexts in a crosstab

A crosstab displays data in a matrix with measures appearing at the intersections of dimensions. The default contexts in a crosstab are:

The calculation is in the...	The input context is...	The output context is...
Header	The dimensions and measures used to generate the body of the block.	All the data is aggregated, then the calculation function returns a single value.

The calculation is in the...	The input context is...	The output context is...
Body of the block	The dimensions and measures used to generate the body of the block.	The same as the input context.
Footer	The dimensions and measures used to generate the body of the block.	All the data is aggregated, then the calculation function returns a single value.
VBody footer	The dimensions and measures used to generate the current column.	All the data is aggregated, then the calculation function returns a single value.
HBody Footer	The dimensions and measures used to generate the current row.	All the data is aggregated, then the calculation function returns a single value.
VFooter	Same as footer.	All the data is aggregated, then the calculation function returns a single value.
HFooter	Same as footer.	All the data is aggregated, then the calculation function returns a single value.

Example: Default contexts in a crosstab

The following report shows the default contexts in a crosstab:

		FY2000	FY2000	FY2000	FY2000	1,115,730
		Q1	Q2	Q3	Q4	1,115,730
France	259,170	61,895	76,555	70,080	50,640	259,170
US	856,560	196,831	189,886	234,574	235,269	856,560
Sum:	1,115,730	258,726	266,441	304,654	285,909	1,115,730

Default contexts in a section

A section consists of a header, body and footer. The default contexts in a section are:

The calculation is in the...	The input context is...	The output context is...
Body	The dimensions and measures in the report, filtered to restrict the data to the section data.	All the data is aggregated, then the calculation function returns a single value.

Example: Default contexts in a section

The following report shows the default contexts in a crosstab:

2001	8,096,123.6

Quarter	Sales revenue	Section
Q1	$2,660,700	8,096,123.6
Q2	$2,279,003	8,096,123.6
Q3	$1,367,841	8,096,123.6
Q4	$1,788,580	8,096,123.6
Sum:	**8,096,123.6**	

2002	13,232,246

Quarter	Sales revenue	Section
Q1	$3,326,172	13,232,246
Q2	$2,840,651	13,232,246
Q3	$2,879,303	13,232,246
Q4	$4,186,120	13,232,246
Sum:	**13,232,246**	

2003	15,059,142.8

Quarter	Sales revenue	Section
Q1	$3,742,989	15,059,142.8
Q2	$4,006,718	15,059,142.8
Q3	$3,953,395	15,059,142.8
Q4	$3,356,041	15,059,142.8
Sum:	**15,059,142.8**	

Default contexts in a break

A break consists of a header, body and footer. The default contexts in a break are:

The calculation is in the...	The input context is...	The output context is...
Header	Current instance of the break.	All the data is aggregated, then the calculation function returns a single value.
Footer	Current instance of the break.	All the data is aggregated, then the calculation function returns a single value.

Example: Default contexts in a break

The following report shows the default contexts in a break:

Year	Quarter	$8096123
	Q1	$2660700
	Q2	$2279003
	Q3	$1367841
	Q4	$1788580
2001		
	Sum:	$8096124

Year	Quarter	$13232246
	Q1	$3326172
	Q2	$2840651
	Q3	$2879303
	Q4	$4186120
2002		
	Sum:	$13232246

Modifying the default calculation context with extended syntax

Extended syntax uses context operators that you add to a formula or measure to specify its calculation context. A measure or formula context consists of its input context and output context.

Extended syntax operators

You specify input and output contexts explicitly with context operators. The following table lists the context operators:

Operator	Description
In	Specifies an explicit list of dimensions to use in the context.
ForEach	Adds dimensions to the default context
ForAll	Removes dimensions from the default context

The ForAll and ForEach operators are useful when you have a default context with many dimensions. It is often easier to add or subtract from the context using ForAll and ForEach than it is to specify the list explicitly using In.

In context operator

The In context operator specifies dimensions explicitly in a context.

Example: Using In to specify the dimensions in a context

In this example you have a report showing Year and Sales Revenue. Your data provider also contains the Quarter object but you do not include this dimension in the block. Instead, you want to include an additional column to show the maximum revenue by quarter in each year. Your report looks like this:

Year	Sales revenue	Max Quarterly Revenue
2001	$8096123.60	$2660699.50
2002	$13232246.00	$4186120.00
2003	$15059142.80	$4006717.50

You can see where the values in the Max Quarterly Revenue column come from by examining this block in conjunction with a block that includes the Quarter dimension:

Year	Quarter	Sales revenue
	Q1	$2660700
	Q2	$2279003
	Q3	$1367841
	Q4	$1788580
2001		
	Max:	**2660699.5**

Year	Quarter	Sales revenue
	Q1	$3326172
	Q2	$2840651
	Q3	$2879303
	Q4	$4186120
2002		
	Max:	**4186120**

Year	Quarter	Sales revenue
	Q1	$3742989
	Q2	$4006718
	Q3	$3953395
	Q4	$3356041
2003		
	Max:	**4006717.5**

The Max Quarterly Revenue column shows the highest quarterly revenue in each year. For example, Q4 has the highest revenue in 2002, so the Max Quarterly Revenue shows Q4 revenue on the row showing 2002.

Using the In operator, the formula for Max Quarterly Revenue is

```
Max ([Sales Revenue] In ([Year];[Quarter])) In ([Year])
```

This formula tells Web Intelligence to calculate the maximum sales revenue for each (Year,Quarter) combination, then output this figure by year.

Note:
Because the default output context of the block is Year, you do not need to specify the output context explicitly in this formula.

ForEach context operator

The ForEach operator adds dimensions to a context.

Example: Using ForEach to add dimensions to a context

The following table shows the maximum revenue for each Quarter in a report which contains the Quarter dimension but does not include it in the block:

Year	Sales revenue	Max Quarterly Revenue
2001	8096123.60	2660699.50
2002	13232246.00	4186120.00
2003	15059142.80	4006717.50

It is possible to create a formula for the Max Quarterly Revenue column that does not include the ForEach operator:

```
Max ([Sales Revenue] In ([Year];[Quarter])) In ([Year])
```

Using the ForEach context operator, you can achieve the same result with the following formula:

```
Max ([Sales Revenue] ForEach ([Quarter])) In ([Year])
```

Why? Because the Year dimension is the default input context in the block. By using the ForEach operator, you add the Quarter dimension to the context, giving an input context of ([Year];[Quarter]).

ForAll context operator

The ForAll context operator removes dimensions from a context.

Example: Using ForAll to remove dimensions from a context

You have a report showing Year, Quarter and Sales Revenue and you want to add a column that shows the total revenue in each year, as shown in the following block:

Year	Quarter	Sales revenue	Yearly Total
2001	Q1	$2660700	$8096124
2001	Q2	$2279003	$8096124
2001	Q3	$1367841	$8096124
2001	Q4	$1788580	$8096124
2002	Q1	$3326172	$13232246
2002	Q2	$2840651	$13232246
2002	Q3	$2879303	$13232246
2002	Q4	$4186120	$13232246
2003	Q1	$3742989	$15059143
2003	Q2	$4006718	$15059143
2003	Q3	$3953395	$15059143
2003	Q4	$3356041	$15059143

To total revenues by year the input context needs to be (Year); by default it is (Year; Quarter). Therefore, you can remove Quarter from the input context by specifying ForAll ([Quarter]) in the formula, which looks like this:

```
Sum([Sales Revenue] ForAll ([Quarter]))
```

Note that you can use the In operator to achieve the same thing; in this case the formula is:

```
Sum([Sales Revenue] In ([Year]))
```

This version of the formula explicitly specifies Year as the context, rather than removing Quarter to leave Year.

Web Intelligence extended syntax keywords

Extended syntax keywords are a form of shorthand that allows you to refer to dimensions in extended syntax without specifying those dimensions explicitly. This helps future-proof reports; if formulas do not contain hard-coded references to dimensions, they will continue to work even if dimensions are added to or removed from a report.

There are five extended syntax keywords: Report, Section, Break, Block and Body.

The Report keyword

The following table describes the data referenced by the Report keyword depending on where it is placed in a report:

When placed in...	References this data...
A block	All data in the report
A block break (header or footer)	All data in the report
A section (header, footer, or outside a block)	All data in the report
Outside any blocks or sections	All data in the report

Example: The Report keyword

You have a report showing Year, Quarter and Sales revenue. The report has a column, Report Total, that shows the total of all revenue in the report.

Year	Quarter	Sales revenue	Report Total
2001	Q1	$2,660,700	36,387,512.4
2001	Q2	$2,279,003	36,387,512.4
2001	Q3	$1,367,841	36,387,512.4
2001	Q4	$1,788,580	36,387,512.4
2002	Q1	$3,326,172	36,387,512.4
2002	Q2	$2,840,651	36,387,512.4
2002	Q3	$2,879,303	36,387,512.4
2002	Q4	$4,186,120	36,387,512.4
2003	Q1	$3,742,989	36,387,512.4
2003	Q2	$4,006,718	36,387,512.4
2003	Q3	$3,953,395	36,387,512.4
2003	Q4	$3,356,041	36,387,512.4

The formula for the Report Total column is Sum([Sales revenue]) In Report. Without the Report keyword, this column would duplicate the figures in the Sales Revenue column because it would use the default output context ([Year];[Quarter]).

The Section keyword

The following table describes the data referenced by the Section keyword depending on where it is placed in a report

When placed in...	References this data...
A block	All data in the section
A block break (header or footer)	All data in the section
A section (header, footer, or outside a block)	All data in the section
Outside any blocks or sections	Not applicable

Example: The Section keyword

You have a report showing Year, Quarter, and Sales revenue.

2001

Quarter	Sales revenue	Section Total
Q1	$2.660.700	8.095.814
Q2	$2.278.693	8.095.814
Q3	$1.367.841	8.095.814
Q4	$1.788.580	8.095.814

The report has a section based on Year. The Section Total column has the formula:

```
Sum ([Sales Revenue]) In Section
```

The figure in the Section Total column is the total revenue for 2001, because the section break occurs on the Year object. Without the Section keyword this column would duplicate the figures in the Sales revenue column, because it would use the default output context ([Year];[Quarter]).

The Break keyword

The following table describes the dimensions referenced by the Break keyword depending on where it is placed in a report:

When placed in...	References this data...
A block	Data in the part of a block delimited by a break
A block break (header or footer)	Data in the part of a block delimited by a break
A section (header, footer, or outside a block)	Not applicable
Outside any blocks or sections	Not applicable

Example: The Break keyword

You have a report showing Year, Quarter and Sales revenue.

Year	Quarter	Sales revenue	Break Total
2001	Q1	$2,660,700	8,096,123.6
	Q2	$2,279,003	8,096,123.6
	Q3	$1,367,841	8,096,123.6
	Q4	$1,788,580	8,096,123.6
2001			

The report has break on Year. The Break Total column has the formula:

```
Sum ([Sales Revenue]) In Break
```

Without the Break keyword this column would duplicate the figures in the Sales revenue column, because it would use the default output context ([Year];[Quarter]).

The Block keyword

The following table describes the dimensions referenced by the Block keyword depending on where it is placed in a report: The Block keyword often encompasses the same data as the Section keyword. The difference is that Block accounts for filters on a block whereas Section ignores them.

When placed in...	References this data...
A block	Data in the whole block, ignoring breaks, respecting filters
A block break (header or footer)	Data in the whole block, ignoring breaks, respecting filters
A section (header, footer, or outside a block)	Not applicable
Outside any blocks or sections	Not applicable

Example: The Block keyword

You have a report showing Year, Quarter and Sales revenue. The report has a section based on Year. The block is filtered to exclude the third and fourth quarters.

2001

Quarter	Sales revenue	First Half Average	Yearly Average
Q1	$2,660,700	$2,469,851.25	$8,096,123.60
Q2	$2,279,003	$2,469,851.25	$8,096,123.60
Sum:	**4,939,702.5**		

2002

Quarter	Sales revenue	First Half Average	Yearly Average
Q1	$3,326,172	$3,083,411.50	$13,232,246.00
Q2	$2,840,651	$3,083,411.50	$13,232,246.00
Sum:	**6,166,823**		

2003

Quarter	Sales revenue	First Half Average	Yearly Average
Q1	$3,742,989	$3,874,853.20	$15,059,142.80
Q2	$4,006,718	$3,874,853.20	$15,059,142.80
Sum:	**7,749,706.4**		

The Yearly Average column has the formula

```
Average([Sales revenue] In Section)
```

and the First Half Average column has the formula

```
Average ([Sales revenue]) In Block
```

You can see how the Block keyword takes account of the filter on the block.

The Body keyword

The following table describes the dimensions referenced by the Body keyword depending on where it is placed in a report:

When placed in...	References this data...
A block	Data in the block

When placed in...	References this data...
A block break (header or footer)	Data in the block
A section (header, footer, or outside a block)	Data in the section
Outside any blocks or sections	Data in the report

Example: The Body keyword

You have a report showing Year, Quarter and Sales revenue, with a break on Year. The report has a section based on Year and a break on Quarter.

Year	Quarter	Sales revenue	Body
2001	Q1	2,660,700	2,660,699.5
	Q2	2,279,003	2,279,003
	Q3	1,367,841	1,367,840.7
	Q4	1,788,580	1,788,580.4
2001		8,096,123.6	

The Body column has the formula

```
Sum ([Sales Revenue]) In Body
```

The totals in the Body column are the same as those in the Sales revenue column because the Body keyword refers to the data in the block. If you were to remove the Month object, the figures in the Block column would change to correspond with the changed figures in the Sales revenue column. If you were to place the formula in the report footer it would return the total revenue for the block.

Using keywords to make reports generic

Extended syntax keywords future-proof your report against changes. If you refer to data explicitly (by specifying dimensions using In, ForEach or ForAll)

your reports might return unexpected data if dimensions are added or removed. The following example illustrates this.

Example: Using the Report keyword to display percentages

In this example you have a block that contains Year, Quarter and Sales revenue objects. You want to display revenues by year and quarter, and the percentage of the total revenue in the report that each individual revenue represents, as shown:

Year	Quarter	Sales revenue	Percentage of Total
2001	Q1	$2660700	7.31
2001	Q2	$2279003	6.26
2001	Q3	$1367841	3.76
2001	Q4	$1788580	4.92
2002	Q1	$3326172	9.14
2002	Q2	$2840651	7.81
2002	Q3	$2879303	7.91
2002	Q4	$4186120	11.5
2003	Q1	$3742989	10.29
2003	Q2	$4006718	11.01
2003	Q3	$3953395	10.86
2003	Q4	$3356041	9.22
		Sum:	**100**

The formula for the Percentage of Total column is:

```
([Sales revenue]/(Sum([Sales revenue]) In Report)) * 100
```

In a block, the Report includes all data in a report, so this formula could be written:

```
([Sales revenue]/Sum([Sales revenue] ForAll ([Year];[Quar
ter]))) * 100
```

This formula tells Web Intelligence to remove Year and Quarter from the output context; in other words, to calculate a grand total, because there are no other dimensions in the report. The formula then divides each revenue by the grand total to give its percentage of the total.

Although you can use ForAll in this situation, it is much better to use the Report keyword. Why? What if the Month dimension were subsequently added to the report? The version of the formula that uses the Report

keyword still calculates each percentage correctly, but the version that explicitly specifies the Year and Quarter dimensions is now wrong:

Year	Quarter	Month	Sales revenue	Percentage of Total
2001	Q1	1	$1003541.20	26.13
2001	Q1	2	$630073.20	29.97
2001	Q1	3	$1027085.10	27.12
2001	Q2	4	$895259.80	28.1
2001	Q2	5	$865615.10	24.3
2001	Q2	6	$517818.50	21.77
2001	Q3	7	$525903.50	20.42
2001	Q3	8	$173756.40	11.11
2001	Q3	9	$668180.80	16.45
2001	Q4	10	$655206.40	18.04
2001	Q4	11	$484024.20	18.55
2001	Q4	12	$649349.80	21.01
2002	Q1	1	$1335401.90	34.77
2002	Q1	2	$609012.80	28.97
2002	Q1	3	$1381757.50	36.49
2002	Q2	4	$1068308.90	33.53
2002	Q2	5	$1081884.80	30.38
2002	Q2	6	$690457.10	29.03
2002	Q3	7	$801954.70	31.14
2002	Q3	8	$581093.50	37.15
2002	Q3	9	$1496254.80	36.84
2002	Q4	10	$1545871.80	42.57
2002	Q4	11	$1081915.30	41.47
2002	Q4	12	$1558332.90	50.43
2003	Q1	1	$1501366.70	39.09
2003	Q1	2	$863451.90	41.07
2003	Q1	3	$1378170.30	36.39
2003	Q2	4	$1222329.40	38.37
2003	Q2	5	$1614147.30	45.32
2003	Q2	6	$1170240.80	49.2
2003	Q3	7	$1247313.50	48.44
2003	Q3	8	$809365.40	51.74
2003	Q3	9	$1896716.40	46.7
2003	Q4	10	$1430300.10	39.39
2003	Q4	11	$1043098.80	39.98
2003	Q4	12	$882642.20	28.56
			Sum:	**1200**

Why is this? The problem lies in:

```
Sum ([Sales Revenue] ForAll ([Year];[Quarter))
```

When Year and Quarter were the only dimensions in the report, this was equivalent to “a grand total of all revenues". Once you add the Month dimension, this expression removes Year and Quarter from the default output context, but leaves Month.

The formula now has a “break" on month. In other words, on every row where Month is 1, this expression now means “the total revenue of all month 1s". In every row where Month is 2, it means “the total revenue of all month 2s". As a result, the percentages are not the percentages you expect.

Web Intelligence functions, operators and keywords

chapter 4

Web Intelligence functions

Web Intelligence divides functions into the following categories:

Category	Description
Aggregate	Aggregates data (for example by summing or averaging a set of values)
Character	Manipulates character strings
Date and Time	Returns date or time data
Document	Returns data about a document
Data Provider	Returns data about a document's data provider
Logical	Returns TRUE or FALSE
Numeric	Returns numeric data
Misc	Functions that do not fit into the above categories

Aggregate functions

Average

Description

Returns the average value of a measure

Function Group

Aggregate

Syntax

```
num Average(measure;[IncludeEmpty])
```

Input

Parameter	Description	Type	Required
measure	Any measure	Measure	Yes
IncludeEmpty	Includes empty rows in the calculation	Keyword	No (Empty rows excluded by default)

Notes

- You can use extended syntax context operators with `Average`.
- You can specify `IncludeEmpty` as the second argument to the function. When you specify this argument, the function takes empty (null) rows into consideration in the calculation.

Examples

If the [Sales Revenue] measure has the values 41569, 30500, 40000 and 50138, `Average([Sales Revenue])` returns 40552.

