

LibreOffice
The Document Foundation

LibreOffice 3 Calc Guide

Using Spreadsheets in LibreOffice 3

Copyright

This document is Copyright © 2005–2011 by its contributors as listed below. You may distribute it and/or modify it under the terms of either the GNU General Public License (<http://www.gnu.org/licenses/gpl.html>), version 3 or later, or the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0/>), version 3.0 or later. Note that Chapter 8, *Using the DataPilot*, is licensed under the *Creative Commons Attribution-Share Alike License*, version 3.0.

Contributors

Andrew Pitonyak
Barbara Duprey
Jean Hollis Weber
Simon Brydon

Feedback

Please direct any comments or suggestions about this document to:
documentation@global.libreoffice.org

Acknowledgments

This book is based on *OpenOffice.org 3.3 Calc Guide*. The contributors to that book are:

Rick Barnes	Peter Kupfer	Martin Fox
James Andrew	Krishna Aradhi	Andy Brown
Stephen Buck	Bruce Byfield	Nicole Cairns
T. J. Frazier	Stigant Fyrwitful	Ingrid Halama
Spencer E. Harpe	Regina Henschel	Peter Hillier-Brook
John Kane	Kirk Abbott	Emma Kirsopp
Jared Kobos	Sigrid Kronenberger	Shelagh Manton
Alexandre Martins	Kashmira Patel	Anthony Petrillo
Andrew Pitonyak	Iain Roberts	Hazel Russman
Gary Schnabl	Rob Scott	Jacob Starr
Sowbhagya Sundaresan	Nikita Telang	Barbara M Tobias
John Viestenz	Jean Hollis Weber	Stefan Weigel
Sharon Whiston	Claire Wood	Linda Worthington
Michele Zarri	Magnus Adielsson	Sandeep Samuel Medikonda

Publication date and software version

Published 16 June 2011. Based on LibreOffice 3.3.

Contents

Copyright.....	2
Note for Mac users.....	8
Chapter 1	
Introducing Calc.....	9
What is Calc?.....	10
Spreadsheets, sheets, and cells.....	10
Parts of the main Calc window.....	10
Starting new spreadsheets.....	17
Opening existing spreadsheets.....	19
Opening CSV files.....	20
Saving spreadsheets.....	21
Password protection.....	23
Navigating within spreadsheets.....	25
Selecting items in a sheet or spreadsheet.....	28
Working with columns and rows.....	30
Working with sheets.....	31
Viewing Calc.....	33
Using the Navigator.....	36
Using document properties.....	38
Chapter 2	
Entering, Editing, and Formatting Data.....	41
Introduction.....	42
Entering data using the keyboard.....	42
Speeding up data entry.....	44
Sharing content between sheets.....	47
Validating cell contents.....	47
Editing data.....	49
Formatting data.....	50
Autoformatting cells and sheets.....	56
Formatting spreadsheets using themes.....	57
Using conditional formatting.....	57
Hiding and showing data.....	58
Sorting records.....	60
Finding and replacing in Calc.....	62
Chapter 3	
Creating Charts and Graphs.....	67
Introduction.....	68
Creating a chart.....	68
Editing charts.....	72
Formatting charts.....	77
Formatting 3D charts.....	79
Formatting the chart elements.....	82
Adding drawing objects to charts.....	85

<i>Resizing and moving the chart</i>	85
<i>Gallery of chart types</i>	86
Chapter 4	
<i>Using Styles and Templates in Calc</i>	95
<i>What is a template?</i>	96
<i>What are styles?</i>	96
<i>Types of styles in Calc</i>	96
<i>Accessing styles</i>	97
<i>Applying cell styles</i>	98
<i>Applying page styles</i>	99
<i>Modifying styles</i>	100
<i>Creating new (custom) styles</i>	103
<i>Copying and moving styles</i>	104
<i>Deleting styles</i>	106
<i>Creating a spreadsheet from a template</i>	106
<i>Creating a template</i>	107
<i>Editing a template</i>	107
<i>Adding templates using the Extension Manager</i>	109
<i>Setting a default template</i>	110
<i>Associating a spreadsheet with a different template</i>	111
<i>Organizing templates</i>	111
Chapter 5	
<i>Using Graphics in Calc</i>	113
<i>Graphics in Calc</i>	114
<i>Adding graphics (images)</i>	114
<i>Modifying images</i>	118
<i>Using the picture context menu</i>	123
<i>Using Calc's drawing tools</i>	125
<i>Positioning graphics</i>	128
<i>Creating an image map</i>	130
Chapter 6	
<i>Printing, Exporting, and E-mailing</i>	133
<i>Quick printing</i>	134
<i>Controlling printing</i>	134
<i>Using print ranges</i>	137
<i>Page breaks</i>	140
<i>Printing options setup in page styles</i>	141
<i>Headers and footers</i>	142
<i>Exporting to PDF</i>	145
<i>Exporting to XHTML</i>	151
<i>Saving as Web pages (HTML)</i>	151
<i>E-mailing spreadsheets</i>	151
<i>Digital signing of documents</i>	151
<i>Removing personal data</i>	152

Chapter 7	
<i>Using Formulas and Functions.....</i>	153
<i>Introduction.....</i>	154
<i>Setting up a spreadsheet.....</i>	154
<i>Creating formulas.....</i>	155
<i>Understanding functions.....</i>	169
<i>Strategies for creating formulas and functions.....</i>	174
<i>Finding and fixing errors.....</i>	176
<i>Examples of functions.....</i>	180
<i>Using regular expressions in functions.....</i>	184
<i>Advanced functions.....</i>	185
Chapter 8	
<i>Using the DataPilot.....</i>	187
<i>Introduction.....</i>	188
<i>Examples with step by step descriptions.....</i>	188
<i>DataPilot functions in detail.....</i>	207
<i>Function GETPIVOTDATA.....</i>	228
Chapter 9	
<i>Data Analysis.....</i>	233
<i>Introduction.....</i>	234
<i>Consolidating data.....</i>	234
<i>Creating subtotals.....</i>	236
<i>Using "what if" scenarios.....</i>	237
<i>Using other "what if" tools.....</i>	241
<i>Working backwards using Goal Seek.....</i>	246
<i>Using the Solver.....</i>	247
Chapter 10	
<i>Linking Calc Data.....</i>	251
<i>Why use multiple sheets?.....</i>	252
<i>Setting up multiple sheets.....</i>	252
<i>Referencing other sheets.....</i>	255
<i>Referencing other documents.....</i>	257
<i>Hyperlinks and URLs.....</i>	258
<i>Linking to external data.....</i>	261
<i>Linking to registered data sources.....</i>	266
<i>Embedding spreadsheets.....</i>	269
Chapter 11	
<i>Sharing and Reviewing Documents.....</i>	275
<i>Introduction.....</i>	276
<i>Sharing documents (collaboration).....</i>	276
<i>Recording changes.....</i>	278
<i>Adding comments to changes.....</i>	280
<i>Adding other comments.....</i>	281
<i>Reviewing changes.....</i>	283
<i>Merging documents.....</i>	285

