

Chapter 4 : Cell Reference and Functions

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1. Cell References and Functions

A formula in a spreadsheet such as Calc is a mathematical equation used to calculate a value. In Calc formulas must begin with an equal (=) sign. A formula entered in a cell may consist of:

- Operators
- Cell references
- Values or text
- Functions

a) Cell References

A cell reference refers to a cell or a range of cells on a worksheet and tells OpenOffice Calc where to look for the values or data that you want to use in a formula. With cell references, you can use data that is contained in different parts of a worksheet in one formula, or you can use the value from one cell in several formulas. You can also refer to cells on other worksheets in the same workbook. Here are some common examples:

This formula:	Refers to:	And Returns:
=C2	Cell C2	The value in cell C2.
=Sheet2!B2	Cell B2 on Sheet2	The value in cell B2 on Sheet2.
=Asset-Liability	The cells named Liability and Asset	The value of the cell named Liability subtracted from the cell named Asset.
{=Week1+Week2}	The cell ranges named Week1 and Week2	The sum of the values of the cell ranges named Week1 and Week 2 as an array formula.

Cell references in a formula can be of three types:

- Relative References
- Absolute References
- Mixed References

The following table summarizes how a reference type updates if a formula containing the reference is copied two cells down and two cells to the right.

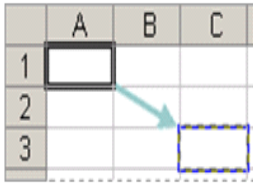
For a formula being copied:

If the reference is:

It changes to:

\$A\$1 absolute column and absolute row.

\$A\$1



In a formula, the exact address of a cell, regardless of the position of the cell that contains the formula. An absolute cell reference takes the form \$A\$1

A\$1 relative column and absolute row.

CS1

In a formula, the address of a cell based on the relative position of the cell that contains the formula and the cell referred to. If you copy the formula, the reference automatically adjusts. A relative reference takes the form A1

\$A1 (absolute column and relative row)

\$A3

A1 (relative column and relative row)

C3

■ Relative References

In OpenOffice Calc and other spreadsheets, a relative cell reference identifies the location a cell or group of cells. Cell references are used in formulas, functions, charts and other Calc commands.

By default, a spreadsheet cell reference is *relative*. What this means is that as a formula or function is copied and pasted to other cells, the cell references in the formula or function change to reflect the function's new location. A relative cell reference consists of the column letter and row number that intersect at the cell's location. An example of a relative cell reference would be C4, G15, or Z2345.

■ Absolute References

In OpenOffice Calc and other spreadsheets, an absolute cell reference identifies the location a cell or group of cells. An absolute cell reference consists of the column letter and row number surrounded by dollar signs (\$).

An absolute cell reference is used when you want a cell reference to stay fixed on a specific cell. This means that as a formula or function is copied and pasted to other cells, the cell references in the formula or function do not change. An example of an absolute cell reference would be \$C\$4, \$G\$15, or \$A\$345.

■ Mixed References

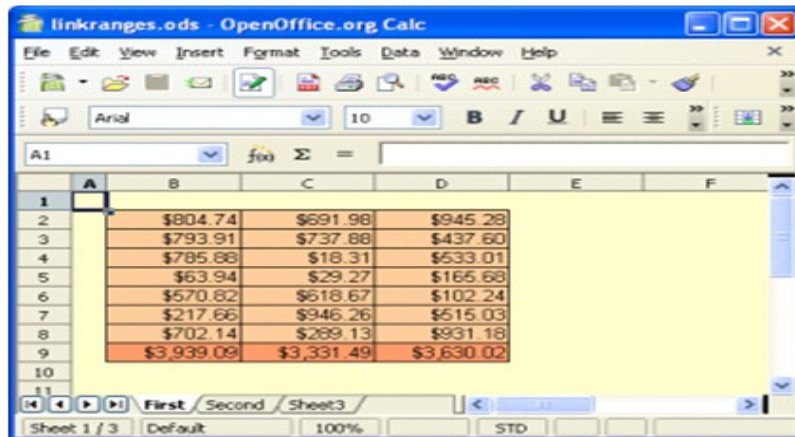
A mixed reference has either an absolute column and relative row or an absolute row and relative column. An absolute column reference takes the form \$A1, \$B1 and so on. An absolute row reference takes the form A\$1, B\$2 and so on.

If the position of the cell that contains the formula changes, the relative reference changes and the absolute reference does not change. If you copy the formula across several columns or down several rows, the relative reference is automatically adjusted and the absolute reference is not adjusted.

b) Cell References Outside The Sheet

The **Paste Special** feature can be used to quickly link to range of cells from another sheet.