Related Topics

- *IncludeEmpty operator* on page 189

Count

Description

Returns the number of values in a dimension or measure

Function Group

Aggregate

Syntax

```
integer Count(dimension|measure;[IncludeEmpty];[Distinct|All])
```

Input

Parameter	Description	Type	Required
dimension|measure	Any dimension or measure	Dimension or measure	Yes
IncludeEmpty	Includes empty values in the calculation	Keyword	No
Distinct|All	Includes distinct values only (default for dimensions) or all values (default for measures) in the calculation	Keyword	No

Notes

- You can use extended syntax context operators with `Count`.
- You can specify `IncludeEmpty` as the second argument to the function. When you specify this argument, the function takes empty (null) rows into consideration in the calculation.
- The `Distinct`/`All` parameter is optional. If you do not specify this parameter, the default values are `Distinct` for dimensions and `All` for measures.

Examples

`Count("Test")` returns 1

`Count([City];Distinct)` returns 5 if there are 5 different cities in a list of cities, even if there are more than 5 rows in the list due to duplication.

`Count([City];All)` returns 10 if there are 10 cities in a list of cities, even though some are duplicated.

`Count ([City];IncludeEmpty)` returns 6 if there are 5 cities and one blank row in a list of cities.

Related Topics

- *IncludeEmpty operator* on page 189
- *Distinct/All operators* on page 188

First

Description

Returns the first value in a data set

Function Group

Aggregate

Syntax

```
input_type First(dimension|measure)
```

Input

Parameter	Description	Type	Required
dimension|measure	Any dimension or measure	Dimension or measure	Yes

Notes

- When placed in a break footer, `First` returns the first value in the in the break.
- When placed a a section footer, `First` returns the first value in the section.

Examples

When placed in a table footer, `First([Revenue])` returns the first value of [Revenue] in the table.

Interpolation

Description

Calculates empty measure values by interpolation

Function Group

Numeric

Syntax

```
num Interpolation(measure;[PointToPoint|Linear];[NotOn
Break];[Row|Col])
```

Input

Parameter	Description	Type	Required
measure	Any measure	Measure	Yes
PointToPoint|Linear	The interpolation method: • `PointToPoint` - point-to-point interpolation • `Linear` - linear regression with least squares interpolation	Keyword	No (`PointToPoint` is default)
NotOnBreak	Prevents the function from resetting the calculation on block and section breaks	Keyword	No
Row|Col	Sets the calculation direction	Keyword	No

Notes

- `Interpolation` is particularly useful when you create a line graph on a measure that contains missing values. By using the function you ensure that the graph plots a continuous line rather than disconnected lines and points.

- Linear regression with least squares interpolation calculates missing values by calculating a line equation in the form f(x) = ax + b that passes as closely as possible through all the available values of the measure.
- Point-to point interpolation calculates missing values by calculating a line equation in the form f(x) = ax + b that passes through the two adjacent values of the missing value.
- The sort order of the measure impacts the values returned by `Interpolation`.
- You cannot apply a sort or a ranking to a formula containing `Interpolation`.
- If there is only one value in the list of values, `Interpolation` uses this value to supply all the missing values.
- Filters applied to an interpolated measure can change the values returned by `Interpolation` depending on which values the filter impacts.

Examples

`Interpolation([Value])` supplies the following missing values using the default point-to-point interpolation method:

Day	Value	Interpolation([Value])
Monday	12	12
Tuesday	14	14
Wednesday		15
Thursday	16	16
Friday		17
Saturday		18
Sunday	19	19

Related Topics

- *Linear operator* on page 189
- *PointToPoint operator* on page 190

Last

Description

Returns the last value in a dimension or measure

Function Group

Aggregate

Syntax

```
input_type Last(dimension|measure)
```

Input

Parameter	Description	Type	Required
dimension|measure	Any dimension or measure	Dimension or measure	Yes

Notes

- When placed in a break footer, `Last` returns the last value in the in the break.
- When placed a a section footer, `Last` returns the last value in the section.

Examples

When placed in a table footer, `First([Revenue])` returns the first value of [Revenue] in the table.

Max

Description

Returns the largest value in a dimension or measure

Function Group

Aggregate

Syntax

```
input_type Max(dimension|measure)
```

Input

Parameter	Description	Type	Required
dimension|measure	Any dimension or measure	Dimension or measure	Yes

Notes

You can use extended syntax context operators with `Max`.

Examples

If the Sales revenue measure has the values 3000, 60034 and 901234, **Max([Sales Revenue])** returns 901234.

If the City dimension has the values "Aberdeen" and "London", **Max ([City])** returns "London".

Median

Description

Returns the median (middle value) of a measure

Function Group

Aggregate

Syntax

```
num Median(measure)
```

Input

Parameter	Description	Type	Required
measure	Any measure	Measure	Yes

Notes

If the set of numbers has an even number of values, `Median` takes the average of the middle two values.

Examples

`Median([Revenue])` returns 971,444 if [Revenue] has the values 835420, 971444, and 1479660.

Min

Description

Returns the smallest value in a dimension or measure

Function Group

Aggregate

Syntax

```
any_type Min(dimension|measure)
```

Input

Parameter	Description	Type	Required
dimension|measure	Any dimension or measure	Dimension or measure	Yes

Notes

You can use extended syntax context operators with `Min`.

Examples

If the Sales revenue measure has the values 3000, 60034 and 901234, `Min([Sales Revenue])` returns 3000.

If the City dimension has the values Aberdeen and London, `Min([City])` returns "Aberdeen".

Mode

Description

Returns the most frequently-occuring value in a data set

Function Group

Aggregate

Syntax

```
input_type Mode(dimension|measure)
```

Input

Parameter	Description	Type	Required
dimension|measure	Any dimension or measure	Measure	Yes

Notes

- `Mode` returns null if the data set does not contain one value that occurs more frequently than all the others.

Examples

`Mode([Revenue])` returns 200 if [Revenue] has the values 100, 200, 300, 200.

`Mode([Country])` returns the most frequently-occuring value of [Country].

Percentage

Description

Expresses a measure value as a percentage of its embedding context

Function Group

Aggregate

Syntax

```
num Percentage(measure;[Break];[Row|Col])
```

Input

Parameter	Description	Type	Required
measure	Any measure	Measure	Yes
Break	Accounts for table breaks	Keyword	No
Row|Col	Sets the calculation direction	Keyword	No

Examples

In the following table, the Percentage column has the formula `Percentage([Sales Revenue])`

Year	Sales Revenue	Percentage
2001	1000	10
2002	5000	50
2003	4000	40
Sum:	**10000**	**100**

By default the embedding context is the measure total in the table. You can make the function take account of a break in a table by using the optional `Break` argument. In this case the default embedding context becomes the table section.

In the following table, the Percentage column has the formula `Percentage([Sales Revenue];Break)`

Year	Quarter	Sales Revenue	Percentage
2001	Q1	1000	10
	Q2	2000	20
	Q3	5000	50
	Q4	2000	20
2001	**Sum:**	10000	100

Year	Quarter	Sales Revenue	Percentage
2002	Q1	2000	20
	Q2	2000	20
	Q3	5000	50
	Q4	1000	10
2002	**Sum:**	10000	100

You can use the `Percentage` function across columns or rows; you can specify this explicitly using the optional `Row|Col` argument. For example, in the following crosstab, the Percentage column has the formula `Percentage([Sales Revenue];Row)`

	Q1	Percentage	Q2	Percentage	Q3	Percentage	Q4	Percentage
2001	1000	10	2000	20	5000	50	2000	20
2002	2000	20	2000	20	5000	50	1000	10

Percentile

Description

Returns the nth percentile of a measure

Function Group

Numeric

Syntax

```
num Percentile(measure;percentile)
```

Input

Parameter	Description	Type	Required
measure	Any measure	Measure	Yes
percentile	A percentage expressed as a decimal	Number	Yes

Notes

The nth percentile is a number that is greater than or equal to n% of the numbers in a set. You express n% in the form 0.n.

Examples

If [measure] has the set of numbers (10;20;30;40;50), `Percentile([measure];0.3)` returns 22, which is greater than or equal to 30% of the numbers in the set.

Product

Description

Multiplies the values of a measure

Function Group

Aggregate

Syntax

```
num Product(measure)
```

Input

Parameter	Description	Type	Required
measure	Any measure	Measure	Yes

Examples

`Product([Measure])` returns 30 if [Measure] has the values 2, 3, 5.

RunningAverage

Description

Returns the running average of a measure

Function Group

Aggregate

Syntax

```
num RunningAverage(measure;[Row|Col];[IncludeEmpty];[re
set_dims])
```

Input

Parameter	Description	Type	Required
measure	Any measure	Measure	Yes
Row|Col	Sets the calculation direction	Keyword	No
IncludeEmpty	Includes empty values in the calculation	Keyword	No
reset_dims	Resets the calculation on the specified dimensions	Dimension list	No

Notes

- You can use extended syntax context operators with `RunningAverage`.
- You can set the calculation direction with the `Row` and `Col` operators.
- If you apply a sort on the measure referenced by `RunningAverage`, Web Intelligence applies the sort to the measure first, then calculates the running average.
- You must always place dimensions in parentheses even if there is only one dimension in the list of reset dimensions.
- When you specify a set of reset dimensions you must separate them with semi-colons.
- `RunningAverage` does not automatically reset the average after a block break or new section.

Examples

`RunningAverage([Revenue])` returns these results in the following table:

Country	**Resort**	Revenue	Running Average
US	Hawaiian Club	1,479,660	835,420
US	Bahamas Beach	971,444	1,225,552

France	French Riviera	835,420	1,095,508

`RunningAverage([Revenue];([Country]))` returns these results in the following table:

Country	**Resort**	Revenue	Running Average
US	Hawaiian Club	1,479,660	835,420
US	Bahamas Beach	971,444	1,225,552
France	French Riviera	835,420	835,420

Related Topics

- *IncludeEmpty operator* on page 189
- *Row/Col operators* on page 191

RunningCount

Description

Returns the running count of a number set

Function Group

Aggregate

Syntax

```
num RunningCount(dimension|measure;[Row|Col];[IncludeEmpty];[reset_dims])
```

Input

Parameter	Description	Type	Required
dimension|measure	Any dimension or measure	Dimension or measure	Yes
Row|Col	Sets the calculation direction	Keyword	No
IncludeEmpty	Includes empty values in the calculation	Keyword	No
reset_dims	Resets the calculation on the specified dimensions	Dimension list	No

Notes

- You can use extended syntax context operators with `RunningCount`.
- You can set the calculation direction with the `Row` and `Col` operators.
- If you apply a sort on the measure referenced by `RunningCount`, Web Intelligence applies the sort to the measure first, then calculates the running count.
- You must always place dimensions in parentheses even if there is only one dimension in the list of reset dimensions.
- When you specify a set of reset dimensions you must separate them with semi-colons.
- `RunningCount` does not automatically reset the count after a block break or new section.

Examples

`RunningCount([Revenue])` returns these results in the following table:

Country	Resort	Revenue	Running Count
US	Hawaiian Club	1,479,660	1
US	Bahamas Beach	971,444	2
France	French Riviera	835,420	3

`RunningCount([Revenue];([Country]))` returns these results in the following table:

Country	Resort	Revenue	Running Count
US	Hawaiian Club	1,479,660	1
US	Bahamas Beach	971,444	2
France	French Riviera	835,420	1

Related Topics

- *IncludeEmpty operator* on page 189
- *Row/Col operators* on page 191
- *IncludeEmpty operator* on page 189
- *IncludeEmpty operator* on page 189

RunningMax

Description

Returns the running maximum of a dimension or measure

Function Group

Aggregate

Syntax

```
input_type RunningMax(dimension|measure;[Row|Col];[reset_dims])
```

Input

Parameter	Description	Type	Required
dimension|measure	Any dimension or measure	Dimension or measure	Yes
Row|Col	Sets the calculation direction	Keyword	No

Parameter	Description	Type	Required
reset_dims	Resets the calculation on the specified dimensions	Dimension list	No

Notes

- You can use extended syntax context operators with `RunningMax`.
- You can set the calculation direction with the `Row` and `Col` operators.
- If you apply a sort on the measure referenced by `RunningMax`, Web Intelligence applies the sort to the measure first, then calculates the running maximum.
- You must always place dimensions in parentheses even if there is only one dimension in the list of reset dimensions.
- When you specify a set of reset dimensions you must separate them with semi-colons.
- `RunningMax` does not automatically reset the max after a block break or new section.

Examples

`RunningMax([Revenue])` returns these results in the following table:

Country	**Resort**	Revenue	Running Max
France	French Riviera	835,420	835,420
US	Bahamas Beach	971,444	971,444
US	Hawaiian Club	1,479,660	1,479,660

Related Topics

- *IncludeEmpty operator* on page 189
- *Row/Col operators* on page 191

RunningMin

Description

Returns the running minimum of a dimension or measure

Function Group

Aggregate

Syntax

```
input_type RunningMin(dimension|measure;[Row|Col];[reset_dims])
```

Input

Parameter	Description	Type	Required
dimension|detail|measure	Any dimension or measure	Dimension or measure	Yes
Row|Col	Sets the calculation direction	Keyword	No
reset_dims	Resets the calculation on the specified dimensions	Dimension list	No

Notes

- You can use extended syntax context operators with `RunningMin`.
- You can set the calculation direction with the `Row` and `Col` operators.
- If you apply a sort on the measure referenced by `RunningMin`, Web Intelligence applies the sort to the measure first, then calculates the running minimum.
- You must always place dimensions in parentheses even if there is only one dimension in the list of reset dimensions.
- When you specify a set of reset dimensions you must separate them with semi-colons.
- `RunningMin` does not automatically reset the minimum after a block break or new section.

Examples

`RunningMin([Revenue])` returns these results in the following table:

Country	**Resort**	Revenue	Running Max
France	French Riviera	835,420	835,420
US	Bahamas Beach	971,444	835,420
US	Hawaiian Club	1,479,660	835,420

Related Topics

- *IncludeEmpty operator* on page 189
- *Row/Col operators* on page 191

RunningProduct

Description

Returns the running product of a measure

Function Group

Aggregate

Syntax

```
num RunningProduct(measure;[Row|Col];[reset_dims])
```

Input

Parameter	Description	Type	Required
measure	Any measure	Measure	Yes
Row|Col	Sets the calculation direction	Keyword	No
reset_dims	Resets the calculation on the specified dimensions	Dimension list	No

Notes

- You can use extended syntax context operators with `RunningProduct`.
- You can set the calculation direction with the `Row` and `Col` operators.
- If you apply a sort on the measure referenced by `RunningProduct`, Web Intelligence applies the sort to the measure first, then calculates the running poduct.
- You must always place dimensions in parentheses even if there is only one dimension in the list of reset dimensions.
- When you specify a set of reset dimensions you must separate them with semi-colons.
- `RunningProduct` does not automatically reset the product after a block break or new section.

Examples

`RunningProduct([Number of guests])` returns these results in the following table:

Country of origin	**City**	Number of guests	Running Product
Japan	Kobe	6	6
Japan	Osaka	4	24
US	Chicago	241	5,784

`RunningProduct([Number of guests];([Country of origin]))` returns these results in the following table:

Country of origin	City	Number of guests	Running Product
Japan	Kobe	6	6
Japan	Osaka	4	24
US	Chicago	241	5784

Related Topics

- *IncludeEmpty operator* on page 189
- *Row/Col operators* on page 191

RunningSum

Description

Returns the running sum of a measure

Function Group

Aggregate

Syntax

```
num RunningSum(measure;[Row|Col];[reset_dims])
```

Input

Parameter	Description	Type	Required
measure	Any measure	Measure	Yes
Row|Col	Sets the calculation direction	Keyword	No
reset_dims	Resets the calculation on the specified dimensions	Dimension list	No

Notes

- You can use extended syntax context operators with the `RunningSum`.

- You can set the calculation direction with the `Row` and `Col` operators.
- If you apply a sort on the measure referenced by the `RunningSum` function, Web Intelligence applies the sort to the measure first, then calculates the running sum.
- You must always place dimensions in parentheses even if there is only one dimension in the list of reset dimensions.
- When you specify a set of reset dimensions you must separate them with semi-colons.
- `RunningSum` does not automatically reset the sum after a block break or new section.

Example

`RunningSum([Revenue])` returns these results in the following table:

Country	**Resort**	Revenue	Running Sum
France	French Riviera	835,420	835,420
US	Bahamas Beach	971,444	1,806,864
US	Hawaiian Club	1,479,660	3,286,524

`RunningSum([Revenue];([Country]))` returns these results in the following table:

Country	**Resort**	**Revenue**	Running Sum
France	French Riviera	835,420	835,420
US	Bahamas Beach	971,444	971,444
US	Hawaiian Club	1,479,660	2,451,104

Related Topics

- *IncludeEmpty operator* on page 189
- *Row/Col operators* on page 191

StdDev

Description

Returns the standard deviation of a measure

Function Group

Aggregate

Syntax

```
num StdDev(measure)
```

Input

Paramter	Description	Type	Required
measure	Any measure	Measure	Yes

Notes

The standard deviation is a measure of the statistical dispersion in a set of numbers. It is calculated by:

- finding the average of the set of numbers
- subtracting the average from each number in the set and squaring the difference
- summing all these squared differences
- dividing this sum by (*number of numbers in the set* - 1)
- finding the square root of the result

Examples

If `measure` has the set of values (2, 4, 6, 8) `StdDev([measure])` returns 2.58.

Related Topics

- *Var* on page 76

StdDevP

Description

Returns the population standard deviation of a measure

Function Group

Aggregate

Syntax

```
num StdDevP(measure)
```

Input

Paramter	Description	Type	Required
measure	Any measure	Measure	Yes

Notes

The population standard deviation is a measure of the statistical dispersion in a set of numbers. It is calculated by:

- finding the average of the set of numbers;
- subtracting the average from each number in the set and squaring the difference;
- summing all these squared differences;
- dividing this sum by (*number of numbers in the set*);
- finding the square root of the result.

You can use extended syntax context operators with `StdDevP`.

Examples

If `measure` has the set of values (2, 4, 6, 8) `StdDevP([measure])` returns 2.24.

Sum

Description

Returns the sum of a measure

Function Group

Aggregate

Syntax

```
num Sum(measure)
```

Input

Paramter	Description	Type	Required
measure	Any measure	Measure	Yes

Notes

You can use extended syntax context operators with `Sum`.

Examples

If the Sales Revenue measure has the values 2000, 3000, 4000, and 1000, `Sum([Sales Revenue])` returns 10000.