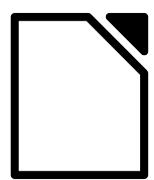
<i>Comparing documents</i>	286
<i>Saving versions</i>	287
Chapter 12	
Calc Macros	289
<i>Introduction</i>	290
<i>Using the macro recorder</i>	290
<i>Write your own functions</i>	294
<i>Accessing cells directly</i>	300
<i>Sorting</i>	302
<i>Conclusion</i>	303
Chapter 13	
Calc as a Simple Database	305
<i>Introduction</i>	306
<i>Associating a range with a name</i>	307
<i>Sorting</i>	312
<i>Filters</i>	313
<i>Calc functions similar to database functions</i>	320
<i>Database-specific functions</i>	329
<i>Conclusion</i>	330
Chapter 14	
Setting up and Customizing Calc	331
<i>Introduction</i>	332
<i>Choosing options that affect all of LibreOffice</i>	332
<i>Choosing options for loading and saving documents</i>	336
<i>Choosing options for Calc</i>	340
<i>Controlling Calc's AutoCorrect functions</i>	348
<i>Customizing the user interface</i>	349
<i>Adding functionality with extensions</i>	356
Appendix A	
Keyboard Shortcuts	359
<i>Introduction</i>	360
<i>Navigation and selection shortcuts</i>	360
<i>Function key shortcuts</i>	361
<i>Arrow key shortcuts</i>	362
<i>Cell formatting shortcuts</i>	362
<i>DataPilot shortcuts</i>	363
Appendix B	
Description of Functions	365
<i>Functions available in Calc</i>	366
<i>Mathematical functions</i>	366
<i>Financial analysis functions</i>	370
<i>Statistical analysis functions</i>	380
<i>Date and time functions</i>	387
<i>Logical functions</i>	390
<i>Informational functions</i>	390

<i>Database functions</i>	392
<i>Array functions</i>	394
<i>Spreadsheet functions</i>	395
<i>Text functions</i>	399
<i>Add-in functions</i>	402
Appendix C	
<i>Calc Error Codes</i>	405
<i>Introduction to Calc error codes</i>	406
<i>Error codes displayed within cells</i>	407
<i>General error codes</i>	408
<i>Index</i>	411

Note for Mac users

Some keystrokes and menu items are different on a Mac from those used in Windows and Linux. The table below gives some common substitutions for the instructions in this chapter. For a more detailed list, see the application Help.

Windows/Linux	Mac equivalent	Effect
Tools > Options menu selection	OpenOffice.org > Preferences	Access setup options
Right-click	Control+click	Open context menu
Ctrl (Control)	⌘ (Command)	Used with other keys
F5	Shift+⌘+F5	Open the Navigator
F11	⌘+T	Open Styles & Formatting window



LibreOffice
The Document Foundation

Chapter 1

Introducing Calc

Using Spreadsheets in LibreOffice

What is Calc?

Calc is the spreadsheet component of LibreOffice. You can enter data (usually numerical) in a spreadsheet and then manipulate this data to produce certain results.

Alternatively, you can enter data and then use Calc in a ‘What if...’ manner by changing some of the data and observing the results without having to retype the entire spreadsheet or sheet.

Other features provided by Calc include:

- Functions, which can be used to create formulas to perform complex calculations on data
- Database functions, to arrange, store, and filter data
- Dynamic charts; a wide range of 2D and 3D charts
- Macros, for recording and executing repetitive tasks; scripting languages supported include LibreOffice Basic, Python, BeanShell, and JavaScript
- Ability to open, edit, and save Microsoft Excel spreadsheets
- Import and export of spreadsheets in multiple formats, including HTML, CSV, PDF, and PostScript

Note

If you want to use macros written in Microsoft Excel using the VBA macro code in LibreOffice, you must first edit the code in the LibreOffice Basic IDE editor. See Chapter 12, Calc Macros.

Spreadsheets, sheets, and cells

Calc works with elements called *spreadsheets*. Spreadsheets consist of a number of individual *sheets*, each sheet containing cells arranged in rows and columns. A particular cell is identified by its row number and column letter.

Cells hold the individual elements—text, numbers, formulas, and so on—that make up the data to display and manipulate.

Each spreadsheet can have many sheets, and each sheet can have many individual cells. In Calc 3.3, each sheet can have a maximum of 1,048,576 (65,536 rows in Calc 3.2 and earlier) and a maximum of 1024 columns

Parts of the main Calc window

When Calc is started, the main window looks similar to Figure 1.

Note

If any part of the Calc window in Figure 1 is not shown, you can display it using the View menu. For example, **View → Status Bar** will toggle (show or hide) the Status Bar. It is not always necessary to display all the parts, as shown; show or hide any of them, as desired.

Title bar

The Title bar, located at the top, shows the name of the current spreadsheet. When the spreadsheet is newly created, its name is *Untitled X*, where *X* is a number. When you save a spreadsheet for the first time, you are prompted to enter a name of your choice.