In the example below, we have a table on the sheet labeled **First**. We want to link to the bottom row from the sheet labeled **Second**

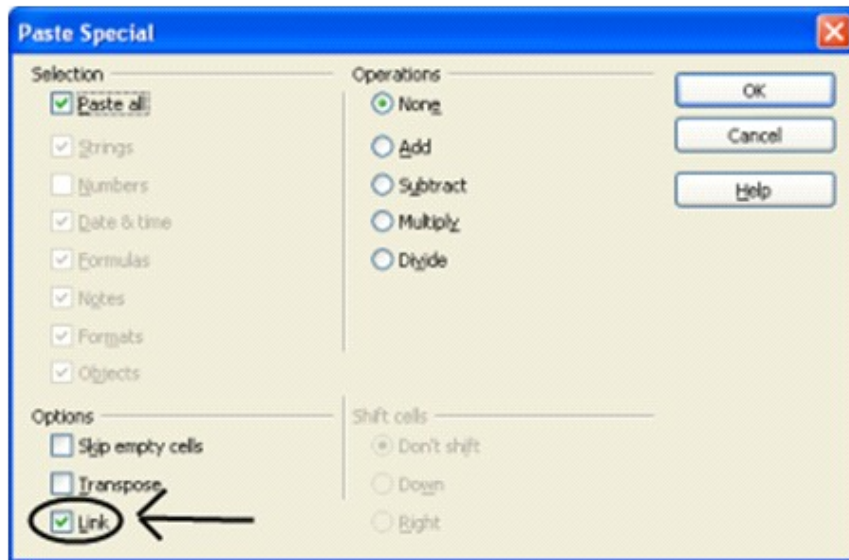


Select the desired range for linking b9:D9, then select Edit - Copy

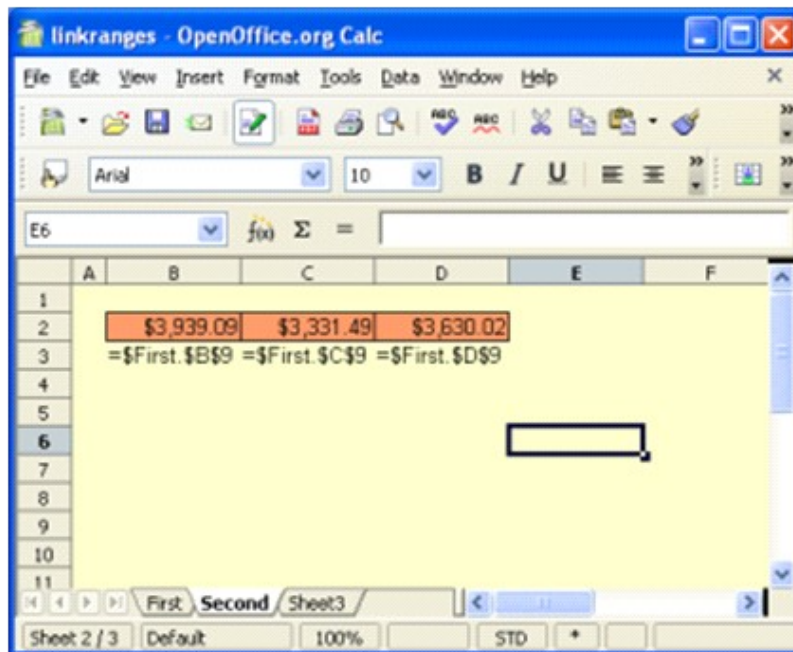
Now go to the sheet from where we will be linking. Select the start cell of the new range (corresponding to B9)

Now select **Edit - Paste Special**.

The Paste Special dialog is shown below. Select the Links option on bottom left.



This can be very useful if you have a very large range of cells that you need mapped to another spreadsheet.



c) Functions

Calc provides all of the commonly used functions found in modern spreadsheet applications. Over 250 standard functions are available in Calc, with many more available through its AddIn feature.

A function can be entered using the following syntax:

=function name (argument 1, argument 2,argument n)

To access the command, Open the context menu in the Commands window - choose **Functions** or Choose **View - Selection** - in the Selection window, click f(x) Function.

The following tables list Calc's functions organized in eleven functional categories.