Var

Description

Returns the variance of a measure

Function Group

Aggregate

Syntax

```
num Var(measure)
```

Input

Paramter	Description	Type	Required
measure	Any measure	Measure	Yes

Notes

The variance is a measure of the statistical dispersion in a set of numbers. It is calculated by:

- finding the average of the set of numbers
- subtracting the average from each number in the set and squaring the difference
- summing all these squared differences
- dividing this sum by (*number of numbers in the set* - 1)

The variance is the square of the standard deviation.

You can use extended syntax context operators with `Var`.

Examples

If `measure` has the set of values (2, 4, 6, 8) `Var([measure])` returns 6.67.

Related Topics

- *StdDev* on page 74

VarP

Description

Returns the population variance of a measure

Function Group

Aggregate

Syntax

```
num VarP(measure)
```

Input

Paramter	Description	Type	Required
measure	Any measure	Measure	Yes

Notes

The population variance is a measure of the statistical dispersion in a set of numbers. It is calculated by:

- finding the average of the set of numbers
- subtracting the average from each number in the set and squaring the difference
- summing all these squared differences
- dividing this sum by (*number of numbers in the set*)

The population variance is the square of the population standard deviation.

You can use extended syntax context operators with `VarP`.

Examples

If `measure` has the set of values (2, 4, 6, 8) `VarP([measure])` returns 5.

Related Topics

- *StdDevP* on page 75

Character functions

Asc

Description

Returns the ASCII value of a character

Function Group

Character

Syntax

```
int Asc(string)
```

Input

Parameter	Description	Type	Required
string	Any string	String	Yes

Notes

If `string` contains more than one character, the function returns the ASCII value of the first character in the string.

Examples

`Asc("A")` returns 65.

`Asc("ab")` returns 97.

`Asc([Country])` returns 85 when the value of [Country] is "US".

Char

Description

Returns the character associated with an ASCII code

Function Group

Character

Syntax

```
string Char(ascii_code)
```

Input

Parameter	Description	Type	Required
ascii_code	An ASCII code	Number	Yes

Notes

If `number` is a decimal, the function ignores the decimal part.

Example
s

`Char(123)` returns "{".

Concatenation

Description

Concatenates (joins) two character strings

Function Group

Character

Syntax

```
string Concatenation(first_string;second_string)
```

Input

Parameter	Description	Type	Required
first_string	The first string	String	Yes
second_string	The second string	String	Yes

Notes

You can also use the '+' operator to concatenate strings.

`"First " + "Second"` returns "First Second".

`"First " + "Second" + " Third"` returns "First Second Third".

Examples

`Concatenation("First ";"Second")` returns "First Second".

`Concatenation("First ";Concatenation("Second ";"Third"))` returns "First Second Third".

Fill

Description

Builds a string by repeating a string `n` times

Function Group

Character

Syntax

```
string Fill(repeating_string;num_repeats)
```

Input

Parameter	Description	Type	Required
repeating_string	The repeating string	String	Yes
num_repeats	The number of repeats	Number	Yes

Examples

`Fill ("New York";2)` returns "New York New York".

FormatDate

Description

Formats a date according to a specified format

Function Group

Character

Syntax

```
string FormatDate(date;format_string)
```

Input

Parameter	Description	Type	Required
date	The date to format	Date	Yes
format_string	The format to apply	String	Yes

Notes

- The format of the output is dependent on the date format applied to the cell.
- The color formatting strings (for example: [Red], [Blue] and so on) cannot be applied to `FormatDate`.

Examples

`FormatDate(CurrentDate();"dd/MM/yyyy")` returns "15/12/2005" if the current date is 15 December 2005.

FormatNumber

Description

Formats a number according to a specified format

Function Group

Character

Syntax

```
string FormatNumber(number;format_string)
```

Input

Parameter	Description	Type	Required
number	The number to format	Number	Yes
format_string	The format to apply	String	Yes

Notes

- The format of the output is dependent on the number format applied to the cell.
- The color formatting strings (for example: [Red], [Blue] and so on) cannot be applied to `FormatNumber`.

Examples

`FormatNumber([Revenue];"#,##.00")` returns 835,420.00 if [Revenue] is 835,420.

HTMLEncode

Description

Applies HTML encoding rules to a string

Function Group

Character

Syntax

```
string HTMLEncode(html)
```

Input

Paramter	Description	Type	Required
html	An HTML string	String	Yes

Examples

`HTMLEncode("http://www.businessobjects.com")` returns "http%3A%2F%2Fwww%2Ebusinessobjects%2Ecom ".

InitCap

Description

Capitalizes the first letter of a string

Function Group

Character

Syntax

```
string InitCap(string)
```

Input

Parameter	Description	Type	Required
string	The string to capitalize	String	Yes

Examples

`InitCap("we hold these truths to be self-evident")` returns "We hold these truths to be self-evident".

Left

Description

Returns the leftmost characters of a string

Function Group

Character

Syntax

```
string Left(string;num_chars)
```

Input

Parameter	Description	Type	Required
string	The input string	string	Yes
num_chars	The number of characters to return from the left	number	Yes

Examples

`Left([Country];2)` returns "Fr" if [Country] is "France".

LeftPad

Description

Pads a string on its left with another string

Function Group

Character

Syntax

```
string LeftPad(padded_string;length;left_string)
```

Input

Parameter	Description	Type	Required
padded_string	The original string	String	Yes
length	The length of the output string	Number	Yes
left_string	The string to be added to the left of `padded_string`	String	Yes

Notes

- If `length` is less than the length of `left_string` and `padded_string` combined, `left_string` is truncated.
- If `length` is less than or equal to the length of `padded_string`, the function returns `padded_string`.
- If `length` is greater than the lengths of `padded_string` and `left_string` combined, `left_string` is repeated or partially repeated enough times to fill out the length.

Examples

`LeftPad("York";8;"New ")` returns "New York"

`LeftPad("York";6;"New ")` returns "NeYork"

`LeftPad("York";11;"New ")` returns "New NewYork"

`LeftPad("New ";2;"York")` returns "New".

LeftTrim

Description

Trims the leading spaces from a string

Function Group

Character

Syntax

```
string LeftTrim(trimmed_string)
```

Input

Parameter	Description	Type	Required
trimmed_string	The string to be trimmed	String	Yes

Examples

`LeftTrim([Country])` returns "France" if [Country] is " France".

Length

Description

Returns the number of characters in a string

Function Group

Character

Syntax

```
int Length(string)
```

Input

Parameter	Description	Type	Required
string	The input string	String	Yes

Examples

`Length([Last Name])` returns 5 if [Last Name] is "Smith".

Lower

Description

Converts a string to lower case

Function Group

Character

Syntax

```
string Lower(string)
```

Input

Parameter	Description	Type	Required
string	The string to be converted to lower case	String	Yes

Examples

`Lower("New York")` returns "new york".

Match

Description

Determines whether a string matches a pattern

Function Group

Character

Syntax

```
bool Match(test_string;pattern)
```

Input

Paramter	Description	Type	Required
test_string	The string to be tested against the text pattern	string	Yes
pattern	The text pattern	string	Yes

Notes

- The pattern can contain the wildcards "*" (replaces any set of characters) or "?" (replaces any single character).

Examples

`Match([Country];"F*")` returns True if [Country} is "France".

`Match([Country];"?S?")` returns True if [Country] is "USA".

`Match("New York";"P*")` returns False.

Pos

Description

Returns the starting position of a text pattern in a string

Function Group

Character

Syntax

```
int Pos(test_string;pattern)
```

Input

Paramter	Description	Type	Required
test_string	The string to be tested for the text pattern	string	Yes
pattern	The text pattern	string	Yes

Notes

- If the pattern occurs more than once, `Pos` returns the position of the first occurrence.

Examples

`Pos("New York";"Ne")` returns 1.

`Pos("New York, New York";"Ne")` returns 1.

`Pos("New York"; "York")` returns 5.

Replace

Description

Replaces part of a string with another string

Function Group

Character

Syntax

```
string Replace(replace_in;replaced_string;replace_with)
```

Input

Parameter	Description	Type	Required
replace_in	The string in which the text is replaced	string	Yes
re-placed_string	The text to be replaced	string	Yes
replace_with	The text that replaces `re placed_string`	string	Yes

Examples

`Replace("New YORK";"ORK";"ork")` returns "New York".

Right

Description

Returns the rightmost characters of a string

Function Group

Character

Syntax

```
string Right(string;num_chars)
```

Input

Parameter	Description	Type	Required
string	Any string	string	Yes
num_chars	The number of characters to return from the right	number	Yes

Examples

`Right([Country];2)` returns "ce" if [Country] is "France".

RightPad

Description

Pads a string on its right with another string

Function Group

Character

Syntax

```
string RightPad(padded_string;length;right_string)
```

Input

Parameter	Description	Type	Required
padded_string	The original string	String	Yes
length	The length of the output string	Number	Yes
right_string	The string to be added to the right of `padded_string`	String	Yes

Notes

- If `length` is less than the length of `right_string` and `padded_string` combined, `right_string` is truncated.

- If `length` is less than or equal to the length of `padded_string`, the function returns `padded_string`.
- If `length` is greater than the lengths of `padded_string` and `right_string` combined, `right_string` is repeated or partially repeated enough times to fill out the length.

Examples

`RightPad("New ";8;"York")` returns "New York"

`RightPad("New ";6;"York")` returns "New Yo"

`RightPad("New ";11;"York")` returns "New YorkYor"

`RightPad("New ";2;"York")` returns "New".

RightTrim

Description

Trims the trailing spaces from a string

Function Group

Character

Syntax

```
string RightTrim(trimmed_string)
```

Input

Parameter	Description	Type	Required
trimmed_string	The string to be trimmed	String	Yes

Examples

`RightTrim([Country])` returns "France" if [Country] is "France ".

Substr

Description

Returns part of a string

Function Group

Character

Syntax

```
string SubStr(string;start;length)
```

Input

Parameter	Description	Type	Required
string	Any string	String	Yes
start	The start position of the extracted string	Number	Yes
length	The length of the extracted string	Number	Yes

Examples

`SubStr("Great Britain";1;5)` returns "Great".

`SubStr("Great Britain";7;7)` returns "Britain".

Trim

Description

Trims the leading and trailing spaces from a string

Function Group

Character

Syntax

```
string Trim(trimmed_string)
```

Input

Parameter	Description	Type	Required
string	The string to be trimmed	String	Yes

Examples

`Trim(" Great Britain ")` returns "Great Britain".

Upper

Description

Converts a string to upper case

Function Group

Character

Syntax

```
string Upper(string)
```

Input

Parameter	Description	Type	Required
string	The string to be converted	String	Yes

Examples

`Upper("New York")` returns "NEW YORK".

UrlEncode

Description

Applies URL encoding rules to a string

Function Group

Character

Syntax

```
string UrlEncode(html)
```

Input

Parameter	Description	Type	Required
html	The URL to be encoded	String	Yes

Examples

`UrlEncode("http://www.businessobjects.com")` returns "http%3A%2F%2Fwww%2Ebusinessobjects%2Ecom".

WordCap

Description

Capitalizes the first letter of all the words in a string

Function Group

Character

Syntax

```
string WordCap(string)
```

Input

Parameter	Description	Type	Required
string	The string to be capitalized	String	Yes

Examples

`WordCap("Sales revenue for March")` returns "Sales Revenue For March".

Date and Time functions

CurrentDate

Description

Returns the current date formatted according to the regional settings

Function Group

Date and Time

Syntax

```
date CurrentDate()
```

Examples

`CurrentDate()` returns 10 September 2002 if the date is 10 September 2002.

CurrentTime

Description

Returns the current time formatted according to the regional settings

Function Group

Date and Time

Syntax

```
time CurrentTime()
```

Examples

`CurrentTime` returns 11:15 if the current time is 11:15.

DayName

Description

Returns the day name in a date

Function Group

Date and Time

Syntax

```
string DayName(date)
```

Input

Parameter	Description	Type	Required
date	The input date	Date	Yes

Examples

`DayName([Reservation Date])` returns "Saturday' when the date in [Reservation Date] is 15 December 2001 (which is a Saturday).

Note

The input date must be a variable. You cannot specify the date directly, as in `DayName("07/15/2001")`.

DayNumberOfMonth

Description

Returns the day number in a month

Function Group

Date and Time

Syntax

```
int DayNumberOfMonth(date)
```

Input

Parameter	Description	Type	Required
date	The input date	Date	Yes

Examples

`DayNumberOfMonth([Reservation Date])` returns 15 when the date in [Reservation Date] is 15 December 2001.

DayNumberOfWeek

Description

Returns the day number in a week

Function Group

Date and Time

Syntax

```
int DayNumberOfWeek(date)
```

Input

Parameter	Description	Type	Required
date	The input date	Date	Yes

Notes

Web Intelligence treats Monday as the first day of the week.

Examples

`DayNumberOfWeek([Reservation Date])` returns 1 when the date in [Reservation Date] is 2 May 2005 (which is a Monday).

DayNumberOfYear

Description

Returns the day number in a year

Function Group

Date and Time

Syntax

```
int DayNumberOfYear(date)
```

Input

Parameter	Description	Type	Required
date	The input date	Date	Yes

Examples

`DayNumberOfYear([Reservation Date])` returns 349 when the date in [Reservation Date] is 15 December 2001.

DaysBetween

Description

Returns the number of days between two dates

Function Group

Date and Time

Syntax

```
int DaysBetween(first_date;last_date)
```

Input

Parameter	Description	Type	Required
first_date	The first date	Date	Yes
last_date	The last date	Date	Yes

Examples

`DaysBetween([Sale Date];[Invoice Date])` returns 2 if [Sale Date] is 15 December 2001 and [Invoice Date] is 17 December 2001.

LastDayOfMonth

Description

Returns the date of the last day in a month

Function Group

Date and Time

Syntax

```
date LastDayOfMonth(date)
```

Input

Parameter	Description	Type	Required
date	Any date in the month	Date	Yes

Examples

`LastDayOfMonth([Sale Date])` returns 31 December 2005 if [Sale Date] is 11 December 2005.

LastDayOfWeek

Description

Returns the date of the last day in a week

Function Group

Date and Time

Syntax

```
date LastDayOfWeek(date)
```

Input

Parameter	Description	Type	Required
date	Any date in the week	Date	Yes

Notes

Web Intelligence treats Monday as the first day of the week.

Examples

`LastDayOfWeek([Sale Date])` returns 15 May 2005 (a Sunday) if [Sale Date] is 11 May 2005.

Month

Description

Returns the month name in a date

Function Group

Date and Time

Syntax

```
string Month(date)
```

Input

Parameter	Description	Type	Required
date	The input date	Date	Yes

Examples

`Month([Reservation Date])` returns "December" when the date in [Reservation Date] is 15 December 2005.

MonthNumberOfYear

Description

Returns the month number in a date

Function Group

Date and Time

Syntax

```
int MonthNumberOfYear(date)
```

Input

Parameter	Description	Type	Required
date	Any date in the year	Date	Yes

Example

`MonthNumberOfYear([Reservation Date])` returns 12 when the date in [Reservation Date] is 15 December 2005.

MonthsBetween

Description

Returns the number of months between two dates

Function Group

Date and Time

Syntax

```
int MonthsBetween(first_date;last_date)
```

Input

Parameter	Description	Type	Required
first_date	The first date	Date	Yes
last_date	The last date	Date	Yes

Examples

`MonthsBetween([Sale Date];[Invoice Date])` returns 1 if [Sale Date] is 2 December 2005 and [Invoice Date] is 2 January 2006.

Quarter

Description

Returns the quarter number in a date

Function Group

Date and Time

Syntax

```
int Quarter(date)
```

Input

Parameter	Description	Type	Required
date	Any date in the quarter	Date	Yes

Examples

`Quarter([Reservation Date])` returns 4 when the date in [Reservation Date] is 15 December 2005.

RelativeDate

Description

Returns a date relative to another date

Function Group

Date and Time

Syntax

```
date RelativeDate(start_date;num_days)
```

Input

Parameter	Description	Type	Required
start_date	The start date	Date	Yes
num_days	The number of days from the start date	Number	Yes

Notes

The `num_days` parameter can be negative to return a date earlier than `start_date`.

Examples

`RelativeDate[Reservation Date];2)` returns 17 December 2005 when [Reservation Date] is 15 December 2005.

`RelativeDate[Reservation Date];-3)` returns 9 January 2007 when [Reservation Date] is 12 January 2007.

ToDate

Description

Returns a character string formatted according to a date format

Function Group

Date and Time

Syntax

```
date ToDate(date_string;format)
```

Input

Parameter	Description	Type	Required
date_string	The date to be formatted	string	Yes
format	The date format	string	Yes

Examples

`ToDate("15/12/2002";"dd/MM/yyyy")` returns 15/12/2002.

Week

Description

Returns the week number in the year

Function Group

Date and Time

Syntax

```
int Week(date)
```

Input

Parameter	Description	Type	Required
date	The input date	Date	Yes

Examples

`Week([Reservation Date])` returns 1 when the date in [Reservation Date] is 4 January 2004 (which occurs in the first week of the year 2004).

Year

Description

Returns the year in a date

Function Group

Date and Time

Syntax

```
int Year(date)
```

Input

Parameter	Description	Type	Required
date	The input date	Date	Yes

Examples

`Year([Reservation Date])` returns 2005 when the date in [Reservation Date] is 15 December 2005.

Data Provider functions

Connection

Description

Returns the parameters of the database connection used by a data provider

Function Group

Data Provider

Syntax

```
string Connection(dp)
```

Input

Parameter	Description	Type	Required
dp	The data provider	Data provider	Yes

Notes

You must enclose the name of the data provider in square brackets.

Examples

`Connection([SalesQuery])` might return `"BO_DRV_CONNECT_MODE=0;BO_DSN=eFashion;ODBC_USER=;ODBC_PASSWORD=;"` (the return value differs depending on the database connection).

DataProvider

Description

Returns the name of the data provider containing a report object

Function Group

Data Provider

Syntax

```
string DataProvider(obj)
```

Input

Parameter	Description	Type	Required
obj	A report object	Report object	Yes

Examples

`DataProvider([Total Revenue])` returns "Sales" if the [Total Revenue] measure is in a data provider called "Sales".

DataProviderKeyDate

Description

Returns the keydate of a data provider

Function Group

Data Provider

Syntax

```
date DataProviderKeyDate(dp)
```

Input

Parameter	Description	Type	Required
dp	The data provider	Data provider	Yes

Notes

- You must enclose the name of the data provider in square brackets.

- The returned keydate is formatted according to the document locale.

Examples

`DataProviderKeyDate([Sales])` returns 3 August 2007 if the keydate for the Sales data provider is 3 August 2007.

DataProviderKeyDateCaption

Description

Returns the keydate caption of a data provider

Function Group

Data Provider

Syntax

```
string DataProviderKeyDateCaption(dp)
```

Input

Parameter	Description	Type	Required
dp	The data provider	Data provider	Yes

Notes

You must enclose the name of the data provider in square brackets.