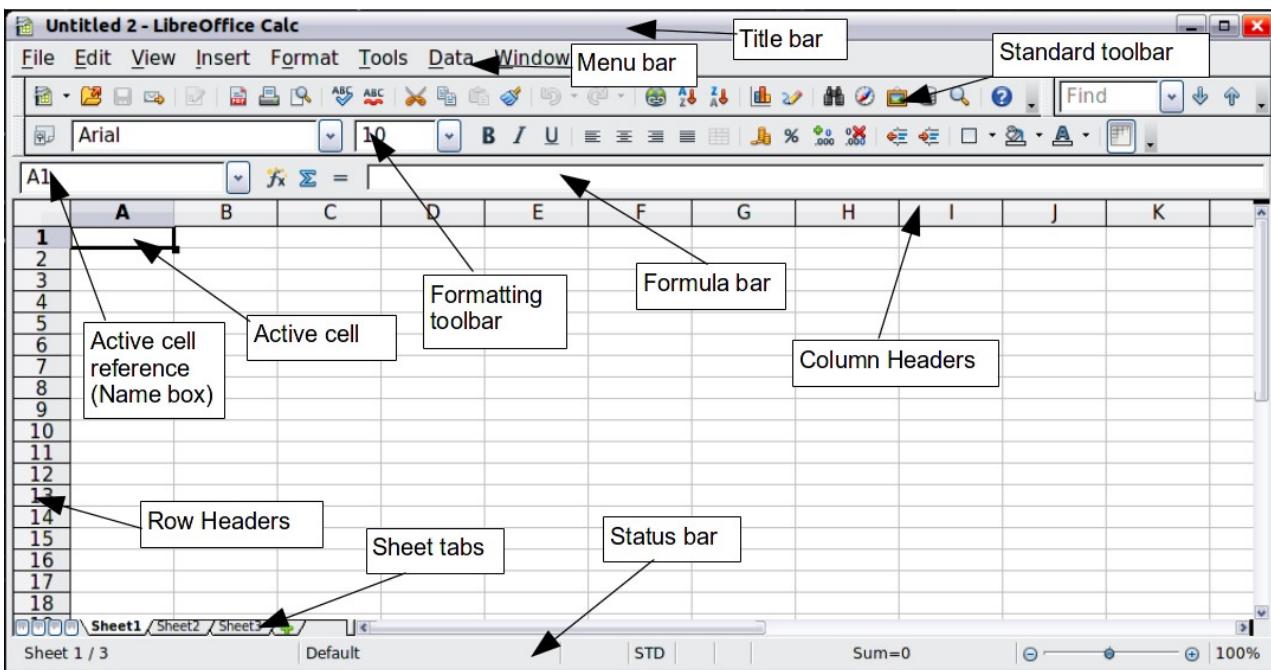


Figure 1: Parts of the Calc window

Menu bar

Under the Title bar is the Menu bar. When you choose one of the menus, a submenu appears with other options. You can modify the Menu bar, as discussed in Chapter 14, Setting Up and Customizing Calc.

- **File** contains commands that apply to the entire document such as **Open**, **Save**, **Wizards**, **Export as PDF**, and **Digital Signatures**.
- **Edit** contains commands for editing the document such as **Undo**, **Changes**, **Compare Document**, and **Find and Replace**.
- **View** contains commands for modifying how the Calc user interface looks such as **Toolbars**, **Full Screen**, and **Zoom**.
- **Insert** contains commands for inserting elements such as **cells**, **rows**, **columns**, **sheets**, and **pictures** into a spreadsheet.
- **Format** contains commands for modifying the layout of a spreadsheet such as **Styles and Formatting**, **Paragraph**, and **Merge Cells**.
- **Tools** contains functions such as **Spelling**, **Share Document**, **Cell Contents**, **Gallery**, and **Macros**.
- **Data** contains commands for manipulating data in your spreadsheet such as **Define Range**, **Sort**, **Filter**, and **DataPilot**.
- **Window** contains commands for the display window such as **New Window**, **Split**, and **Freeze**.
- **Help** contains links to the Help file bundled with the software, **What's This?**, **Support**, **Registration**, and **Check for Updates**.

Toolbars

Calc has several types of toolbars: docked (fixed in place), floating, and tear-off. Docked toolbars can be moved to different locations or made to float, and floating toolbars can be docked.

Four toolbars are located under the Menu bar by default: the Standard toolbar, the Find toolbar, the Formatting toolbar, and the Formula Bar.

The icons (buttons) on these toolbars provide a wide range of common commands and functions. You can also modify these toolbars, as discussed in Chapter 14, Setting Up and Customizing Calc.

Placing the mouse pointer over any of the icons displays a small box, called a tooltip. It gives a brief explanation of the icon's function. For a more detailed explanation, choose **Help** → **What's This?** and hover the mouse pointer over the icon. To turn this feature off again, click once or press the *Esc* key twice. Tips and extended tips can be turned on or off from **Tools** → **Options** → **LibreOffice** → **General**.

Displaying or hiding toolbars

To display or hide toolbars, choose **View** → **Toolbars**, then click on the name of a toolbar in the list. An active toolbar shows a check mark beside its name. Tear-off toolbars are not listed in the View menu.

Palettes and tear-off toolbars

Toolbar icons with a small triangle to the right will display *palettes*, *tear-off toolbars*, and other ways of selecting things, depending on the icon.

An example of a palette is shown in Figure 2. It is displayed by clicking the small triangle to the right of the Borders toolbar icon.

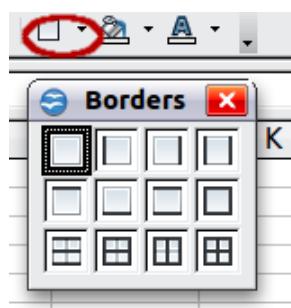


Figure 2: Toolbar palette

An example of a *tear-off toolbar* is shown in Figure 3. Tear-off toolbars can be floating or docked along an edge of the screen or in one of the existing toolbar areas. To move a floating tear-off toolbar, drag it by the title bar.

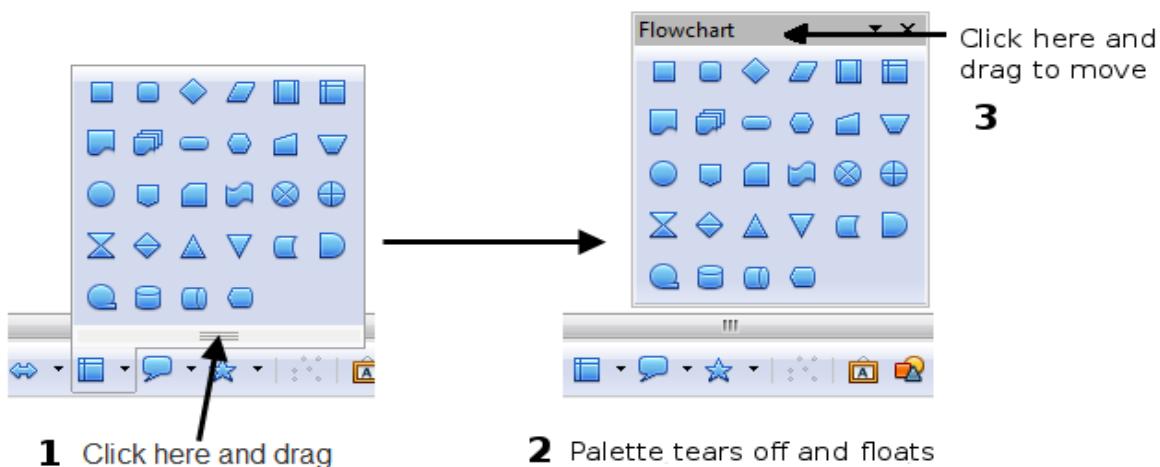


Figure 3: Example of a tear-off toolbar

Moving toolbars

To move a docked toolbar, place the mouse pointer over the toolbar handle, hold down the left mouse button, drag the toolbar to the new location, and then release the mouse button.