Table 1: Functions available in Calc

Function Category	Standard	Addins	Total
Mathematical	54	8	62
Financial	22	37	59
Statistical	77	0	77
Date and Time	17	13	30
Logical	6	0	6
Informational	16	2	18
Database	12	0	12
Array	14	0	14
Spreadsheet	20	0	20
Text	27	1	28
Total	265	61	326

Function Examples

There are many categories of functions. Some of them are mathematical functions, statistical functions, date and time functions, logical functions and many more. Below are some examples:

■ Mathematical functions

INT(number)	Rounds the given number down to the nearest integer.
ROUND(number; count)	Rounds the given number to a certain number of decimal places according to valid mathematical criteria. Count (optional) is the number of the places to which the value is to be rounded. If the count parameter is negative, only the whole number portion is rounded. It is rounded to the place indicated by the count.
SUM(number_1; number_2; ... number_30)	Adds all the numbers in a range of cells. Number_1; number_2;... number_30 are up to 30 arguments whose sum is to be calculated. You can also enter a range using cell references.

■ Statistical analysis functions

AVERAGE(number_1; number_2; ... number_30)	Returns the average of the arguments. Number_1; number_2; ... number_30 are numerical values or ranges. Text is ignored.
COUNT(value_1; value_2; ... value_30)	Counts how many numbers are in the list of arguments. Text entries are ignored. Value_1; value_2; ... value_30 are values or ranges which are to be counted.
COUNTA(value_1; value_2; ... value_30)	Counts how many values are in the list of arguments. Text entries are also counted, even when they contain an empty string of length 0. If an argument is an array or reference, empty cells within the array or reference are ignored. value_1; value_2; ... value_30 are up to 30 arguments representing the values to be counted.

MAX(number_1; number_2; ... number_30)	Returns the maximum value in a list of arguments. Number_1; number_2; ... number_30 are numerical values or ranges.
MIN(number_1; number_2; ... number_30)	Returns the minimum value in a list of arguments. Number_1; number_2; ... number_30 are numerical values or ranges.

■ **Date and time functions**

DATE(year; month; day)	Converts a date written as year, month, day to an internal serial number and displays it in the cell's formatting. Year is an integer between 1583 and 9956 or 0 and 99. Month is an integer between 1 and 12. Day is an integer between 1 and 31.
DAY(number)	Returns the day, as an integer, of the given date value. A negative date/time value can be entered. Number is a time value.
HOUR(number)	Returns the hour, as an integer, for the given time value. Number is a time value.
NOW()	Returns the computer system date and time. The value is updated when your document recalculates. NOW is a function without arguments.
TODAY()	Returns the current computer system date. The value is updated when your document recalculates. TODAY is a function without arguments.
WEEKDAY(number; type)	Returns the day of the week for the given number (date value). The day is returned as an integer based on the type. Type determines the type of calculation: type = 1 (default), the weekdays are counted starting from Sunday (Monday = 0); type = 2, the weekdays are counted starting from Monday (Monday = 1); type = 3, the weekdays are counted starting from Monday (Monday = 0).

2. Exercises

1. Prepare the spreadsheet as below:

	A	B	C	D
1	2	50	78	MALAYSIA
2	5	72	120	
3	7	22	100	IRELAND
4	8	34	230	1/12/2008
5	12	45	225	85%

Use functions to find the:

- a) Total of numbers in A1:C5 _____
- b) Average of numbers in A1:C5 _____
- c) Highest number in A1:D5 _____
- d) Lowest number in A1:D5 _____
- e) Number of cells in A1:D5 using Count Function _____
- f) Number of cells in A1:D5 using CountA Function _____

2. Based on the data in the spreadsheet below, calculate the following:

	A	B	C	D	E
1	9	10	3	2	25 JAN 00
2	4	20	7	1	
3	8	5	5	6	RM15
4	COMPUTER 1	90%			
5					

- a) =SUM (A1:D1) _____
- b) =AVERAGE (C1:C3) _____
- c) =MIN (A1:E4) _____

- d) =MAX (A1:E4) _____
- e) =COUNT (A1:E4) _____
- f) =COUNTA (A1:E4) _____
- g) =SUM (A2:D2)-MIN (A1:E4) _____

3. Without entering the data in the spreadsheet, calculate the following:

	A	B	C	D	E	F
1	AMAN GROCERY STORE					
2	Sales	Total Weight (kg)	Price (per kg)	Total Sales		
3	Rice Flour	40	1.50			
4	Wheat Flour	70	3.00			
5	Glutinous Flour	30	2.00			
6	Self Raising Flour	20	2.50			
7						

Total Sales is the product of Total Weight and Price (per kg)

- a) Calculate Total Weight in D3
Formula in D3 _____ Value Displayed _____
- b) Copy the formula in D3 to D4:D6
Formula in D4 _____ Value Displayed _____
Formula in D5 _____ Value Displayed _____
Formula in D6 _____ Value Displayed _____
- c) Copy the formula in D3 to E4
Formula in E6 _____ Value Displayed _____
- d) Copy the formula in D3 to E6
Formula in E6 _____ Value Displayed _____