Examples

`DataProviderKeyDateCaption([Sales])` returns "Current calendar date" if the keydate caption in the Sales data provider is "Current calendar date".

DataProviderSQL

Description

Returns the SQL generated by a data provider

Function Group

Data Provider

Syntax

```
string DataProviderSQL(dp)
```

Input

Parameter	Description	Type	Required
dp	The data provider	Data provider	Yes

Notes

You must enclose the name of the data provider in square brackets.

Examples

`DataProviderSQL([Query 1])` returns "**SELECT country.country_name FROM country**" if the data provider SQL is "**SELECT country.country_name FROM country**".

DataProviderType

Description

Returns the type of a data provider

Function Group

Data Provider

Syntax

```
string DataProviderType(dp)
```

Input

Parameter	Description	Type	Required
dp	The data provider	Data provider	Yes

Notes

- `DataProviderType` returns "Universe" for universe data providers or "Personal data" for personal data providers.
- You must enclose the name of the data provider in square brackets.

Examples

`DataProviderType([Sales])` returns "Universe" if the "Sales" data provider is based on a universe.

IsPromptAnswered

Description

Determines whether a prompt has been answered

Function Group

Data Provider

Syntax

```
bool IsPromptAnswered([dp];prompt_string)
```

Input

Parameter	Description	Type	Required
dp	The data provider containing the prompt	Data provider	No
prompt_string	The prompt text	String	Yes

Notes

You must enclose the name of the data provider in square brackets.

Examples

`IsPromptAnswered("Choose a city")` returns true if the prompt identified by the text "Choose a city" has been answered.

`IsPromptAnswered([Sales];"Choose a city")` returns true if the prompt identified by the text "Choose a city" in the [Sales] data provider has been answered.

LastExecutionDate

Description

Returns the date on which a data provider was last refreshed

Function Group

Data Provider

Syntax

```
date LastExecutionDate(dp)
```

Input

Parameter	Description	Type	Required
dp	The data provider	Data provider	Yes

Notes

- If your report has one data provider only you can omit the `dp` parameter.
- You must enclose the name of the data provider in square brackets.
- You can use the `DataProvider` function to provide a reference to a data provider.

Examples

`LastExecutionDate([Sales Query])` returns "3/4/2002" if the Sales Query data provider was last refreshed on 4 March 2002.

Related Topics

- *DataProvider* on page 109

LastExecutionDuration

Description

Returns the time in seconds taken by the last refresh of a data provider

Function Group

Data Provider

Syntax

```
num LastExecutionDuration(dp)
```

Input

Parameter	Description	Type	Required
dp	The data provider	Data provider	Yes

Notes

You must enclose the name of the data provider in square brackets.

Examples

`LastExecutionDuration([Sales])` returns 3 if the "Sales" data provider took 3 second to return its data the last time it was run.

LastExecutionTime

Description

Returns the time at which a data provider was last refreshed

Function Group

Data Provider

Syntax

```
time LastExecutionTime(dp)
```

Input

Parameter	Description	Type	Required
dp	The data provider	Data provider	Yes

Notes

- If your report has one data provider only you can omit the `dp` parameter.
- You can use the `DataProvider` function to provide a reference to a data provider.
- You must enclose the name of the data provider in square brackets.

Examples

`LastExecutionTime([Sales Query])` returns "2:48:00 PM" if the Sales Query data provider was last refreshed at 2:48:00 PM.

Related Topics

- *DataProvider* on page 109

NumberOfDataProviders

Description

Returns the number of data providers in a report

Function Group

Data Provider

Syntax

```
int NumberOfDataProviders()
```

Examples

`NumberOfDataProviders()` returns 2 if the report has two data providers.

NumberOfRows

Description

Returns the number of rows in a data provider

Function Group

Data Provider

Syntax

```
int NumberOfRows(dp)
```

Input

Parameter	Description	Type	Required
dp	The data provider	Data provider	Yes

Notes

- You must enclose the name of the data provider in square brackets.
- You can use the `DataProvider` function to provide a reference to a data provider.

Examples

`NumberOfRows([Query 1])` returns 10 if the "Query 1" data provider has 10 rows.

Related Topics

- *DataProvider* on page 109

RefValueDate

Description

Returns the date of the reference data used for data tracking

Function Group

Data Provider

Syntax

```
date RefValueDate()
```

Examples

`RefValueDate()` returns 15 December 2008 if the reference date is 15 December 2008.

RefValueUserReponse

Description

Returns the response to a prompt when the reference data was the current data

Function Group

Data Provider

Syntax

```
string RefValueUserResponse([dp];prompt_string;[Index])
```

Input

Parameter	Description	Type	Required
dp	The data provider	Data provider	No
prompt_string	The prompt text	String	Yes
Index	Tells the function to return the database primary keys of the prompt values	Keyword	No

Notes

- The function returns an empty string if data tracking is not activated.
- You must enclose the name of the data provider in square brackets.
- You can use the `DataProvider` function to provide a reference to a data provider.
- If you selected more than one value in answer to a prompt, the function returns a string consisting of a list of values (or primary keys if the `Index` operator is specified) separated by semi-colons.

Examples

`RefValueUserResponse( "Which city?" )` returns "Los Angeles" if you entered "Los Angeles" in the "Which City?" prompt at the time when the reference data was the current data.

`RefValueUserResponse([Sales Query];"Which city?")` returns "Los Angeles," if you entered "Los Angeles" in the "Which City?" prompt in the "Sales Query" data provider at the time when the reference data was the current data.

UniverseName

Description

Returns a the name of the universe on which a data provider is based

Function Group

Data Provider

Syntax

```
string UniverseName(dp)
```

Input

Parameter	Description	Type	Required
dp	The data provider	Data provider	Yes

Notes

- Web Intelligence automatically updates the name of the data provider in the formula. If in the above example the data provider is renamed to "Q1" , the formula becomes `UniverseName([Q1])`.
- You must enclose the name of the data provider in square brackets.
- You can use the `DataProvider` function to provide a reference to a data provider.

Examples

`UniverseName([Query 1])` returns "eFashion" if the [Query 1] data provider is based on the eFashion universe.

Related Topics

- *DataProvider* on page 109

UserResponse

Description

Returns the response to a prompt

Function Group

Data Provider

Syntax

```
string UserResponse([dp];prompt_string;[Index])
```

Input

Parameter	Description	Type	Required
dp	The data provider	Data provider	No
prompt_string	The prompt text	String	Yes
Index	Tells the function to return the database primary keys of the prompt values	Keyword	No

Notes

- You must enclose the name of the data provider in square brackets.
- You can use the `DataProvider` function to provide a reference to a data provider.
- If you select more than one value in answer to a prompt, the function returns a string consisting of a list of values (or primary keys if the `Index` operator is specified) separated by semi-colons.

Examples

`UserResponse("Which city?")` returns "Los Angeles if you entered "Los Angeles" in the "Which City?" prompt.

`UserResponse([Sales Query];"Which city?")` returns "Los Angeles," if you entered "Los Angeles" in the "Which City?" prompt in the "Sales Query" data provider.

`UserResponse([Sales Query];"Which city?";Index)` returns 23 if you entered "Los Angeles" in the "Which City?" prompt in the "Sales Query" data provider, and the database primary key of Los Angeles is 23.

Document functions

DocumentAuthor

Description

Returns the InfoView logon of the document creator

Function Group

Document

Syntax

```
string DocumentAuthor()
```

Examples

`DocumentAuthor()` returns "gkn" if the document author's login is "gkn".

DocumentCreationDate

Description

Returns the date on which a document was created

Function Group

Document

Syntax

```
date DocumentCreationDate()
```

Examples

`DocumentCreationDate()` returns 15 December 2008 if the document was created on 15 December 2008.

DocumentCreationTime

Description

Returns the time when a document was created

Function Group

Document

Syntax

```
time DocumentCreationTime()
```

Examples

`DocumentCreationTime()` returns 11:15 if the document was created at 11:15.

DocumentDate

Description

Returns the date on which a document was last saved

Function Group

Document

Syntax

```
date DocumentDate()
```

Examples

`DocumentDate()` returns 8 August 2005 if the document was last saved on 8 August 2005.

DocumentName

Description

Returns the document name

Function Group

Document

Syntax

```
string DocumentName()
```

Examples

`DocumentName()` returns "Sales Report" if the document is called "Sales Report".

DocumentPartiallyRefreshed

Description

Determines whether a document is partially refreshed

Function Group

Document

Syntax

```
bool DocumentPartiallyRefreshed()
```

Notes

`DocumentPartiallyRefreshed` returns a boolean value that you can use in the `If` function.

Examples

`DocumentPartiallyRefreshed()` returns True if the document is partially refreshed.

DocumentTime

Description

Returns the time when a document was last saved

Function Group

Document

Syntax

```
time DocumentTime()
```

Notes

The format of the returned time varies depending on the cell format.

Example

`DocumentTime()` returns 15:45 if the document was last saved at 15:45.

DrillFilters

Description

Returns the drill filters applied to a document or object in drill mode

Function Group

Document

Syntax

```
string DrillFilters(obj|separator)
```

Input

Parameter	Description	Type	Required
obj	A report object	Report object	Either `obj` or `separator` required
separator	The drill filter separator	String	Either `obj` or `separator` required

Notes

- You can insert `DrillFilters` directly without the need to enter the formula manually by inserting a DrillFilters cell.
- If you do not specify an object, the function returns all drill filters applied to the document.

Examples

`DrillFilters()` returns "US" if the document has a drill filter restricting the [Country] object to US.

`DrillFilters()` returns "US - 1999" if the document has a filter restricting [Country] to "US" and [Year] to 1999.

`DrillFilters("/")` returns "US / 1999" if the document has filters restricting [Country] to "US" and [Year] to 1999.

`DrillFilters ([Quarter])` returns "Q3" if the document has a drill filter restricting [Quarter] to "Q3".

LastPrintDate

Description

Returns the date on which a document was last printed

Function Group

Document

Syntax

```
date LastPrintDate()
```

Examples

`LastPrintDate()` returns 12 December 2005 if the document was last printed on 12 December 2005.

PromptSummary

Description

Returns the prompt text and user response of all prompts in a document

Function Group

Document

Syntax

```
string PromptSummary()
```

Examples

`QuerySummary()` returns information about all the prompts in a document.

Example output:

```
 Enter Quantity Sold: 5000
Enter value(s) for State (optional): California, Texas, Utah
```

```
Enter Customer (optional):
```

QuerySummary

Description

Returns information about the queries in a document

Function Group

Document

Syntax

`string QuerySummary([dp])`

Input

Parameter	Description	Type	Required
dp	A data provider	Data provider	No

Notes

- You must enclose the name of the data provider in square brackets.

Examples

`QuerySummary()` returns information about all the queries in a document.

`QuerySummary([Query 1])` returns information about the queries based on the [Query 1] data provider.

Output example:

```
Query 1:
        Universe: eFashion
        Last execution time: 1s
        NB of rows: 34500
        Result objects: State, Year, Sales Revenue
        Scope of analysis: State, City, Year, Quarter, Month
```

```
 Filters:
  (State inlist{"US";"France";}
  And (Sales Revenue Greater Than 1000000
  Or Sales Revenue Less Than 10000))

Query 2:
 Source file: D:\Data\datacar.xls
 Result objects: State, Year, Sales Revenue
```

ReportFilter

Description

Returns the report filters applied to an object or report

Function Group

Document

Syntax

```
string ReportFilter(obj)
```

Input

Parameter	Description	Type	Required
obj	A report object	Report object	Yes

Examples

`ReportFilter([Country])` returns "US" if there is a report filter on the Country object that restricts it to "US".

ReportFilterSummary

Description

Returns a summary of the report filters in a document or report

Function Group

Document

Syntax

```
string ReportFilterSummary(report_name)
```

Input

Parameter	Description	Type	Required
report_name	The name of the report	String	No

Notes

If `report_name` is omitted, `ReportFilterSummary` returns a summary of all the report filters in all the reports in the document.

Examples

`ReportFilterSummary()` returns information about all the report filters in a document.

`ReportFilterSummary("Report1")` returns information about the report filters in the "Report1" report.

Output example:

```
Filters on Report1:
        (Sales Revenue Greater Than 1000000
         Or (Sales Revenue Less Than 3000))
       Filters on Section on City:
         (City InList{"Los Angeles";"San Diego";})
       Ranking Filter:
        (Top 10 & Bottom 10 [Customer] Based on [Sales Revenue]
 (Count))
```

Logical functions

Even

Description

Determines whether a number is even

Function Group

Logical

Syntax

```
bool Even(number)
```

Input

Parameter	Description	Type	Required
number	Any number	Number	Yes

Notes

- `Even` returns a boolean value that you can use in the `If` function.
- If you place `Even` directly into a column, Web Intelligence converts the return value to an integer (1=true; 0=false). You can format this number using a Boolean number format.

Examples

`Even(4)` returns True.

`Even(3)` returns False.

`Even(23.2)` returns False.

`Even(-4)` returns True.

`Even(-2.2)` returns False.

IsDate

Description

Determines whether a value is a date

Function Group

Logical

Syntax

```
bool IsDate(obj)
```

Input

Parameter	Description	Type	Required
obj	Any report object	Report object	Yes

Notes

- `IsDate` returns a boolean value that you can use in the `If` function.
- If you place `IsDate` directly into a column, Web Intelligence converts the return value to an integer (1=true; 0=false). You can format this number using a Boolean number format.

Examples

`IsDate([Reservation Date])` returns True if [Reservation Date] is a date.

`If(IsDate([Reservation Date]) Then "Date" Else "Not a date"` returns "Date" if [Reservation Date] is a date.

Related Topics

- *If...Then...Else* on page 167

IsError

Description

Determines whether an object returns an error

Function Group

Logical

Syntax

```
bool IsError(obj)
```

Input

Parameter	Description	Type	Required
obj	Any report object	Report object	Yes

Notes

- `IsError` returns a boolean value that you can use in the `If` function.
- If you place `IsError` directly into a column, Web Intelligence converts the return value to an integer. You can format this number using a Boolean number format.

Examples

`IsError([Revenue])` returns False if the [Revenue] variable does not return an error.

`IsError([Average Guests])` returns True if the [Average Guests] variable returns a division by zero (#DIV/0) error.

`If IsError([Average Guests]) Then "Error" Else "No error"` returns "Error" if the [Average Guests] variable returns a division by zero (#DIV/0) error.

Related Topics

- *If...Then...Else* on page 167

IsLogical

Description

Determines whether a value is boolean

Function Group

Logical

Syntax

```
bool IsLogical(obj)
```

Input

Parameter	Description	Type	Required
obj	Any report object	Report object	Yes

Notes

- `IsLogical` returns a boolean value that you can use in the `If` function.
- If you place `IsLogical` directly into a column, Web Intelligence converts the return value to an integer. You can format this number using a Boolean number format.

Examples

`IsLogical(IsString([Country]))` returns True.

`IsLogical([Country])` returns False if country returns any data type other than boolean.

`If IsLogical(IsDate([Country])) Then "Boolean" Else "Not boolean"` returns "Boolean".

Related Topics

- *If...Then...Else* on page 167

IsNull

Description

Determines whether a value is null

Function Group

Logical

Syntax

```
bool IsNull(obj)
```

Input

Parameter	Description	Type	Required
obj	Any report object	Report object	Yes

Notes

- `IsNull` returns a boolean value that you can use in the `If` function.
- If you place `IsNull` directly into a column, Web Intelligence converts the return value to an integer. You can format this number using a Boolean number format.

Examples

`IsNull([Revenue])` returns False if the [Revenue] variable is not null.

`IsNull([Average Guests])` returns True if the [Average Guests] variable is null.

Related Topics

- *If...Then...Else* on page 167

IsNumber

Description

Determines whether a value is a number

Function Group

Logical

Syntax

```
bool IsNumber(obj)
```

Input

Parameter	Description	Type	Required
obj	Any report object	Report object	Yes

Notes

- `IsNumber` returns a boolean value that you can use in the `If` function.
- If you place `IsNumber` directly into a column, Web Intelligence converts the return value to an integer. You can format this number using a Boolean number format.

Examples

`IsNumber([Revenue])` returns True if the [Revenue] variable is a number.

`IsNumber([Customer Name])` returns False if the [Customer Name] variable is not a number.

`If IsNumber([Customer Name]) Then "Number" Else "Not a number"` returns "Not a number" if the [Customer Name] variable is not a number.

Related Topics

- *If...Then...Else* on page 167

IsString

Description

Determines whether a value is a string

Function Group

Logical

Syntax

```
bool IsString(obj)
```

Input

Parameter	Description	Type	Required
obj	Any report object	Report object	Yes

Notes

- `IsString` returns a boolean value that you can use in the `If` function.
- If you place `IsString` directly into a column, Web Intelligence converts the return value to an integer. You can format this number using a Boolean number format.

Examples

`IsString([Revenue])` returns false if the [Revenue] variable is not a string.

`IsString([Customer Name])` returns true if the [Customer Name] variable is a string.

`If IsString([Customer Name]) Then "String" Else "Not a string"` returns "String" if the [Customer Name] variable is a string.

Related Topics

- *If...Then...Else* on page 167

IsTime

Description

Determines whether a variable is a time variable

Function Group

Logical

Syntax

```
bool IsTime(obj)
```

Input

Parameter	Description	Type	Required
obj	Any report object	Report object	Yes

Notes

- `IsTime` returns a boolean value that you can use in the `If` function.
- If you place `IsTime` directly into a column, Web Intelligence converts the return value to an integer. You can format this number using a Boolean number format.

Examples

`IsTime([Reservation Time])` returns true if the [Reservation Time] variable is a time variable.

`IsTime([Average Guests])` returns false if the [Average Guests] variable is not a time variable.

`If IsTime([Average Guests]) Then "Time" Else "Not time"` returns "Not time" if the [Average Guests] variable is not a time variable.

Related Topics

- *If...Then...Else* on page 167

Odd

Description

Determines whether a number is odd

Function Group

Logical

Syntax

```
bool Odd(number)
```

Input

Parameter	Description	Type	Required
number	Any number	Number	Yes

Notes

- `Odd` returns a boolean value that you can use in the `If` function.
- If you place `Odd` directly into a column, Web Intelligence converts the return value to an integer. You can format this number using a Boolean number format.
- `Odd` ignores the fractional parts of decimal numbers.

Examples

`Odd(5)` returns True.

`Odd(4)` returns False.

`Odd(23.2)` returns True.

`Odd(24.2)` returns True.

`Odd(-23.2)` returns True.

`Odd(-24.2)` returns True.