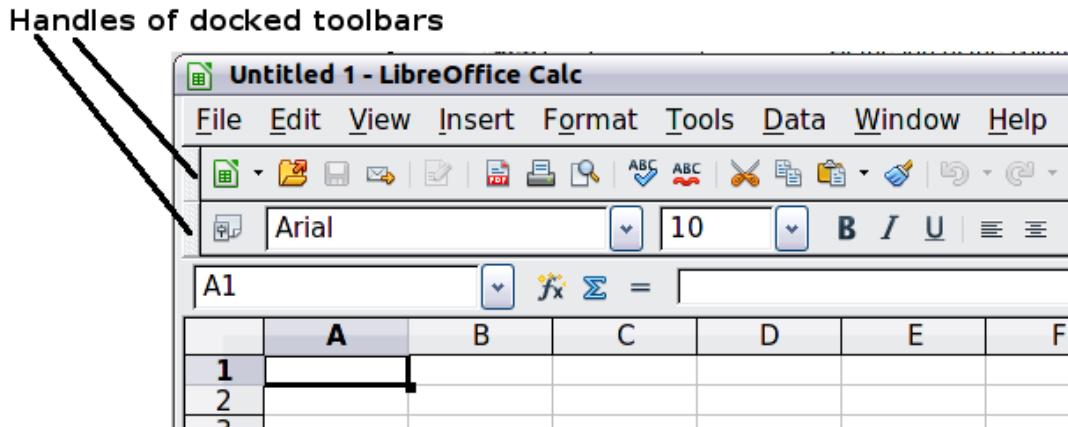


Figure 4: Moving a docked toolbar

To move a floating toolbar, click on its title bar and drag it to a new location, as shown in Figure 3.

Docking/floating windows and toolbars

Toolbars and some windows, such as the Navigator and the Styles and Formatting window, are dockable. You can move, resize, or dock them to an edge.

To dock a window or toolbar, hold down the *Control* key and double-click on the frame of the floating window (or in a vacant area near the icons at the top of the floating window) to dock it in its last position.

To undock a window, hold down the *Control* key and double-click on the frame (or a vacant area near the icons at the top) of the docked window.

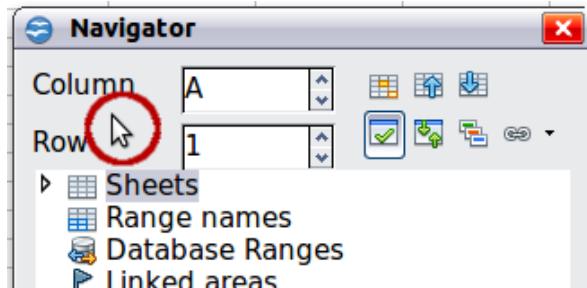


Figure 5: Control+double-click to dock or undock

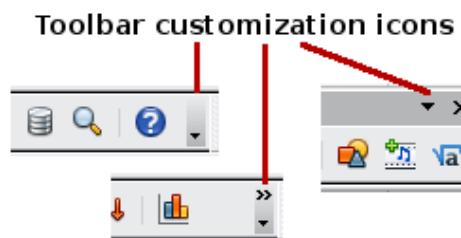
Customizing toolbars

You can customize toolbars in several ways, including choosing which icons are visible and locking the position of a docked toolbar.

To access a toolbar's customization options, use the down-arrow at the end of the toolbar or on its title bar.

To show or hide icons defined for the selected toolbar, choose **Visible Buttons** from the drop-down menu.

Visible icons are indicated by a border around the icon (Figure 6). Click on icons to hide or show them on the toolbar.



You can also add icons and create new toolbars, as described in Chapter 16.

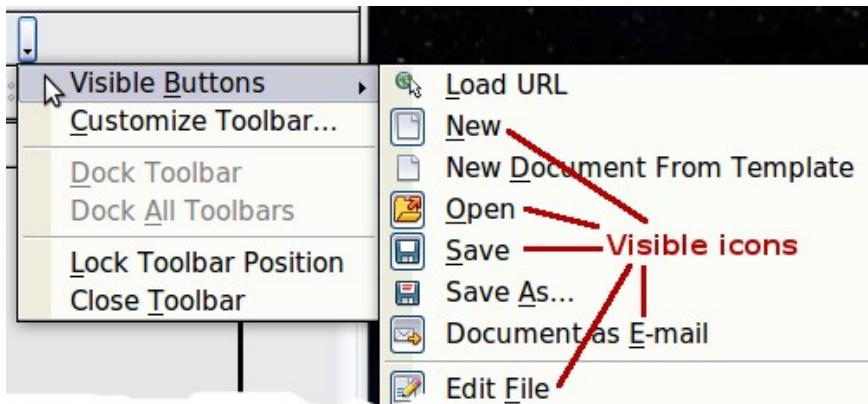


Figure 6: Selection of visible toolbar icons

Formatting toolbar

In the Formatting toolbar, the three boxes on the left are the **Apply Style**, **Font Name**, and **Font Size** lists (see Figure 7). They show the current settings for the selected cell or area. (The Apply Style list may not be visible by default.) Click the down-arrow to the right of each box to open the list.