Related Topics

- *If...Then...Else* on page 167

Numeric functions

Abs

Description

Returns the absolute value of a number

Function Group

Numeric

Syntax

```
num Abs(number)
```

Input

Parameter	Description	Type	Required
number	Any number	Number	Yes

Examples

`Abs(25)` returns 25.

`Abs(-11)` returns 11.

Ceil

Description

Returns a number rounded up to the nearest integer

Function Group

Numeric

Syntax

```
num Ceil(number)
```

Input

Parameter	Description	Type	Required
number	Any number	Number	Yes

Examples

`Ceil(2.4)` returns 3.

`Ceil(3.1)` returns 4.

`Ceil(-3.1)` returns -3.

Cos

Description

Returns the cosine of an angle

Function Group

Numeric

Syntax

```
num Cos(angle)
```

Input

Parameter	Description	Type	Required
angle	An angle in radi-ans	Number	Yes

Exampless

`Cos(180)` returns -0.6.

EuroConvertFrom

Description

Converts a euro amount to another currency

Function Group

Numeric

Syntax

```
num EuroConvertFrom(euro_amount;curr_code;round_level)
```

Input

Parameter	Description	Type	Required
euro_amount	The amount in euros	Number	Yes
curr_code	The ISO code of the target currency	String	Yes
round_level	The number of decimal places to which the result is rounded	Number	Yes

Notes

The currency code must be the code of one of the 12 EU currencies whose values were fixed in relation to the Euro prior to their abolition in January 2002. If it is not, the function returns #ERROR. The currencies are:

BEF	Belgian franc
DEM	German mark
GRD	Greek drachma
ESP	Spanish peseta
FRF	French franc
IEP	Irish punt
ITL	Italian lira
LUF	Luxembourg franc
NLG	Dutch guilder
ATS	Austrian schilling
PTS	Portugese escudo
FIM	Finnish mark

Examples

`EuroConvertFrom(1000;"FRF";2)` returns 6559.57.

`EuroConvertFrom(1000;"FRF";1)` returns 6559.60.

`EuroConvertFrom(1000.04;"DEM";2)` returns 1955.83.

`EuroConvertFrom(1000.04;"DEM";1)` returns 1955.80.

Related Topics

- *How Web Intelligence rounds and truncates numbers* on page 204

EuroConvertTo

Description

Converts an amount to euros

Function Group

Numeric

Syntax

```
num EuroConvertTo(noneuro_amount;curr_code;round_level)
```

Input

Parameter	Description	Type	Required
euro_amount	The amount in the non-euro currency	Number	Yes
curr_code	The ISO code of the non-euro currency	String	Yes
round_level	The number of decimal places to which the result is rounded	Number	Yes

Example

`EuroConvertTo(6559;"FRF";2)` returns 999.91.

`EuroConvertTo(6559;"FRF";1)` returns 999.90.

`EuroConvertTo(1955;"DEM";2)` returns 999.58.

`EuroConvertTo(1955;"DEM";1)` returns 999.60.

Note

The currency code must be the code of one of the 12 EU currencies whose values were fixed in relation to the Euro prior to their abolition in January 2002. If it is not, the function returns #ERROR. The currencies are:

BEF	Belgian franc
DEM	German mark
GRD	Greek drachma
ESP	Spanish peseta
FRF	French franc
IEP	Irish punt
ITL	Italian lira
LUF	Luxembourg franc
NLG	Dutch guilder
ATS	Austrian schilling
PTS	Portugese escudo
FIM	Finnish mark

Related Topics

- *How Web Intelligence rounds and truncates numbers* on page 204

EuroFromRoundError

Description

Returns the rounding error in a conversion from euros

Function Group

Numeric

Syntax

```
num EuroFromRoundError(euro_amount;curr_code;round_level)
```

Input

Parameter	Description	Type	Required
euro_amount	The amount in euros	Number	Yes
curr_code	The ISO code of the target currency	String	Yes
round_level	The number of decimal places to which the result is rounded	Number	Yes

Output

The rounding error in the calculation

Examples

`EuroFromRoundErr(1000;"FRF";2)` returns 0. (There is no difference between the unrounded conversion and the conversion rounded to 2 decimal places.)

`EuroFromRoundErr(1000;"FRF";1)` returns 0.03. (The unrounded conversion is 6559.57. The conversion rounded to 1 decimal place is 6559.60. The rounding error is 0.03.)

`EuroFromRoundErr(1000;"DEM";2)` returns 0. (There is no difference between the unrounded conversion and the conversion rounded to 2 decimal places.)

`EuroFromRoundErr(1000;"DEM";1)` returns -0.01. (The unrounded conversion is 1955.83. The conversion rounded to 1 decimal place is 1995.80. The rounding error is -0.03.)

Note

The currency code must be the code of one of the 12 EU currencies whose values were fixed in relation to the Euro prior to their abolition in January 2002. If it is not, the function returns #ERROR. The currencies are:

BEF	Belgian franc
DEM	German mark
GRD	Greek drachma
ESP	Spanish peseta
FRF	French franc
IEP	Irish punt
ITL	Italian lira
LUF	Luxembourg franc
NLG	Dutch guilder
ATS	Austrian schilling
PTS	Portugese escudo
FIM	Finnish mark

Related Topics

- *How Web Intelligence rounds and truncates numbers* on page 204

EuroToRoundError

Description

Returns the rounding error in a conversion to euros

Function Group

Numeric

Syntax

```
num EuroToRoundError(noneuro_amount;curr_code;round_level)
```

Input

Parameter	Description	Type	Required
euro_amount	The amount in the non-euro currency	Number	Yes
curr_code	The ISO code of the non-euro currency	String	Yes
round_level	The number of decimal places to which the result is rounded	Number	Yes

Examples

`EuroToRoundErr(6559;"FRF";2)` returns 0. (There is no difference between the unrounded conversion and the conversion rounded to 2 decimal places.)

`EuroToRoundErr(6559;"FRF";1)` returns -0.01. (The unrounded conversion is 999.91. The conversion rounded to 1 decimal place is 999.90. The rounding error is -0.01.)

`EuroToRoundErr(1955;"DEM";2)` returns 0. (There is no difference between the unrounded conversion and the conversion rounded to 2 decimal places.)

`EuroToRoundErr(1955;"DEM";1)` returns 0.02. (The unrounded conversion is 999.58. The conversion rounded to 1 decimal place is 999.60. The rounding error is 0.02.)

Note

The currency code must be the code of one of the 12 EU currencies whose values were fixed in relation to the Euro prior to their abolition in January 2002. If it is not, the function returns #ERROR. The currencies are:

BEF	Belgian franc
DEM	German mark
GRD	Greek drachma
ESP	Spanish peseta
FRF	French franc
IEP	Irish punt
ITL	Italian lira
LUF	Luxembourg franc
NLG	Dutch guilder
ATS	Austrian schilling
PTS	Portugese escudo
FIM	Finnish mark

Related Topics

- *How Web Intelligence rounds and truncates numbers* on page 204

Exp

Description

Returns an exponential (e raised to a power)

Function Group

Numeric

Syntax

```
num Exp(power)
```

Input

Parameter	Description	Type	Required
power	The power	Number	Yes

Notes

An exponential is the constant e (2.718...) raised to a power.

Examples

`Exp(2.2)` returns 9.03.

Fact

Description

Returns the factorial of a number

Function Group

Numeric

Syntax

```
int Fact(number)
```

Input

Parameter	Description	Type	Required
number	Any number	Number	Yes

Notes

The factorial of `number` is the product of all the integers from 1 to `number`.

Examples

`Fact(4)` returns 24.

`Fact(5.9)` returns 120.

Floor

Description

Returns a number rounded down to the nearest integer

Function Group

Numeric

Syntax

```
int Floor(number)
```

Input

Parameter	Description	Type	Required
number	Any number	Number	Yes

Example

`Floor(24.4)` returns 24.

Ln

Description

Returns the natural logarithm of a number

Function Group

Numeric

Syntax

```
num Ln(number)
```

Input

Parameter	Description	Type	Required
number	Any number	Number	Yes

Examples

`Ln(10)` returns 2.

Log

Description

Returns the logarithm of a number in a specified base

Function Group

Numeric

Syntax

```
num Log(number;base)
```

Input

Parameter	Description	Type	Required
number	Any number	Number	Yes
base	The base of the logarithm	Number	Yes

Examples

`Log(125;5)` returns 3.

Log10

Description

Returns the base 10 logarithm of a number

Function Group

Numeric

Syntax

```
num Log10(number)
```

Input

input_number	A number

Examples

`Log10(100)` returns 2.

Mod

Description

Returns the remainder from the division of two numbers

Function Group

Numeric

Syntax

```
num Mod(dividend;divisor)
```

Input

Parameter	Description	Type	Required
dividend	The dividend	Number	Yes
divisor	The divisor	Number	Yes

Examples

`Mod(10;4)` returns 2.

`Mod (10.2;4.2)` returns 1.8.

Power

Description

Returns a number raised to a power

Function Group

Numeric

Syntax

```
num Power(number;power)
```

Input

Parameter	Description	Type	Required
number	The number to raise to a power	Number	Yes
power	The power	Number	Yes

Example

`Power(10;2)` returns 100.

Rank

Description

Ranks a measure by dimensions

Function Group

Numeric

Syntax

```
int Rank(measure;[ranking_dims];[Top|Bottom];[reset_dims])
```

Input

Parameter	Description	Type	Required
measure	The measure to be ranked	Measure	Yes
ranking_dims	The dimensions used to rank the measure	Dimension list	No
Top|Bottom	Sets the ranking order: • `Top` - descending • `Bottom` - ascending	Keyword	No (`Top` is default)
reset_dims	The dimensions that reset the ranking	Dimension list	No

Notes

- If you do not specify ranking dimensions, Web Intelligence uses the default calculation context to calculate the ranking.
- You must always place dimensions in parentheses even if there is only one dimension in the list of ranking or reset dimensions.
- When you specify a set of ranking or reset dimensions you must separate them with semi-colons.
- By default the ranking is reset over a section or block break.

Examples

In the following table the rank is given by `Rank([Revenue];([Country]))`:

Country	Revenue	Rank
France	835,420	2
US	2,451,104	1

In the following table the rank is given by `Rank([Revenue];([Country]);Bottom)`. The `Bottom` argument means that the measures are ranked in descending order.

Country	Revenue	Rank
France	835,420	1
US	2,451,104	2

In the following table the rank is given by `Rank([Revenue];([Country];[Resort]))`:

Country	Resort	Revenue	Rank
France	French Riviera	835,420	3
US	Bahamas Beach	971,444	2
US	Hawaiian Club	1,479,660	1

In the following table the rank is given by `Rank([Revenue];([Country];[Year]);([Country]))`. The rank is reset on the Country dimension.

Country	Year	Revenue	Rank
France	FY1998	295,940	1
France	FY1999	280,310	2
France	FY2000	259,170	3
US	FY1998	767,614	3
US	FY1999	826,930	2
US	FY2000	856,560	1

Related Topics

- *Bottom/Top operators* on page 187

Round

Description

Rounds a number

Function Group

Numeric

Syntax

```
num Round (number;round_level)
```

Input

Parameter	Description	Type	Required
number	The number to be rounded	Number	Yes
round_level	The number of decimal places to which the number is rounded	Number	Yes

Examples

`Round(9.44;1)` returns 9.4.

`Round(9.45;1)` returns 9.5.

`Round(9.45;0)` returns 9.

`Round(9.45;-1)` returns 10.

`Round(4.45;-1)` returns 0.

Related Topics

- *How Web Intelligence rounds and truncates numbers* on page 204

Sign

Description

Returns the sign of a number

Function Group

Numeric

Syntax

```
int Sign(number)
```

Input

Parameter	Description	Type	Required
number	Any number	Number	Yes

Notes

`Sign` returns -1 if `number` is negative, 0 if `number` is zero and 1 if `number` is positive.

Examples

`Sign(3)` returns 1.

`Sign(-27.5)` returns -1.

Sin

Description

Returns the sine of an angle

Function Group

Numeric

Syntax

```
num Sin(angle)
```

Input

Parameter	Description	Type	Required
angle	An angle in radi-ans	Number	Yes

Example

`Sin(234542)` returns -0,116992.

Sqrt

Description

Returns the square root of a number

Function Group

Numeric

Syntax

```
num Sqrt(number)
```

Input

Parameter	Description	Type	Required
number	Any number	Number	Yes

Example

`Sqrt(25)` returns 5.

Tan

Description

Returns the tangent of an angle

Function Group

Numeric

Syntax

```
num Tan(angle)
```

Input

Parameter	Description	Type	Required
angle	An angle in radians	Number	Yes

Examples

`Tan(90)` returns -2.

ToNumber

Description

Returns a string as a number

Function Group

Numeric

Syntax

```
num ToNumber(string)
```

Input

Parameter	Description	Type	Required
string	A number as a string	String	Yes

Notes

If `string` is not a number, `ToNumber` returns #ERROR.

Examples

`ToNumber("45")` returns 45.

Truncate

Description

Truncates a number

Function Group

Numeric

Syntax

```
num Truncate(number;truncate_level)
```

Input

Parameter	Description	Type	Required
number	The number to be rounded	Number	Yes
truncate_level	The number of decimal places to which the number is truncated	Number	Yes

Notes

Example

`Truncate(3.423;2)` returns 3.42.

Related Topics

- *How Web Intelligence rounds and truncates numbers* on page 204

Misc functions

BlockName

Description

Returns the block name

Function Group

Misc

Syntax

```
string BlockName()
```

Examples

`BlockName()` returns "Block1" if it is placed in a block called "Block1".

ColumnNumber

Description

Returns the column number

Function Group

Misc

Syntax

```
int ColumnNumber()
```

Examples

`ColumnNumber()` returns 2 if the formula is placed in the second column of a table.

CurrentUser

Description

Returns the InfoView login of the current user

Function Group

Misc

Syntax

```
string CurrentUser()
```

Examples

`CurrentUser()` returns "gkn" if the current user's InfoView login is "gkn".

ForceMerge

Description

Includes synchronized dimensions in measure calculations when the dimensions are not in the measure's calculation context

Function Group

Misc

Syntax

```
num ForceMerge(measure)
```

Input

Parameter	Description	Type	Required
measure	Any measure	Measure	Yes

Output

The result of the calculation with the synchronized dimensions taken into account

Notes

- `ForceMerge` returns #MULTIVALUE if applied to a smart measure because the grouping set necessary to calculate the smart measure does not exist.
- `ForceMerge` is the Web Intelligence equivalent of the BusinessObjects/Desktop Intelligence `Multicube` function.

Examples

`ForceMerge([Revenue])` returns the value of [Revenue], taking into account any synchronized dimensions that do not appear in the same block as the [Revenue] measure.

GetContentLocale

Description

Returns the document locale

Function Group

Misc

Syntax

```
string GetContentLocale()
```

Examples

`GetContentLocale()` returns "fr_FR" if the content locale is "French (France)".

GetLocale

Description

Returns the current locale

Function Group

Misc

Syntax

```
string GetLocale()
```

Examples

`GetLocale()` returns "en_US" if the current locale is "en_US".

If...Then...Else

Description

Returns a value based on whether an expression is true or false

Function Group

Misc

Syntax

```
If bool_value Then true_value [Else false_value]
```

Input

Parameter	Description	Type	Required
bool_value	A boolean value	Boolean	Yes
true_value	The value to return if `bool_value` is true	Any	Yes
false_value	The value to return if `bool_value` is false	Any	Yes if `Else` is included

Notes

- `true_value` and `false_value` can mix datatypes.
- You can use the boolean operators `And`, `Between`, `InList`, `Or` and `Not` with `If`.
- You can nest `If` conditions by using `ElseIf`. The syntax is:

  ```
  If test_value Then true_value [Else false_value|ElseIf
  test_value Then true_value [Else
  false_value…]]
  ```

- Web Intelligence also supports the syntax `If(bool_value;true_value;false_value)`.

Examples

`If [Sales Revenue]>1000000 Then "High Revenue"` returns "High Revenue" for all rows whose revenue is larger than 1,000,000 and nothing for all other rows.

`If [Sales Revenue] >1000000 Then "High Revenue" Else [Revenue]` returns "High Revenue" for all rows whose revenue is larger than 1,000,000 and the revenue value for all other rows.

`If [Sales Revenue]>1000000 Then "High Revenue" Else "Low Revenue"` returns "High Revenue" for all rows whose revenue is larger than 1,000,000 and "Low Revenue" for all rows whose revenue is less than 1,000,000.

`If [Sales Revenue]>1000000 Then "High Revenue" ElseIf [Sales Revenue] > 800000 Then "Medium Revenue" Else "Low Revenue"` returns "High Revenue" for all rows whose revenue is larger than 1000000, "Medium Revenue" for all rows whose revenue is between 800000 and 1000000, and "Low Revenue" for all other rows.

Related Topics

- *If* on page 168
- *And operator* on page 183
- *Between operator* on page 184
- *Inlist operator* on page 185
- *Or operator* on page 183
- *Not operator* on page 184

If

Description

Returns a value based on whether an expression is true or false

Function Group

Misc

Syntax

```
If(bool_value;true_value;false_value)
```

Input

Parameter	Description	Type	Required
bool_value	A boolean value	Boolean	Yes
true_value	The value to return if `bool_value` is true	Any	Yes
false_value	The value to return if `bool_value` is false	Any	Yes

Notes

- `true_value` and `false_value` can mix datatypes.
- You can nest `If` conditions by replacing `false_value` with additional `If` conditions:

  ```
  If(bool_value;true_value;If(bool_value;true_value;false_value|If...))
  ```

- Web Intelligence also supports the `If...Then...Else` syntax.

Examples

`If([Sales Revenue]>1000000;"High Revenue";"Low Revenue")` returns "High Revenue" for all rows whose revenue is larger than 1,000,000 and "Low Revenue" for all rows whose revenue is less than 1,000,000.

`If([Sales Revenue]>1000000;"High Revenue";[Revenue])` returns "High Revenue" for all rows whose revenue is larger than 1,000,000 and the revenue value for all other rows.

Related Topics

- *If...Then...Else* on page 167

LineNumber

Description

Returns the line number in a table

Function Group

Misc

Syntax

```
int LineNumber()
```

Notes

Numbering of the lines in a table starts with the header, which is line 1.

Examples

`LineNumber()` returns 2 when the function appears at the second line in a table.

NameOf

Description

Returns the name of an object

Function Group

Misc

Syntax

```
string NameOf(obj)
```

Input

Parameter	Description	Type	Required
obj	Any report object	Report object	Yes

Notes

Web Intelligence uses `NameOf` in column and row headers in reports.

Examples

`NameOf([Reservation Date])` returns "Reservation Date".

NoFilter

Description

Ignores filters when calculating a value

Function Group

Misc

Syntax

```
input_type NoFilter(obj;[All|Drill])
```

Input

Parameter	Description	Type	Required
obj	Any report object	Report object	Yes
All|Drill	• No keyword specified - ignore report and block filters • `All` - ignore all filters • `Drill` - ignore report and drill filters	Keyword	No

Notes

- `NoFilter(obj;Drill)` does not work in query drill mode because the drill filters are added to the query rather than applied to the report data.
- If you end drill mode with drill filters applied, the drill filters become report filters and can change the value of any objects to which `NoFilter(obj;Drill)` is applied.

Examples

When placed in a block footer, `NoFilter(Sum([Sales Revenue]))` returns the total sales revenue of all possible rows in the block, even when rows are filtered out of the block.

`NoFilter(Sum([Sales Revenue]);All)` returns the sum of the sales revenue for all countries including France, even though there is a filter that excludes France from the report.

`NoFilter(Sum([Sales Revenue]);Drill)` returns the sum of the sales revenue for all countries, even when there is a drill filter on the [Country] dimension.

NumberOfPages

Description

Returns the number of pages in a report

Function Group

Misc

Syntax

```
integer NumberOfPages()
```

Examples

`NumberOfDataPages()` returns 2 if the report has two pages.

Page

Description

Returns the current page number in a report

Function Group

Misc

Syntax

```
integer Page()
```

Example

`Page()` returns 2 if it appears in the second page of the report.

Previous

Description

Returns a previous value of an object

Function Group

Misc

Syntax

```
input_type Previous(dimension|measure|Self;[reset_dims];[offset];[NoNull])
```

Input

Parameter	Description	Type	Required
dimension|measure|Self	The dimension or measure whose previous value the function returns, or the Self keyword	Dimension, measure or keyword	Yes
reset_dims	The list of dimensions used to reset the calculation	Dimension list	No
offset	Specifies the value of `dimension` or `measure` that is `offset` rows previous to the current row	Integer	No (default is 1)
NoNull	Tells the function to return the first non-null value starting from the offset	Keyword	No

Notes

- The default value of `offset` is 1. `Previous([Revenue];1)` and `Previous([Revenue])` are functionally the same.
- When you include the `NoNull` argument, Web Intelligence returns the first non-null value of the object beginning from the cell `offset` rows before the current row and counting backwards.
- You can use extended syntax context operators with `Previous`.
- The `Self` operator allows you to refer to the previous value of a cell when it contains content other than one report object.
- You must always place dimensions in parentheses even if there is only one dimension in the list of reset dimensions.
- When you specify a set of reset dimensions you must separate them with semi-colons.
- Web Intelligence applies `Previous` after applying all report, section and block filters.
- You cannot apply a filter on a formula that uses `Previous`.
- Web Intelligence applies `Previous` after applying all sorts.

- You cannot apply a sort on a formula that uses `Previous`.
- If `Previous` is applied on a measure and the measure returns an undefined value, `Previous` returns an undefined value even if the previous line returned a value.
- `Previous` ignores breaks when placed outside a break header or footer.
- `Previous` returns the value in the previous instance of the footer when placed in a break footer.
- Web Intelligence resets `Previous` in each report section.
- When used in a crosstab, `Previous` does not treat the last value in a row as the previous value of the first value of the next row.

Examples

`Previous([Country];1)` returns the following values in the following table:

Country	Revenue	Previous
US	5,000,000	
UK	2,000,000	US
France	2,100,000	UK

`Previous([Revenue])` returns the following values in the following table:

Country	Revenue	Previous
US	5,000,000	
UK	2,000,000	5,000,000
France	2,100,000	2,000,000

`Previous([Revenue];([Country])` returns the following values in the following table:

Country	Region	Revenue	Previous

US	North	5,000,000	
	South	7,000,000	5,000,000
UK	North	3,000,000	
	South	4,000,000	3,000,000

`Previous([Revenue])` returns the following values in the following crosstab:

	2004	Previous	2005	Previous
US	5,000,000		6,000,000	5,000,000
UK	2,000,000		2,500,000	2,000,000
France	3,000,000		2,000,000	3,000,000

`Previous([Revenue])` returns the following values in the following table with a break on [Country]:

Country	Region	Revenue	Previous
US	North	5,000,000	
	South	7,000,000	5,000,000
US		12,000,000	

Country	Region	Revenue	Previous
UK	North	3,000,000	7,000,000
	South	4,000,000	3,000,000
UK		7,000,000	12,000,000

`Previous([Revenue]);2;NoNull)` returns the following values in the following table:

Year	Quarter	Revenue	Previous
2008	Q1	500	
2008	Q2		
2008	Q3	400	500
2008	Q4	700	500
2008	Q1	300	400
2008	Q2		700
2008	Q3		300
2008	Q4	200	300

`2*Previous(Self)` returns the sequence 2, 4, 6, 8, 10...

Related Topics

- *Comparing values using the Previous function* on page 226
- *Self operator* on page 193

RefValue

Description

Returns the reference value of a report object when data tracking is activated

Function Group

Misc

Syntax

```
input_type RefValue(obj)
```

Examples

`RefValue([Top Performing Region])` returns "South West" if the value of the [Top Performing Region] variable is "South West" in the reference data.

`RefValue([Revenue])` returns 1000 if the value of the [Revenue] measure is 1000 in the reference data.

RelativeValue

Description

Returns previous or subsequent values of an object

Function Group

Misc

Syntax

```
input_type RelativeValue(measure|detail;slicing_dims;offset)
```

Input

Parameter	Description	Type	Required
measure|detail	Any measure or a detail of a dimension in the block	Measure or detail	Yes
slicing_dims	The dimensions that provide the calculation context	Dimension list	Yes
offset	Specifies the value of `measure` or `detail` that is `offset` rows removed from the current row	Integer	Yes

Notes

- The object must be a measure or a detail of a dimension available in the block.

- The sort order of the list of values of the slicing dimensions is used to determine the output of the function.

  The sort order is determined by two factors: sorts applied to the slicing dimensions, and the order in which the slicing dimensions are listed in the function.
- A dimension used as a section master can be specified as a slicing dimension.
- All the slicing dimensions must be present in the block or section header of the block in which the function is placed. If a slicing dimension is later removed from the block, the function returns the #COMPUTATION error.
- If the offset exceeds the number of rows in the list of values of the slicing dimension, the function returns null.
- `RelativeValue` cannot be used recursively.
- You must always place dimensions in parentheses even if there is only one dimension in the list of slicing dimensions.

Examples

The RelativeValue column in the table below contains the following formula:
`RelativeValue([Revenue];([Year]);-1)`

Year	Quarter	Sales Person	Revenue	RelativeValue
2007	Q1	Smith	1000	
2007	Q2	Jones	2000	
2007	Q3	Wilson	1500	
2007	Q4	Harris	3000	
2008	Q1	Smith	4000	1000
2008	Q2	Jones	3400	2000
2008	Q3	Wilson	2000	1500
2008	Q4	Harris	1700	3000

For detailed information on `RelativeValue`, see the "Comparing values using Web Intelligence functions" chapter in the *Using Functions, Formulas*

and Calculations in Web Intelligence guide, or see the link at the bottom of this topic.

Related Topics

- *#COMPUTATION* on page 208
- *Comparing values using the RelativeValue function* on page 226

ReportName

Description

Returns the name of a report

Function Group

Misc

Syntax

```
string ReportName()
```

Examples

`ReportName()` returns "Sales Report" if it is placed in a report called "Sales Report".

RowIndex

Description

Returns the number of a row

Function Group

Misc

Syntax

```
integer RowIndex()
```

Notes

- Row numbering starts at 0.
- `RowIndex` returns #MULTIVALUE when placed in a table header or footer.

Examples

`RowIndex` returns 0 when it appears on the first row of a table.

UniqueNameOf

Description

Returns the unique name of an object

Function Group

Misc

Syntax

```
string UniqueNameOf(obj)
```

Input

Parameter	Description	Type	Required
obj	Any report object	Report object	Yes

Examples

`UniqueNameOf([Reservation Date])` returns "Reservation Date".

Web Intelligence function and formula operators

Operators link the various components in a formula. Formulas can contain mathematical, conditional, logical, function-specific or extended syntax operators.

Mathematical operators

Mathematical operators are familiar from everyday arithmetic. There are addition (+), subtraction (-), multiplication (*), division (/) operators that allow you to perform mathematical operations in a formula. The formula `[Sales Revenue] - [Cost of Sales]` contains a mathematical operator, in this case subtraction.

Note:
When used with character strings, the '+' operator becomes a string concatenation operator. That is, it joins character strings. For example, the formula "John" + " Smith" returns "John Smith".

Conditional operators

Conditional operators determine the type of comparison to be made between values.

Operator	Description
=	Equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
<>	Not equal to

You use conditional operators with the If function, as in:

```
If [Revenue]>10000 Then "High" Else "Low"
```

which returns "High" for all rows where the revenue is greater than or equal to 10000 and "Low" for all other rows.

Logical operators

The Web Intelligence logical operators are `And`, `Or`, `Not`, `Between` and `Inlist`. Logical operators are used in boolean expressions, which return `True` or `False`.

And operator

Description

The `And` operator links boolean values. If all the boolean values linked by `And` return true, the combination of all the values also returns true.

Syntax

```
bool_value And bool_value [And bool_value...]
```

Examples

`If [Resort] = "Bahamas Beach" And [Revenue]>100000 Then "High Bahamas Revenue"` returns "High Bahamas Revenue" if [Resort] = "Bahamas Beach" And [Revenue]>100000.

Or operator

Description

The `Or` operator links boolean values. If any one boolean value linked by `Or` returns true, the combination of all the values also returns true.

Syntax

```
bool_value Or bool_value [Or bool_value...]
```

Examples

`If [Resort] = "Bahamas Beach" Or [Resort]="Hawaiian Club" Then "US" Else "France"` returns "US" if [Resort]="Bahamas Beach" or "Hawaiian Club", or "France" otherwise.

Not operator

Description

The `Not` operator returns the opposite of a boolean value.

Syntax

```
bool Not(bool_value)
```

Examples

`If Not([Country] = "US") Then "Not US"` returns "Not US" if [Country] has any value other than "US".

Between operator

Description

The `Between` operator determines if a variable is between two values.

Syntax

```
bool Between(first_value;second_value)
```

Notes

- You use `Between` with the `If` function and the `Where` operator.
- Because the Document Formatting Locale can affect the sort order of data, changing the locale can impact the result returned by the Between operator. (You set the Document Formatting Locale in the **Web Intelligence Document Preferences** tab in InfoView.)

Examples

`If [Revenue] Between(800000;900000) Then "Medium Revenue"` returns "Medium Revenue" if [Revenue] is between 800000 and 900000.

`[Sales Revenue] Between (10000;20000)` returns true if the sales revenue is between 10000 and 20000.

`If ([Sales Revenue] Between (200000;500000);"Medium Rev enue";"Low/High Revenue")` returns "Medium Revenue" if [Sales Revenue] is 300000.

Related Topics

- *If...Then...Else* on page 167
- *Where operator* on page 193

Inlist operator

Description

The `Inlist` operator determines if a value is in a list of values.

Syntax

```
bool test_value Inlist(value_list)
```

Notes

It is the combination of `test_value` + `InList` that returns a boolean value, not `InList` alone.

Examples

`If Not ([Country] InList("England";"Scotland";"Wales")) Then "Not Britain" Else "Britain"` returns "Not Britain" if [Country] is not equal to "England", "Scotland" or "Wales", or "Britain" otherwise.

`If [Resort] InList("Bahamas Beach";"Hawaiian Club") Then "US Resort"` returns "US Resort" if [Resort] is equal to "Bahamas Beach" or "Hawaiian Club".

Related Topics

- *If...Then...Else* on page 167
- *Where operator* on page 193

Function-specific operators

Some Web Intelligence functions can take specific operators as arguments. For example, the `Previous` function can take the `Self` operator.

All functions use `)` and `(` to enclose function arguments. Functions that accept multiple parameters use `;` to separate the parameters.

All operator

The `All` operator tells the `NoFilter` function to ignore all filters, or tells the `Count` function to count all values, including duplicates.

Related Topics

- *Count* on page 51
- *Distinct/All operators* on page 188
- *NoFilter* on page 171
- *All/Drill operators* on page 186

All/Drill operators

Description

The `All`/`Drill` operators determine which filters the `NoFilter` function ignores.

- Not specified - `NoFilter` ignores report and block filters
- All - `NoFilter` ignores all filters
- Drill - `NoFilter` ignores report filters and drill filters

Bottom/Top operators

Description

The `Bottom`/`Top` operators tell the `Rank` function to rank in descending or ascending order.

- `Top` - ranks in descending order
- `Bottom` - ranks in ascending order

Examples

`Rank([Revenue];([Country]);Top` ranks countries by revenue from highest to lowest.

Related Topics

- *Rank* on page 155

Break operator

Description

The `Break` operator tells `Percentage` function to account for table breaks.

Examples

The formula `Percentage([Revenue])` gives the following result in the following table (percentages are calculated on the total revenue in the block):

Year	Quarter	Revenue	Percentage
2005	Q1	10000	10%
2005	Q2	20000	20%
2006	Q1	30000	30%

2006	Q2	40000	40%

The formula `Percentage([Revenue];Break)` gives the following result in the following table (percentages are calculated on the total revenue in each part of the block):

Year	Quarter	Revenue	Percentage
2005	Q1	10000	33.3%
2005	Q2	20000	66.6%
2006	Q1	30000	42.9%
2006	Q2	40000	57.1%

Related Topics

- *Percentage* on page 60

Distinct/All operators

The `Distinct/All` operators tell the `Count` function to count distinct values only, or all values.

Examples

`Count([Revenue];Distinct)` returns 3 if [Revenue] has the values (5;5;6;4).

`Count([Revenue];All)` returns 4 if [Revenue] has the values (5;5;6;4).

Related Topics

- *Count* on page 51

IncludeEmpty operator

Description

The `IncludeEmpty` operator tells some aggregate functions to include empty values in calculations.

Examples

`Average([Revenue];IncludeEmpty)` returns 3 if [Revenue] has the values (5;3;<empty>;4).

Related Topics

- *Average* on page 50
- *Count* on page 51
- *RunningAverage* on page 63
- *RunningCount* on page 65

Index operator

Description

The `Index` operator tells the `UserResponse` and `RefValueUserResponse` functions to to return the database primary key of the prompt response.

Related Topics

- *UserResponse* on page 121
- *RefValueUserReponse* on page 119

Linear operator

Description

The `Linear` operator tells the `Interpolation` function to use linear regression with least squares interpolation to supply missing measure values.

Linear regression with least squares interpolation calculates missing values by calculating a line equation in the form f(x) = ax + b that passes as closely as possible through all the available values of the measure.

Related Topics

- *Interpolation* on page 54

NoNull operator

Description

The `NoNull` operator tells the `Previous` function to ignore null values.

When used with `NoNull`, `Previous` returns the first non-null value of the object, beginning from the cell `offset` rows before the current row and counting backwards.

Related Topics

- *Previous* on page 173

NotOnBreak operator

Description

The `NotOnBreak` operator tells the `Interpolation` function to ignore section and block breaks.

Related Topics

- *Interpolation* on page 54

PointToPoint operator

Description

The `PointToPoint` operator tells the `Interpolation` function to use point-to-point interpolation to supply missing measure values.

Point-to point interpolation calculates missing values by calculating a line equation in the form f(x) = ax + b that passes through the two adjacent values of the missing value.

Related Topics

- *Interpolation* on page 54

Row/Col operators

Description

The `Row`/`Col` operators set the calculation direction of the following functions: `Percentage`, `RunningAverage`, `RunningCount`, `RunningMax`, `RunningMin`, `RunningProduct`, `RunningSum`.

Notes

With the `Row` operator, Web Intelligence calculates each value in the row as a percentage of the total value of all the rows in the embedding context. With the `Col` operator, Web Intelligence calculates each value in the column as a percentage of the total value of all the columns in the embedding context.

In a crosstab, Web Intelligence by default calculates the value in each cell as a percentage of the total value in the crosstab. With the `Row` operator, Web Intelligence calculates the values in the rows as percentages of the total value for the row. With the `Col` operator, Web Intelligence calculates the values in the columns as percentages of the total value in the column.

Examples

In a crosstab, `Percentage([Measure])` gives the following result:

Measure	Percentage	Measure	Percentage
100	10%	500	50%
200	20%	200	20%

`Percentage([Measure];Row)` gives the following result:

Measure	Percentage	Measure	Percentage
100	16.7%	500	83.3%
200	50%	200	50%

`Percentage([Measure];Col)` gives the following result:

Measure	Percentage	Measure	Percentage
100	33.3%	500	83.3%
200	66.6%	200	16.7%

With the ROW operator (or by default), Web Intelligence calculates the running aggregate by row. With the COL operator, Web Intelligence calculates the running aggregate by column.

In a crosstab, `RunningSum([Measure])` or `RunningSum([Measure];Row)` gives the following result:

Measure	RunningSum	Measure	RunningSum
100	100	200	300
400	700	250	950

In a crosstab, `RunningSum([Measure];Col)` gives the following result:

Measure	RunningSum	Measure	RunningSum
100	100	200	700
400	500	250	950

Related Topics

- *Percentage* on page 60
- *RunningAverage* on page 63
- *RunningCount* on page 65
- *RunningMax* on page 67
- *RunningMin* on page 69
- *RunningProduct* on page 70
- *RunningSum* on page 72

Self operator

Description

Refers the Previous function to the previous cell when it does not contain a report object.

Examples

`5 + Previous(Self)` returns the sequence 5, 10, 15, 20, 25, 30...

`1 + 0.5 * Previous(Self)` returns the sequence 1, 1.5, 1.75, 1.88...

Related Topics

- *Previous* on page 173

Where operator

Description

The `Where` operator restricts the data used to calculate a measure.

Examples

The formula `Average ([Sales Revenue]) Where ([Country] = "US")` calculates the average sales where the country is "US".

The formula `Average ([Sales Revenue]) Where ([Country] = "US" Or [Country] = "France")` calculates the average sales where the country is "US" or "France".

The formula `[Revenue] Where (Not ([Country] Inlist ("US"; "France")))` calculates the revenue for the countries other than US and France.

The variable [High Revenue] has the formula `[Revenue] Where [Revenue > 500000]`. When placed in a block, [High Revenue] displays either the revenue when its value is greater than 500000, or nothing. When placed in a footer at the bottom of the [High Revenue] column, the formula `Average ([High Revenue])` returns the average of all the revenues greater than 500000.