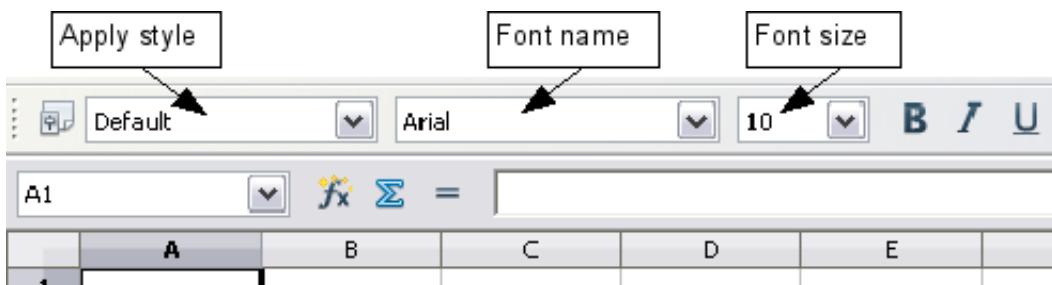


Figure 7: Apply Style, Font Name and Font Size lists

Note

If any of the icons (buttons) in Figure 7 is not shown, you can display it by clicking the small triangle at the right end of the **Formatting** toolbar, selecting **Visible Buttons** in the drop-down menu, and selecting the desired icon (for example, **Apply Style**) in the drop-down list. It is not always necessary to display all the toolbar buttons, as shown; show or hide any of them, as desired.

Formula Bar

On the left hand side of the Formula Bar is a small text box, called the *Name Box*, with a letter and number combination in it, such as *D7*. This combination, called the cell reference, is the column letter and row number of the selected cell.

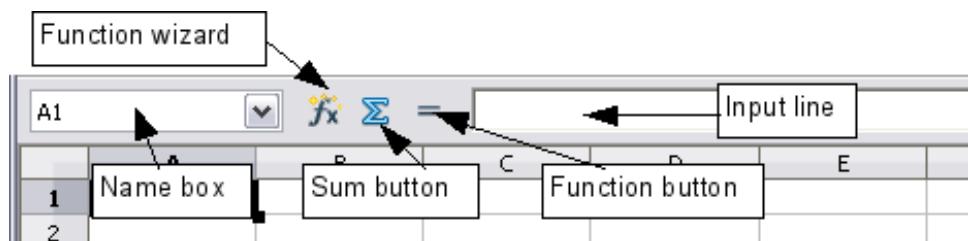


Figure 8: Formula Bar

To the right of the Name Box are the **Function Wizard**, **Sum**, and **Function** buttons.

Clicking the **Function Wizard** button opens a dialog from which you can search through a list of available functions. This can be very useful because it also shows how the functions are formatted.

In a spreadsheet the term *function* covers much more than just mathematical functions. See Chapter 7, Using Formulas and Functions, for more details.

Clicking the **Sum** button inserts a formula into the current cell that totals the numbers in the cells above the current cell. If there are no numbers above the current cell, then the cells to the left are placed in the Sum formula.

Clicking the **Function** button inserts an equals (=) sign into the selected cell and the Input line, thereby enabling the cell to accept a formula.

When you enter new data into a cell, the Sum and Equals buttons change to **Cancel** and **Accept** buttons .

The contents of the current cell (data, formula, or function) are displayed in the **Input line**, which is the remainder of the Formula Bar. You can either edit the cell contents of the current cell there, or you can do that in the current cell. To edit inside the Input line area, click in the area, then type your changes. To edit within the current cell, just double-click the cell.

Right-click (context) menus

Right-click on a cell, graphic, or other object to open a context menu. Often the context menu is the fastest and easiest way to reach a function. If you're not sure where in the menus or toolbars a function is located, you may be able to find it by right-clicking.

Individual cells

The main section of the screen displays the cells in the form of a grid, with each cell being at the intersection of a column and a row.

At the top of the columns and at the left end of the rows are a series of gray boxes containing letters and numbers. These are the column and row headers. The columns start at A and go on to the right, and the rows start at 1 and go down.

These column and row headers form the cell references that appear in the Name Box on the Formula Bar (see Figure 8). You can turn these headers off by selecting **View → Column & Row Headers**.

Sheet tabs

At the bottom of the grid of cells are the sheet tabs. These tabs enable access to each individual sheet, with the visible (active) sheet having a white tab. Clicking on another sheet tab displays that sheet, and its tab turns white. You can also select multiple sheet tabs at once by holding down the *Control* key while you click the names.

From Calc 3.3, you can choose colors for the different sheet tabs. Right-click on a tab and choose **Tab Color** from the context menu to open a palette of colors. To add new colors to the palette, see "Color options" in Chapter 14, Setting up and Customizing Calc.

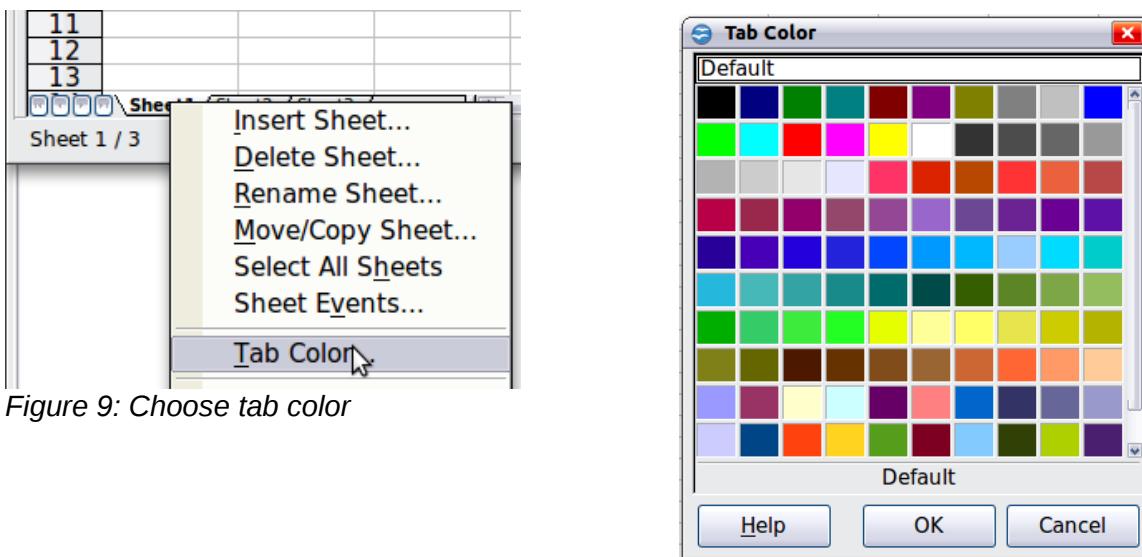


Figure 9: Choose tab color

Status bar

The Calc status bar provides information about the spreadsheet and convenient ways to quickly change some of its features.