Related Topics

- *And operator* on page 183
- *Between operator* on page 184
- *Inlist operator* on page 185
- *Or operator* on page 183
- *Not operator* on page 184

Extended syntax operators

You specify input and output contexts explicitly with context operators. The following table lists the context operators:

Operator	Description
In	Specifies an explicit list of dimensions to use in the context.
ForEach	Adds dimensions to the default context
ForAll	Removes dimensions from the default context

The ForAll and ForEach operators are useful when you have a default context with many dimensions. It is often easier to add or subtract from the context using ForAll and ForEach than it is to specify the list explicitly using In.

In context operator

The In context operator specifies dimensions explicitly in a context.

Example: Using In to specify the dimensions in a context

In this example you have a report showing Year and Sales Revenue. Your data provider also contains the Quarter object but you do not include this dimension in the block. Instead, you want to include an additional column to show the maximum revenue by quarter in each year. Your report looks like this:

Year	Sales revenue	Max Quarterly Revenue
2001	$8096123.60	$2660699.50
2002	$13232246.00	$4186120.00
2003	$15059142.80	$4006717.50

You can see where the values in the Max Quarterly Revenue column come from by examining this block in conjunction with a block that includes the Quarter dimension:

Year	Quarter	Sales revenue
	Q1	$2660700
	Q2	$2279003
	Q3	$1367841
	Q4	$1788580
2001		
	Max:	**2660699.5**

Year	Quarter	Sales revenue
	Q1	$3326172
	Q2	$2840651
	Q3	$2879303
	Q4	$4186120
2002		
	Max:	**4186120**

Year	Quarter	Sales revenue
	Q1	$3742989
	Q2	$4006718
	Q3	$3953395
	Q4	$3356041
2003		
	Max:	**4006717.5**

The Max Quarterly Revenue column shows the highest quarterly revenue in each year. For example, Q4 has the highest revenue in 2002, so the Max Quarterly Revenue shows Q4 revenue on the row showing 2002.

Using the In operator, the formula for Max Quarterly Revenue is

```
Max ([Sales Revenue] In ([Year];[Quarter])) In ([Year])
```

This formula tells Web Intelligence to calculate the maximum sales revenue for each (Year,Quarter) combination, then output this figure by year.

Note:
Because the default output context of the block is Year, you do not need to specify the output context explicitly in this formula.

ForEach context operator

The ForEach operator adds dimensions to a context.

Example: Using ForEach to add dimensions to a context

The following table shows the maximum revenue for each Quarter in a report which contains the Quarter dimension but does not include it in the block:

Year	Sales revenue	Max Quarterly Revenue
2001	8096123.60	2660699.50
2002	13232246.00	4186120.00
2003	15059142.80	4006717.50

It is possible to create a formula for the Max Quarterly Revenue column that does not include the ForEach operator:

```
Max ([Sales Revenue] In ([Year];[Quarter])) In ([Year])
```

Using the ForEach context operator, you can achieve the same result with the following formula:

```
Max ([Sales Revenue] ForEach ([Quarter])) In ([Year])
```

Why? Because the Year dimension is the default input context in the block. By using the ForEach operator, you add the Quarter dimension to the context, giving an input context of ([Year];[Quarter]).

ForAll context operator

The ForAll context operator removes dimensions from a context.

Example: Using ForAll to remove dimensions from a context

You have a report showing Year, Quarter and Sales Revenue and you want to add a column that shows the total revenue in each year, as shown in the following block:

Year	Quarter	Sales revenue	Yearly Total
2001	Q1	$2660700	$8096124
2001	Q2	$2279003	$8096124
2001	Q3	$1367841	$8096124
2001	Q4	$1788580	$8096124
2002	Q1	$3326172	$13232246
2002	Q2	$2840651	$13232246
2002	Q3	$2879303	$13232246
2002	Q4	$4186120	$13232246
2003	Q1	$3742989	$15059143
2003	Q2	$4006718	$15059143
2003	Q3	$3953395	$15059143
2003	Q4	$3356041	$15059143

To total revenues by year the input context needs to be (Year); by default it is (Year; Quarter). Therefore, you can remove Quarter from the input context by specifying ForAll ([Quarter]) in the formula, which looks like this:

```
Sum([Sales Revenue] ForAll ([Quarter]))
```

Note that you can use the In operator to achieve the same thing; in this case the formula is:

```
Sum([Sales Revenue] In ([Year]))
```

This version of the formula explicitly specifies Year as the context, rather than removing Quarter to leave Year.

Web Intelligence extended syntax keywords

Extended syntax keywords are a form of shorthand that allows you to refer to dimensions in extended syntax without specifying those dimensions explicitly. This helps future-proof reports; if formulas do not contain hard-coded references to dimensions, they will continue to work even if dimensions are added to or removed from a report.

There are five extended syntax keywords: Report, Section, Break, Block and Body.

The Block keyword

The following table describes the dimensions referenced by the Block keyword depending on where it is placed in a report: The Block keyword often encompasses the same data as the Section keyword. The difference is that Block accounts for filters on a block whereas Section ignores them.

When placed in...	References this data...
A block	Data in the whole block, ignoring breaks, respecting filters
A block break (header or footer)	Data in the whole block, ignoring breaks, respecting filters
A section (header, footer, or outside a block)	Not applicable
Outside any blocks or sections	Not applicable

Example: The Block keyword

You have a report showing Year, Quarter and Sales revenue. The report has a section based on Year. The block is filtered to exclude the third and fourth quarters.

2001

Quarter	Sales revenue	First Half Average	Yearly Average
Q1	$2,660,700	$2,469,851.25	$8,096,123.60
Q2	$2,279,003	$2,469,851.25	$8,096,123.60
Sum:	**4,939,702.5**		

2002

Quarter	Sales revenue	First Half Average	Yearly Average
Q1	$3,326,172	$3,083,411.50	$13,232,246.00
Q2	$2,840,651	$3,083,411.50	$13,232,246.00
Sum:	**6,166,823**		

2003

Quarter	Sales revenue	First Half Average	Yearly Average
Q1	$3,742,989	$3,874,853.20	$15,059,142.80
Q2	$4,006,718	$3,874,853.20	$15,059,142.80
Sum:	**7,749,706.4**		

The Yearly Average column has the formula

```
Average([Sales revenue] In Section)
```

and the First Half Average column has the formula

```
Average ([Sales revenue]) In Block
```

You can see how the Block keyword takes account of the filter on the block.

The Body keyword

The following table describes the dimensions referenced by the Body keyword depending on where it is placed in a report:

When placed in...	References this data...
A block	Data in the block

When placed in...	References this data...
A block break (header or footer)	Data in the block
A section (header, footer, or outside a block)	Data in the section
Outside any blocks or sections	Data in the report

Example: The Body keyword

You have a report showing Year, Quarter and Sales revenue, with a break on Year. The report has a section based on Year and a break on Quarter.

Year	Quarter	Sales revenue	Body
2001	Q1	2,660,700	2,660,699.5
	Q2	2,279,003	2,279,003
	Q3	1,367,841	1,367,840.7
	Q4	1,788,580	1,788,580.4
2001		8,096,123.6	

The Body column has the formula

```
Sum ([Sales Revenue]) In Body
```

The totals in the Body column are the same as those in the Sales revenue column because the Body keyword refers to the data in the block. If you were to remove the Month object, the figures in the Block column would change to correspond with the changed figures in the Sales revenue column. If you were to place the formula in the report footer it would return the total revenue for the block.

The Break keyword

The following table describes the dimensions referenced by the Break keyword depending on where it is placed in a report:

When placed in...	References this data...
A block	Data in the part of a block delimited by a break
A block break (header or footer)	Data in the part of a block delimited by a break
A section (header, footer, or outside a block)	Not applicable
Outside any blocks or sections	Not applicable

Example: The Break keyword

You have a report showing Year, Quarter and Sales revenue.

Year	Quarter	Sales revenue	Break Total
2001	Q1	$2,660,700	8,096,123.6
	Q2	$2,279,003	8,096,123.6
	Q3	$1,367,841	8,096,123.6
	Q4	$1,788,580	8,096,123.6
2001			

The report has break on Year. The Break Total column has the formula:

```
Sum ([Sales Revenue]) In Break
```

Without the Break keyword this column would duplicate the figures in the Sales revenue column, because it would use the default output context ([Year];[Quarter]).

The Report keyword

The following table describes the data referenced by the Report keyword depending on where it is placed in a report:

When placed in...	References this data...
A block	All data in the report

When placed in...	References this data...
A block break (header or footer)	All data in the report
A section (header, footer, or outside a block)	All data in the report
Outside any blocks or sections	All data in the report

Example: The Report keyword

You have a report showing Year, Quarter and Sales revenue. The report has a column, Report Total, that shows the total of all revenue in the report.

Year	Quarter	Sales revenue	Report Total
2001	Q1	$2,660,700	36,387,512.4
2001	Q2	$2,279,003	36,387,512.4
2001	Q3	$1,367,841	36,387,512.4
2001	Q4	$1,788,580	36,387,512.4
2002	Q1	$3,326,172	36,387,512.4
2002	Q2	$2,840,651	36,387,512.4
2002	Q3	$2,879,303	36,387,512.4
2002	Q4	$4,186,120	36,387,512.4
2003	Q1	$3,742,989	36,387,512.4
2003	Q2	$4,006,718	36,387,512.4
2003	Q3	$3,953,395	36,387,512.4
2003	Q4	$3,356,041	36,387,512.4

The formula for the Report Total column is Sum([Sales revenue]) In Report. Without the Report keyword, this column would duplicate the figures in the Sales Revenue column because it would use the default output context ([Year];[Quarter]).

The Section keyword

The following table describes the data referenced by the Section keyword depending on where it is placed in a report

When placed in...	References this data...
A block	All data in the section
A block break (header or footer)	All data in the section
A section (header, footer, or outside a block)	All data in the section
Outside any blocks or sections	Not applicable

Example: The Section keyword

You have a report showing Year, Quarter, and Sales revenue.

2001

Quarter	Sales revenue	Section Total
Q1	$2.660.700	8.095.814
Q2	$2.278.693	8.095.814
Q3	$1.367.841	8.095.814
Q4	$1.788.580	8.095.814

The report has a section based on Year. The Section Total column has the formula:

```
Sum ([Sales Revenue]) In Section
```

The figure in the Section Total column is the total revenue for 2001, because the section break occurs on the Year object. Without the Section keyword this column would duplicate the figures in the Sales revenue column, because it would use the default output context ([Year];[Quarter]).

How Web Intelligence rounds and truncates numbers

Several Web Intelligence functions contain a parameter that determines to what level the function rounds or truncates the value it returns. This parameter accepts an integer that is either greater than 0, 0, or less than 0.

Parameter	Description
> 0	The function rounds/truncates to `<parameter>` decimal places. Examples: `Round(3.13;1)` returns 3.1 `Round(3.157;2)` returns 3.16
0	The function rounds/truncates to the nearest integer. Examples: `Truncate(3.7;0)` returns 3 `Truncate(4.164;0)` returns 4
< 0	The function rounds/truncates to the nearest 10 (parameter = -1), 100 (parameter = -2), 1000 (parameter = -3) and so on. Examples: Round(123.76;-1) returns 120 Round(459.9;-2) returns 500 Truncate(1600;-3) returns 1000

Related Topics

- *Round* on page 158
- *Truncate* on page 162
- *EuroConvertTo* on page 144
- *EuroConvertFrom* on page 142
- *EuroFromRoundError* on page 146
- *EuroToRoundError* on page 148

Troubleshooting Web Intelligence formulas

chapter 5

Formula error and information messages

In some cases a Web Intelligence formula cannot return a value and returns an error or information message beginning with '#". The message appears in the cell in which the formula is placed.

#COMPUTATION

#COMPUTATION occurs when a slicing dimension specified in the `RelativeValue` function is no longer available in the calculation context of the block where the function is placed.

#COMPUTATION is also related to the misuse of context operators in a formula. For more information, see the *Using Functions, Formulas and Calculations in Web Intelligence* guide

Related Topics

- *RelativeValue* on page 178

#CONTEXT

#CONTEXT appears in a measure when the measure has a non-existent calculation context.

#CONTEXT is related to the #INCOMPATIBLE and #DATASYNC error messages, which appear in dimensions when a block contains a non-existent calculation context.

In the case of #INCOMPATIBLE the context is non-existent because the dimensions are incompatible; in the case of #DATASYNC the context is non-existent because the dimensions are from multiple unsynchronized data providers.

Example: Non-existent calculation context in a query

If a block based on the Island Resorts Marketing universe contains the Reservation Year and Revenue objects, the #CONTEXT error message

appears because it is not possible to aggregate revenue by reservation year. (Reservations have not yet generated any revenue.)

#DATASYNC

#DATASYNC occurs when you place a dimension from a different data provider in a block containing dimensions from another data provider, and the two data providers are not synchronized through a merged dimension. #DATASYNC appears in all dimensions in the block and #CONTEXT in the measures.

Example: Dimensions from different data providers in a block

If a report based on the Island Resorts Marketing universe contains data providers with the objects (Year, Revenue) and (Quarter), a block containing Year, Quarter and Revenue displays #DATASYNC in the Year and Quarter columns because the two data providers are not synchronized through a merged dimension.

#DIV/0

#DIV/0 occurs when a formula tries to divide a number by zero, which is mathematically impossible. Zero can never appear as a divisor.

Example: Determining revenue per item

You have a report showing sales revenues, numbers of items sold and the revenue per item (which is calculated by dividing the sales revenue by the number of items sold).

You had a very bad quarter in which you didn't create any revenue; the Revenue per Item column returns #DIV/0 for this quarter, because the formula is attempting to divide by zero; that is, divide the revenue by zero number of items sold.

#INCOMPATIBLE

#INCOMPATIBLE occurs when a block contains incompatible objects.

Example: Incompatible objects in a query

If a block based on the Island Resorts Marketing universe contains the Year and Reservation Year dimensions, the columns containing these dimensions show #INCOMPATIBLE because these objects are incompatible.

#MULTIVALUE

#MULTIVALUE occurs when you place a formula that returns more than one value in a cell that outputs one value only.

Example: Multivalue in a cell

You have a report showing Country, Resort and Revenue and you add a cell to the report containing the formula [Revenue] ForEach ([Country]). This cell returns #MULTIVALUE because Country has two values in the report: ‘US’ and ‘France’.

One cell cannot display the revenues for both the US and France. Placed outside the table, a cell containing revenue can only aggregate the revenues in the table in some way (for example by summing or averaging them).

If the report is broken into sections on Country, the formula is correct when placed in a section because there is only one value of Country per section. Outside a section, however, the formula still returns #MULTIVALUE

#OVERFLOW

#OVERFLOW occurs when a calculation returns a value that is too large for Web Intelligence to handle. This value, in exponential form, is 1.7E308 (1.7 followed by 307 zeros).

#PARTIALRESULT

#PARTIALRESULT occurs when Web Intelligence was unable to retrieve all rows associated with a report object.

If #PARTIALRESULT occurs often in your reports and you have the approrpiate security rights, modify the Max Rows Retrieved query property to allow Web Intelligence to retrieve more data. If you do not have the right to modify the query, see your Business Objects administrator.

If your report contains smart measures it is more likely to display #PARTIALRESULT because smart measures require Web Intelligence to retrieve larger amounts of data than classic measures.

#RANK

#RANK occurs when you try to rank data based on an object that depends on the order of values. (Objects that use the Previous() function or any running aggregate function depend on the order of values.) Ranking causes these objects to recalculate their values, which then changes the ranking, resulting in a circular dependency. Such a dependency can occur either when you use the Rank dialog box to create a ranking, or when you use the Rank() function.

Example: Ranking on running average or previous values

f you attempt to rank a block on a column that contains the Previous() function or any running aggregate function, the entire block returns #RANK.

#RECURSIVE

#RECURSIVE occurs when Web Intelligence cannot make a calculation due to a circular dependency.

Example: Using the NumberOfPages() function

If you place the NumberOfPages() function in a cell whose Autofit Height or Autofit Width properties are set, Web Intelligence returns #RECURSIVE because the placing of this formula in an autofit cell creates a circular dependency. Web Intelligence must know the exact size of the report before it can return a value from the function, but the size of the cell (which affects the size of the report) is determined by the cell content.

#SECURITY

#SECURITY occurs when you attempt to use a function for which you do not have security rights.

Example: Using the DataProviderSQL() function

If a user who does not have the right to view data provider SQL places the DataProviderSQL() function in a cell, the #SECURITY message appears in the cell.

#SYNTAX

#SYNTAX occurs when a formula references an object that no longer exists in the report.

Example: Referencing a non-existent object

You have a report that originally showed Year, Quarter and Sales revenue, with an additional column showing difference between the revenue and the average yearly revenue. This figure is given by the variable Difference from Yearly Average.

If the Difference from Yearly Average variable is deleted from the report, the column containing it returns #SYNTAX.

#TOREFRESH

#TOREFRESH appears in cells based on smart measures when the value returned by the smart measure is not available. This situation occurs when the "grouping set" containing the value is not available in the data provider.

You remove the #TOREFRESH error by refreshing the data.

#UNAVAILABLE

#UNAVAILABLE appears when Web Intelligence cannot calculate the value of a smart measure.

This situation occurs when Web Intelligence cannot display the values in a filtered smart measure without applying a filter to the query. Because this carries a risk of impacting other reports based on the same query, Web Intelligence does not apply the query filter.

#ERROR

#ERROR is the default error message that covers all errors not covered by other error messages.

Calculating values with smart measures

chapter 6

Smart measures defined

"Smart measures" are measures whose values are calculated by the database (relational or OLAP) on which a Web Intelligence universe is based, rather than by Web Intelligence itself. A measure is defined as a smart measure in the universe when its data is aggregated in a way not supported by Web Intelligence.

To return values for smart measure, Web Intelligence generates a query to calculate the measure in all the calculation contexts required in a report. These contexts can change as the report is edited. As a result, Web Intelligence modifies the query at each data refresh after the required contexts have changed.

Smart measures behave differently from classic measures, which support a basic set of aggregation functions (Max, Min, Count, Sum, Average) that Web Intelligence can calculate in all contexts without help from the database. For example, if you build a query containing the [Country] and [Region] dimensions and the [Revenue] measure (which calculates the sum of the revenue), Web Intelligence initially displays Country, Region and Revenue in a block. If you then remove Region from the block, Web Intelligence is still able to calculate the total revenue for each country by summing the revenues for all the regions in the country.

Calculation contexts are represented by "grouping sets" in the query that Web Intelligence generates.

Grouping sets and smart measures

A "grouping set" is a set of dimensions that generates a result for a measure. When Web Intelligence returns data for a smart measure, the generated SQL includes grouping sets for all the aggregations of that measure that are included in the report.