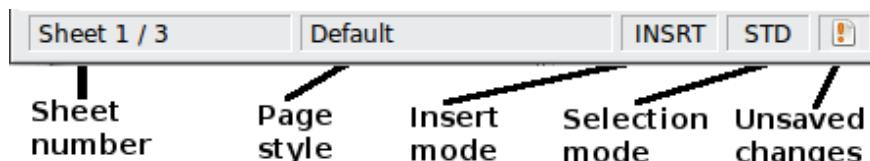


Figure 10: Left end of Calc status bar

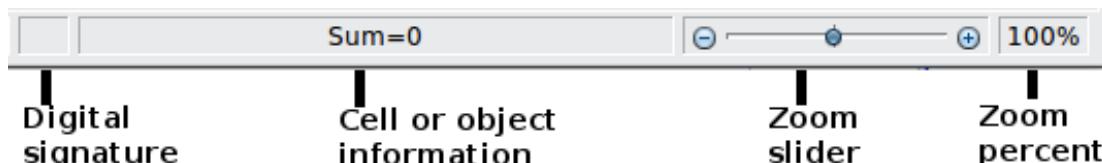


Figure 11: Right end of Calc status bar

Sheet sequence number (**Sheet 1 / 3**)

Shows the sequence number of the current sheet and the total number of sheets in the spreadsheet. The sequence number may not correspond with the name on the sheet tab.

Page style (**Default**)

Shows the page style of the current sheet. To edit the page style, double-click on this field. The Page Style dialog opens.

Insert mode (**INSRT**)

Click to toggle between INSRT (Insert) and OVER (Overwrite) modes when typing. This field is blank when the spreadsheet is not in a typing mode (for example, when selecting cells).

Selection mode (**STD**)

Click to toggle between STD (Standard), EXT (Extend), and ADD (Add) selection. EXT is an alternative to *Shift+click* when selecting cells. See page 28 for more information.

Unsaved changes (

An icon appears here if changes to the spreadsheet have not been saved.

Digital signature (

If the document has not been digitally signed, double-clicking in this area opens the Digital Signatures dialog, where you can sign the document. See Chapter 6, Printing, Exporting, and E-mailing, for more about digital signatures.

If the document has been digitally signed, an icon  shows in this area. You can double-click the icon to view the certificate. A document can be digitally signed only after it has been saved.

Cell or object information (Sum=0)

Displays information about the selected items. When a group of cells is selected, the sum of the contents is displayed by default; you can right-click on this field and select other functions, such as the average value, maximum value, minimum value, or count (number of items selected).

When the cursor is on an object such as a picture or chart, the information shown includes the size of the object and its location.

Zoom (100%)

To change the view magnification, drag the Zoom slider or click on the + and – signs. You can also right-click on the zoom level percentage to select a magnification value or double-click to open the Zoom & View Layout dialog.

Starting new spreadsheets

You can start a new, blank document in Calc in several ways.

- **From the operating system menu**, in the same way that you start other programs. When LibreOffice was installed on your computer, in most cases a menu entry for each component was added to your system menu. If you are using a Mac, you should see the LibreOffice icon in the Applications folder. When you double-click this icon, LibreOffice opens at the Start Center (Figure 13).
- **From the Quickstarter**, which is found in Windows, some Linux distributions, and (in a slightly different form) in Mac OS X. The Quickstarter is an icon that is placed in the system tray or the dock during system startup. It indicates that LibreOffice has been loaded and is ready to use.

Right-click the **Quickstarter** icon (Figure 12) in the system tray to open a menu from which you can open a new document, open the Templates and Documents dialog box, or choose an existing document to open. You can also double-click the **Quickstarter** icon to display the Templates and Documents dialog box.

See Chapter 1, Introducing LibreOffice, in the *Getting Started* guide for more information about using the Quickstarter.

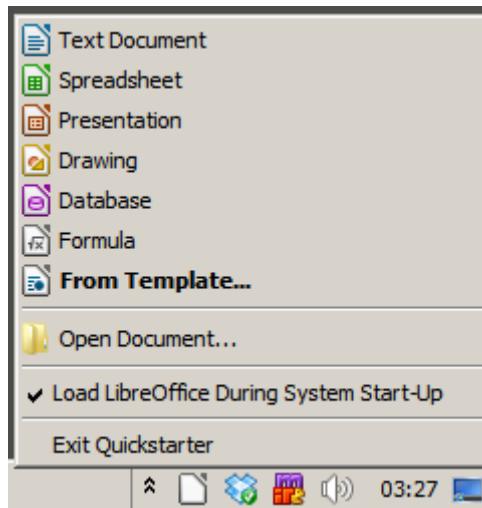


Figure 12: Quickstarter menu on Windows 7

- **From the Start Center.** When LibreOffice is open but no document is open (for example, if you close all the open documents but leave the program running), the Start Center is shown. Click one of the icons to open a new document of that type, or click the Templates icon to start a new document using a template. If a document is already open in LibreOffice, the new document opens in a new window.

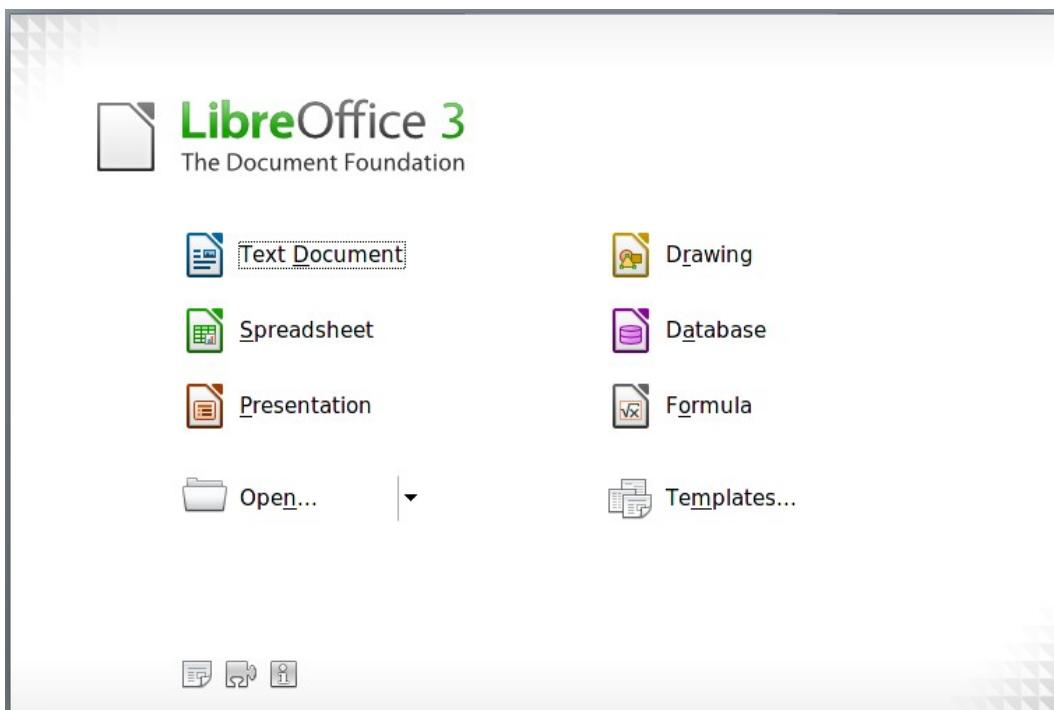


Figure 13: LibreOffice Start Center

When LibreOffice is open, you can also start a new document in one of the following ways.

- Press the **Control+N** keys.
- Use **File → New → Spreadsheet**.
- Click the **New** button on the main toolbar.

Starting a new document from a template

Calc documents can also be created from templates. Follow the above procedures, but instead of choosing **Spreadsheet**, choose the **Templates** icon from the Start Center or **File → New → Templates and Documents** from the Menu bar or toolbar.

On the Templates and Documents window (Figure 14), navigate to the appropriate folder and double-click on the required template. A new spreadsheet, based on the selected template, opens.

A new LibreOffice installation does not contain many templates, but you can add more by downloading them from <http://extensions.libreoffice.org/> and installing them as described in Chapter 14, Setting Up and Customizing Calc.

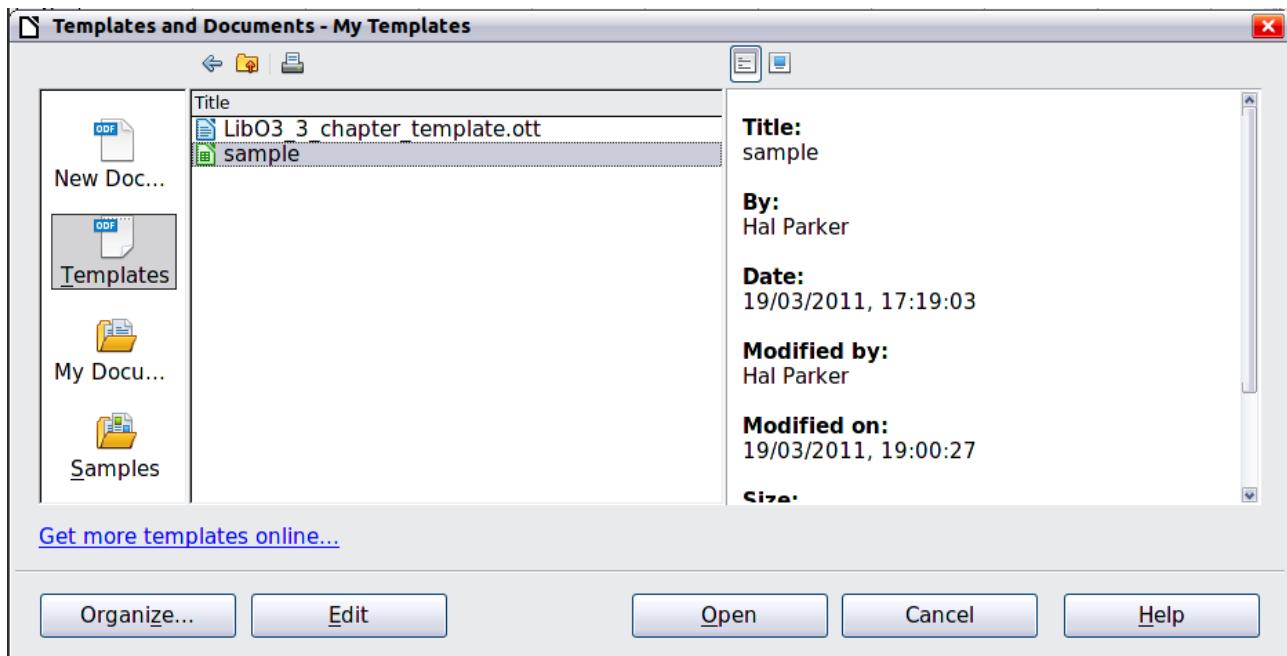


Figure 14: Starting a new spreadsheet from a template

Opening existing spreadsheets

When no document is open, the Start Center (Figure 22) provides an icon for opening an existing document or choosing from a list of recently-edited documents.



You can also open an existing document in one of the following ways. If a document is already open in LibreOffice, the second document opens in a new window.

- Choose **File → Open....**
- Click the **Open** button on the main toolbar.
- Press **Control+O** on the keyboard.
- Use **File → Recent Documents** to display the last 10 files that were opened in any of the LibreOffice components.
- Use the **Open Document** selection on the Quickstarter.

In each case, the Open dialog box appears. Select the file you want, and then click **Open**. If a document is already open in LibreOffice, the second document opens in a new window.

If you have associated Microsoft Office file formats with LibreOffice, you can also open these files by double-clicking on them.

Opening CSV files

Comma-separated-values (CSV) files are text files that contain the cell contents of a single sheet. Each line in a CSV file represents a row in a spreadsheet. Commas, semicolons, or other characters are used to separate the cells. Text is entered in quotation marks; numbers are entered without quotation marks.

To open a CSV file in Calc:

- 1) Choose **File → Open**.
- 2) Locate the CSV file that you want to open.
- 3) If the file has a *.csv extension, select the file and click **Open**.
- 4) If the file has another extension (for example, *.txt), select the file, select **Text CSV (*.csv;*.txt)** in the File type box (scroll down into the spreadsheet section to find it), and then click **Open**.
- 5) On the Text Import dialog (Figure 15), select the Separator options to divide the text in the file into columns.