Example: Grouping sets in a query

A query contains the [Country], [Region], [City] dimensions and the [Revenue] smart measure. These objects imply the following grouping sets to calculate revenue in all possible contexts:

- Total smart measure value

- smart measure value by (Country, Region, City)
- smart measure value by (Country, City)
- smart measure value by (City)
- smart measure value by (Region, City)
- smart measure value by (Region)
- smart measure value by (Country, Region)
- smart measure value by (Country)

Web Intelligence retrieves grouping sets by using the `UNION` operator in the query. If the database does not support `UNION`, Web Intelligence itself performs the unions.

Web Intelligence updates the grouping sets according to the calculation contexts required by the report, which can change in response to changes in the report structure.

How Web Intelligence manages grouping sets

When you first build and run a query including smart measures, Web Intelligence includes the grouping sets necessary to calculate the smart measures at the most detailed level implied by the query objects. Web Intelligence always includes this grouping set in the query SQL.

For example, if you build a query containing the [Country], [Region] and [City] dimensions and the [Revenue] smart measure, Web Intelligence includes the (Country, Region, City) grouping set in the generated SQL. This grouping set always appears in the SQL. Web Intelligence adds and removes other grouping sets in response to changes in the report.

If you remove the [City] dimension from the block, Web Intelligence needs the (Country, Region) grouping set in order to return the revenue values. This grouping set is not yet available in the query SQL, so Web Intelligence displays #TOREFRESH in the [Revenue] cells. When you refresh the data, Web Intelligence is able to replace #TOREFRESH with the revenue values.

If you then replace the [City] dimension in the block, the (Country, Region) grouping set is no longer needed. Web Intelligence removes it from the query SQL and discards its values the next time you refresh the data.

Each time you refresh the report data, Web Intelligence updates the query SQL to include or discard grouping sets according to the calculation contexts required by the report.

In certain situations, Web Intelligence cannot display the value of a smart measure. In this case Web Intelligence displays #UNAVAILABLE in the measure cells.

Smart measures and the scope of analysis

When you build a query with a scope of analysis, Web Intelligence generates an initial grouping set that contains the result objects, but not the scope objects. Web intelligence does not generate all the possible grouping sets from the combination of the result objects plus the scope objects.

Example: A query with a scope of analysis and a smart measure

A query has the result objects [Country] and [Revenue]. The scope of analysis contains the [Region] and [City] dimensions. When you run the query, Web Intelligence retrieves the (Country) grouping set and displays [Country] and [Revenue] in a block.

Smart measures and SQL

Grouping sets and the UNION operator

Some databases support grouping sets explicitly with the `GROUPING SETS` operator. Web Intelligence uses multiple result sets and the `UNION` operator to simulate the effect of `GROUPING SETS`.

Example: Grouping sets retrieved with the UNION operator

This example describes a query containing [Country], [Region], [City] dimensions and the [Revenue] smart measure.

Note:
For simplicity, the smart measure calculates a sum. In practice, a smart measure is not needed for this aggregation because Web Intelligence universes support the `Sum` function.

When the query is first run, the grouping set is (Country, Region, City). The entire SQL query returns this grouping set and there is no need for the `UNION` operator in the SQL.

If you remove the [City] dimension from the table, Web Intelligence needs the (Country, Region) grouping set to display the revenue (which appears as #TOREFRESH). After data refresh, the SQL is as follows:

```
SELECT
  SELECT
  0 AS GID,
  country.country_name,
  region.region_name,
  NULL,
  sum(city.revenue)
FROM
  country,
  region,
  city
WHERE
  ( country.country_id=region.country_id  )
  AND  ( region.region_id=city.region_id  )
GROUP BY
  country.country_name,
  region.region_name
UNION
SELECT
  1 AS GID,
  country.country_name,
  region.region_name,
  city.city_name,
  sum(city.revenue)
FROM
  country,
  region,
  city
WHERE
  ( country.country_id=region.country_id  )
  AND  ( region.region_id=city.region_id  )
GROUP BY
  country.country_name,
  region.region_name,
  city.city_name
```

Each grouping set is represented by a `SELECT` statement, and each has its own ID (the GID column). Grouping sets that do not contain the full set of dimensions include empty columns (`SELECT ''`) because each `SELECT` statement in a query including `UNION` must have the same number of columns.

If you add a new block containing [Country] and [Revenue] to the report, Web Intelligence needs the (Country) grouping set. The generated SQL now includes three grouping sets as follows:

```
SELECT
  0 AS GID,
  country.country_name,
  region.region_name,
  NULL,
  sum(city.revenue)
FROM
  country,
  region,
  city
WHERE
  ( country.country_id=region.country_id  )
  AND  ( region.region_id=city.region_id  )
GROUP BY
  country.country_name,
  region.region_name
UNION
SELECT
  1 AS GID,
  country.country_name,
  NULL,
  NULL,
  sum(city.revenue)
FROM
  country,
  city,
  region
WHERE
  ( country.country_id=region.country_id  )
  AND  ( region.region_id=city.region_id  )
GROUP BY
  country.country_name
UNION
SELECT
  2 AS GID,
  country.country_name,
  region.region_name,
  city.city_name,
  sum(city.revenue)
FROM
```

```
  country,
  region,
  city
WHERE
  ( country.country_id=region.country_id  )
  AND  ( region.region_id=city.region_id  )
GROUP BY
  country.country_name,
  region.region_name,
  city.city_name
```

Smart measures and formulas

Smart measures and dimensions containing formulas

If a formula or variable appears as a dimension in the calculation context of a smart measure, and the formula determines the grouping set required by the measure, Web Intelligence cannot display values for the smart measure. Web Intelligence cannot deduce the grouping set from a formula in this situation.

For example, a report contains a variable, `Semester`, with the formula `If [Quarter] = "Q1" or [Quarter] = "Q2" Then "H1" Else "H2"`

Placed in a block, the `Semester` variable returns the following result:

Semester	Revenue
H1	#UNAVAILABLE
H2	#UNAVAILABLE

Smart measures in formulas

Web Intelligence can return a value for a smart measure when the smart measure is included in a formula, even when the formula requires a different calculation context from the context implied by the position of the formula.

For example, a report contains a block as follows:

Country	Region	Revenue
US	North	10000
US	South	15000
US	East	14000
US	West	12000

If you include an additional column in the table with the formula

```
[Revenue] ForAll ([Region])
```

Web Intelligence initially returns #TOREFRESH because the formula requires the grouping set (Country). (The formula excludes regions from the calculation.) When you refresh the data, Web Intelligence adds the (Country) grouping set to the query and displays the measure values.

Smart measures and filters

Smart measures and filters on dimensions

If a filter is applied to a dimension on which the value of a smart value depends, but the dimension does not appear explicitly in the calculation context of the measure, Web Intelligence cannot return a value for the smart measure and displays #UNAVAILABLE.

This situation occurs because Web Intelligence cannot calculate the effect of the filter on the measure values. The only way to know its effect is to apply

the filter to the query. This carries the risk of impacting other reports based on the same query. As a result, Web intelligence does not apply the filter at the query level.

Example: A smart measure and a filter on a dimension

A query contains the [Country] and [Region] dimensions and the [Revenue] smart measure. [Country] and [Revenue] are displayed in a block. If you apply a report filter restricting the values of [Region] to "South East" or "South West", Web Intelligence displays #UNAVAILABLE in the [Revenue] cells.

Smart measures and drill filters

In general, Web Intelligence cannot return values for smart measures when a filter is applied to a dimension that impacts the calculation of the measure. Dimensions filtered by drill filters are an exception to this rule.

Example: A drill filter that affects a smart measure

A block contains the [Country] and [Revenue] objects. You drill on [Country] and Web Intelligence displays [Region], [Revenue] in the block and moves the filter on [Country] to the drill toolbar.

To do this, Web Intelligence adds the (Country, Region) grouping set to the query and retrieves all its data, then filters this data to display only those regions contained in the drilled country. Web Intelligence does not need to add a filter at the query level to filter regions based on their country.

Comparing values using Web Intelligence functions

chapter 7

Comparing values using the Previous function

The `Previous` function returns a comparative previous value of an expression. The value returned depends on the layout of the report.

For more powerful comparison capabilities, use the `RelativeValue` function. `RelativeValue` returns a previous or subsequent comparative value of an expression. The value returned does not depend on the layout of the report.

Related Topics

- *Previous* on page 173
- *RelativeValue* on page 178
- *Comparing values using the RelativeValue function* on page 226

Comparing values using the RelativeValue function

The `RelativeValue` function returns comparative values of an expression. The function returns these values independently of the layout of a report.

When using `RelativeValue`, you specify the following:

- The expression whose comparative value you want to find (the expression must be a measure or a detail of a dimension available in the block)
- The list of "slicing dimensions"
- The offset.

The function uses the slicing dimensions, the offset, and the "sub-axis dimensions" (which are implied by the slicing dimensions) to return a comparative value. The sub-axis dimensions are all the other dimensions in the calculation context apart from the slicing dimensions.

Expressed in general terms, `RelativeValue` returns the value of the expression in the row which, in the list of values of the slicing dimensions, is `offset` rows removed from the current row, and where the values of the sub-axis dimensions are the same as in the current row.

Note:
All slicing dimensions must always be in the calculation context of the block in which the function is placed. If a slicing dimension is subsequently removed, the function returns #COMPUTATION.

Example:

In this example, the RelativeValue column contains the following formula:

```
RelativeValue([Revenue];([Year]);-1)
```

- The expression is [Revenue];
- The slicing dimension is [Year];
- The offset is -1 (the function returns the immediately previous value in the list).

Year	Quarter	Sales Person	Revenue	RelativeValue
2007	Q1	Smith	1000	
2007	Q2	Jones	2000	
2007	Q3	Wilson	1500	
2007	Q4	Harris	3000	
2008	Q1	Smith	4000	1000
2008	Q2	Jones	3400	2000
2008	Q3	Wilson	2000	1500
2008	Q4	Harris	1700	3000

Expressed as a business question, the formula tells Web Intelligence to return the revenue generated by the same sales person in the same quarter in the previous year.

Expressed as a calculation in words, the formula tells Web Intelligence to return the value of [Revenue] (the expression) in the row where the value of [Year] (the slicing dimension) is the previous value from the list of values of the [Year] object, and where the values of [Quarter] and [Sales Person] (the sub-axis dimensions) are the same as in the current row.

Related Topics

- *RelativeValue* on page 178

Slicing dimensions and the RelativeValue function

The `RelativeValue` function uses the list of values of the slicing dimensions to find the comparative row. The function returns the comparative value of the expression specified in the function that is `offset` number of rows away in the list of slicing dimensions.

As a result, the sort order of the slicing dimensions is crucial in determining the function output.

Example: Multiple slicing dimensions

In the table below, the RelativeValue column has the following formula:
`RelativeValue([Revenue];([Year];[Quarter]);-1)`

- The expression is [Revenue];
- The slicing dimensions are ([Year];[Quarter]);
- The offset is -1 (the function returns the immediately previous value in the list).

Year	Quarter	Sales Person	Revenue	RelativeValue
2007	Q1	Smith	1000	
2007	Q2	Smith	2000	
2007	Q3	Smith	1500	
2007	Q4	Smith	3000*	
2007	Q1	Jones	4000	
2007	Q2	Jones	3400	
2007	Q3	Jones	2000	
2007	Q4	Jones	1700	
2008	Q1	Smith	5000**	3000*

Year	Quarter	Sales Person	Revenue	RelativeValue
2008	Q2	Smith	3000***	5000**
2008	Q3	Smith	2700****	3000***
2008	Q4	Smith	6800	2700****

Expressed as a business question, the formula tells Web Intelligence to return the revenue generated by the same sales person in the previous quarter.

Expressed as a calculation in words, the formula tells Web Intelligence to return the value of [Revenue] in the row where the values of [Year] and [Quarter] represent the previous value in the ([Year];[Quarter]) list of values, and where the value of [Sales Person] is the same as in the current row.

To find the comparative value of revenue, Web Intelligence uses the list of values of the slicing dimensions:

Year	Quarter	
2007	Q1	
2007	Q2	
2007	Q3	
2007	Q4	*
2008	Q1	**
2008	Q2	***
2008	Q3	****
2008	Q4	

The sort order of the slicing dimensions determines the output of the function. The * in the tables show the sort order.

Related Topics

- *RelativeValue* on page 178

Slicing dimensions and sections

A slicing dimension can be in the section master cell of a report.

Example:

In the table below, the RelativeValue column has the following formula:

```
RelativeValue([Revenue];([Year];[Quarter]);-1)
```

2007

Quarter	Sales Person	Revenue	RelativeValue
Q1	Smith	1000	
Q2	Smith	2000	
Q3	Smith	1500	
Q4	Smith	3000*	
Q1	Jones	4000	

Quarter	Sales Person	Revenue	RelativeValue
Q2	Jones	3400	
Q3	Jones	2000	
Q4	Jones	1700	

2008

Quarter	Sales Person	Revenue	RelativeValue
Q1	Smith	5000**	3000*
Q2	Smith	3000***	5000**
Q3	Smith	2700 ****	3000***
Q4	Smith	6800	2700****

To find the comparative value of revenue, Web Intelligence uses the list of values of the slicing dimensions:

Year	Quarter	
2007	Q1	
2007	Q2	
2007	Q3	
2007	Q4	*
2008	Q1	**
2008	Q2	***
2008	Q3	****
2008	Q4	

The sort order of the slicing dimensions determines the output of the function. The * in the tables show the sort order.

Related Topics

- *RelativeValue* on page 178

Order of slicing dimensions

Because the sort order of the list of values of the slicing dimensions determines the output of `RelativeValue`, the order in which the slicing dimensions are specified impacts the output of the function.

Example: Order of slicing dimensions

In the table below, the RelativeValue column has the following formula:

```
RelativeValue([Revenue];([Year];[Quarter]);-1)
```

Year	Quarter	Sales Person	Revenue	RelativeValue
2007	Q1	Smith	1000	
2007	Q2	Smith	2000	
2007	Q3	Smith	1500	
2007	Q4	Smith	3000*	
2007	Q1	Jones	4000	
2007	Q2	Jones	3400	
2007	Q3	Jones	2000	
2007	Q4	Jones	1700	
2008	Q1	Smith	5000**	3000*
2008	Q2	Smith	3000***	5000**
2008	Q3	Smith	2700****	3000***
2008	Q4	Smith	6800	2700****

Expressed as a business question, the formula tells Web Intelligence to display the revenue generated by the same sales person in the previous quarter.

The sort order of the slicing dimensions is as follows:

Year	Quarter	
2007	Q1	
2007	Q2	
2007	Q3	
2007	Q4	*
2008	Q1	**
2008	Q2	***
2008	Q3	****
2008	Q4	

The function call is changed to:

```
RelativeValue([Revenue];([Quarter];[Year]);-1)
```

The sort order of the slicing dimensions becomes:

Quarter	Year	
Q1	2007	*
Q1	2008	**
Q2	2007	***
Q2	2008	****
Q3	2007	*****
Q3	2008	******
Q4	2007	*******
Q4	2008	********

The sort order has the following impact on the function result:

Year	Quarter	Sales Person	Revenue	RelativeValue
2007	Q1	Smith	1000*	
2007	Q2	Smith	2000***	
2007	Q3	Smith	1500*****	
2007	Q4	Smith	3000*******	
2007	Q1	Jones	4000	
2007	Q2	Jones	3400	
2007	Q3	Jones	2000	
2007	Q4	Jones	1700	
2008	Q1	Smith	5000**	1000*
2008	Q2	Smith	3000****	2000***
2008	Q3	Smith	2700******	1500*****
2008	Q4	Smith	6800********	3000*******

Expressed as a business question, the formula now tells Web Intelligence to display the revenue generated by the same sales person in the same quarter of the previous year.

The change in the sort order of the slicing dimension changes the meaning of the formula. The * in the tables indicate the sort order.

Related Topics

- *RelativeValue* on page 178

Slicing dimensions and sorts

Because the sort order of the list of values of the slicing dimensions determines the function output, a sort applied to any dimension in the slicing dimensions impacts the function output.

Example: A custom sort applied to a slicing dimension

In the table below, the RelativeValue column has the following formula:

```
RelativeValue([Revenue];([Year];[Quarter]);-1)
```

A custom sort (Q1, Q2, Q4, Q3) is applied to [Quarter], giving the following result for the function:

Year	Quarter	Sales Person	Revenue	RelativeValue
2007	Q1	Smith	1000	
2007	Q2	Smith	2000	
2007	Q4	Smith	3000	
2007	Q3	Smith	1500*	
2007	Q1	Jones	4000	
2007	Q2	Jones	3400	
2007	Q4	Jones	1700	
2007	Q3	Jones	2000	
2008	Q1	Smith	5000**	1500*
2008	Q2	Smith	3000***	5000**
2008	Q4	Smith	6800****	3000***
2008	Q3	Smith	2700	6800****

The sorted list of slicing dimensions is as follows:

Year	Quarter	
2007	Q1	
2007	Q2	
2007	Q4	
2007	Q3	*
2008	Q1	**

Year	Quarter	
2008	Q2	***
2008	Q4	****
2008	Q3	

The * in the tables show the sort order.

Related Topics

- *RelativeValue* on page 178

Using RelativeValue in crosstabs

The RelativeValue function works in crosstabs in exactly the same way as in vertical tables. The layout of the data in a crosstab has no impact on the function output.

Related Topics

- *RelativeValue* on page 178

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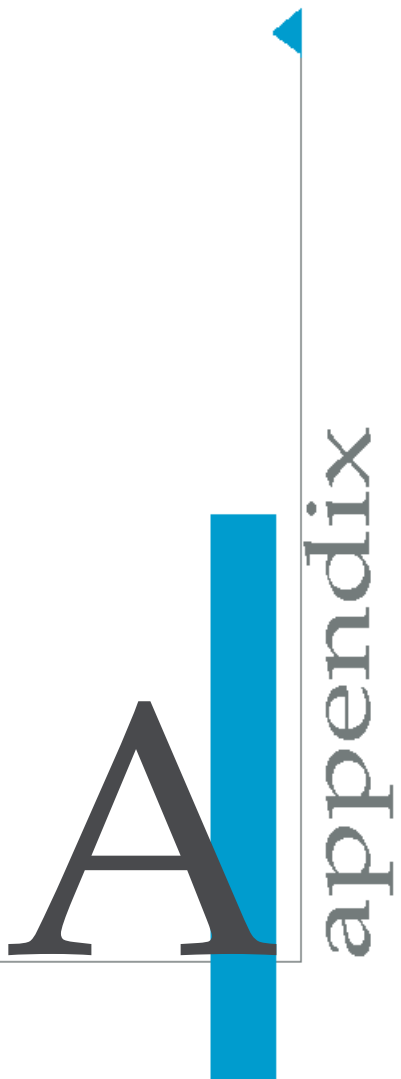

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