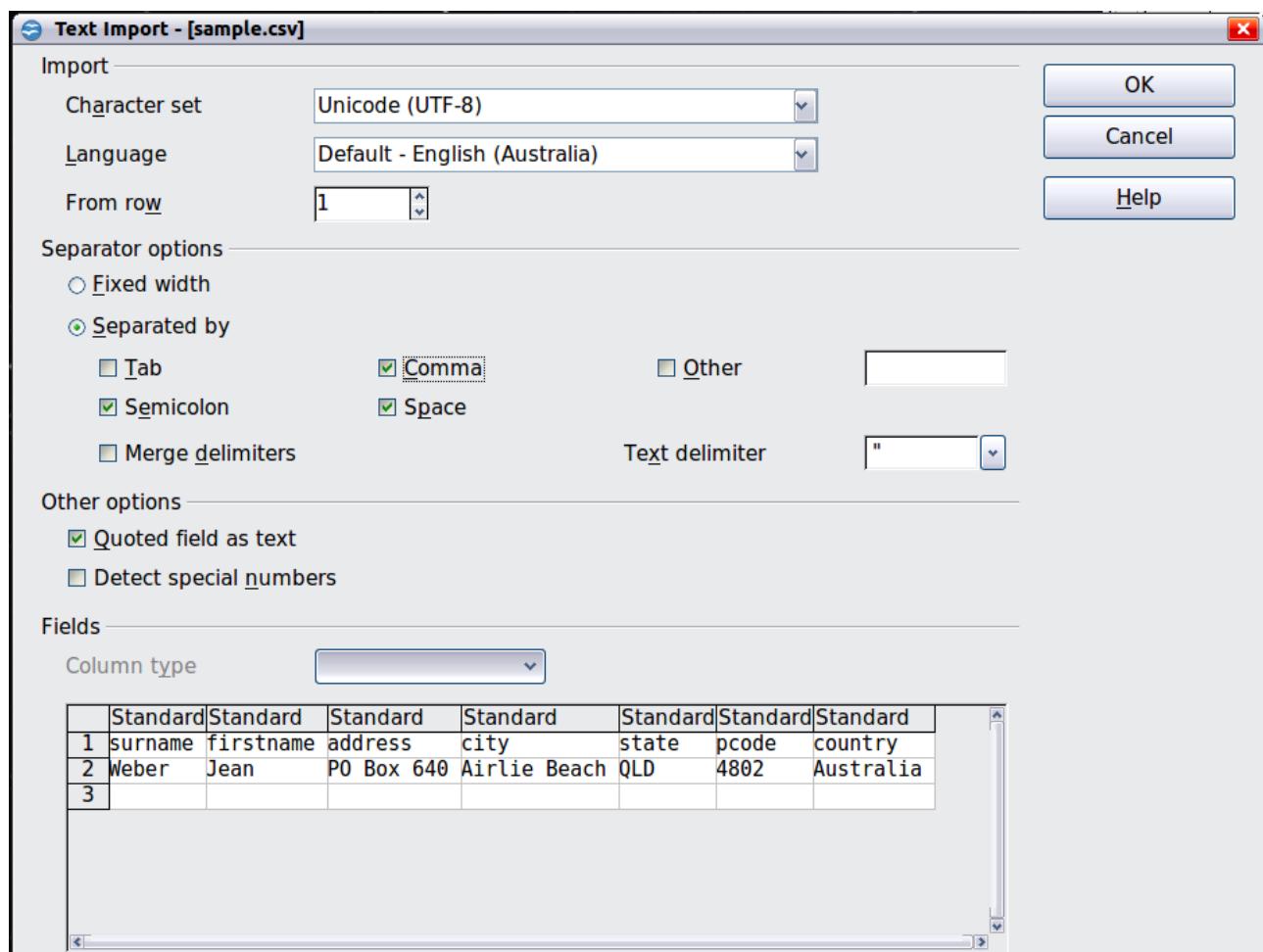


Figure 15: Text Import dialog, with Comma (,) selected as the separator and double quotation mark (") as the text delimiter.

You can preview the layout of the imported data at the bottom of the dialog. Right-click a column in the preview to set the format or to hide the column.

If the CSV file uses a text delimiter character that is not in the Text delimiter list, click in the box, and type the character.

- 6) The choices in the *Other options* section determine whether quoted data will always be imported as text, and whether Calc will automatically detect all number formats, including special number formats such as dates, time, and scientific notation. The detection depends on the language settings.
- 7) Click **OK** to open the file.

Caution



If you do not select **Text CSV (*.csv;*.txt)** as the file type when opening the file, the document opens in Writer, not Calc.

Saving spreadsheets

Spreadsheets can be saved in three ways.

- Press **Control+S**.
- Choose **File → Save (or Save All or Save As)**.
- Click the **Save** button on the main toolbar.

If the spreadsheet has not been saved previously, then each of these actions will open the **Save As** dialog. There you can specify the spreadsheet name and the location in which to save it.

Note

If the spreadsheet has been previously saved, then saving it using the **Save (or Save All)** command will overwrite an existing copy. However, you can save the spreadsheet in a different location or with a different name by selecting **File → Save As**.

Saving a document automatically

You can choose to have Calc save your spreadsheet automatically at regular intervals. Automatic saving, like manual saving, overwrites the last saved state of the file. To set up automatic file saving:

- 1) Choose **Tools → Options → Load/Save → General**.
- 2) Click on **Save AutoRecovery information every** and set the time interval. The default value is 15 minutes. Enter the value you want by typing it or by pressing the up or down arrow keys.

Saving as a Microsoft Excel document

If you need to exchange files with users of Microsoft Excel, they may not know how to open and save *.ods files. Only Microsoft Excel 2007 with Service Pack 2 (SP2) can do this. Users of Microsoft Excel 2007, 2003, XP, and 2000 can also download and install a free OpenDocument Format (ODF) plugin from Sun Microsystems, available from Softpedia, <http://www.softpedia.com/get/Office-tools/Other-Office-Tools/Sun-ODF-Plugin-for-Microsoft-Office.shtml>.

Some users of Microsoft Excel may be unwilling or unable to receive *.ods files. (Perhaps their employer does not allow them to install the plug-in.) In this case, you can save a document as a Excel file (*.xls or *.xlsx).

- 1) **Important**—First save your spreadsheet in the file format used by LibreOffice, *.ods. If you do not, any changes you may have made since the last time you saved it will only appear in the Microsoft Excel version of the document.
- 2) Then choose **File → Save As**.
- 3) On the Save As dialog (Figure 16), in the **File type** (or **Save as type**) drop-down menu, select the type of Excel format you need. Click **Save**.

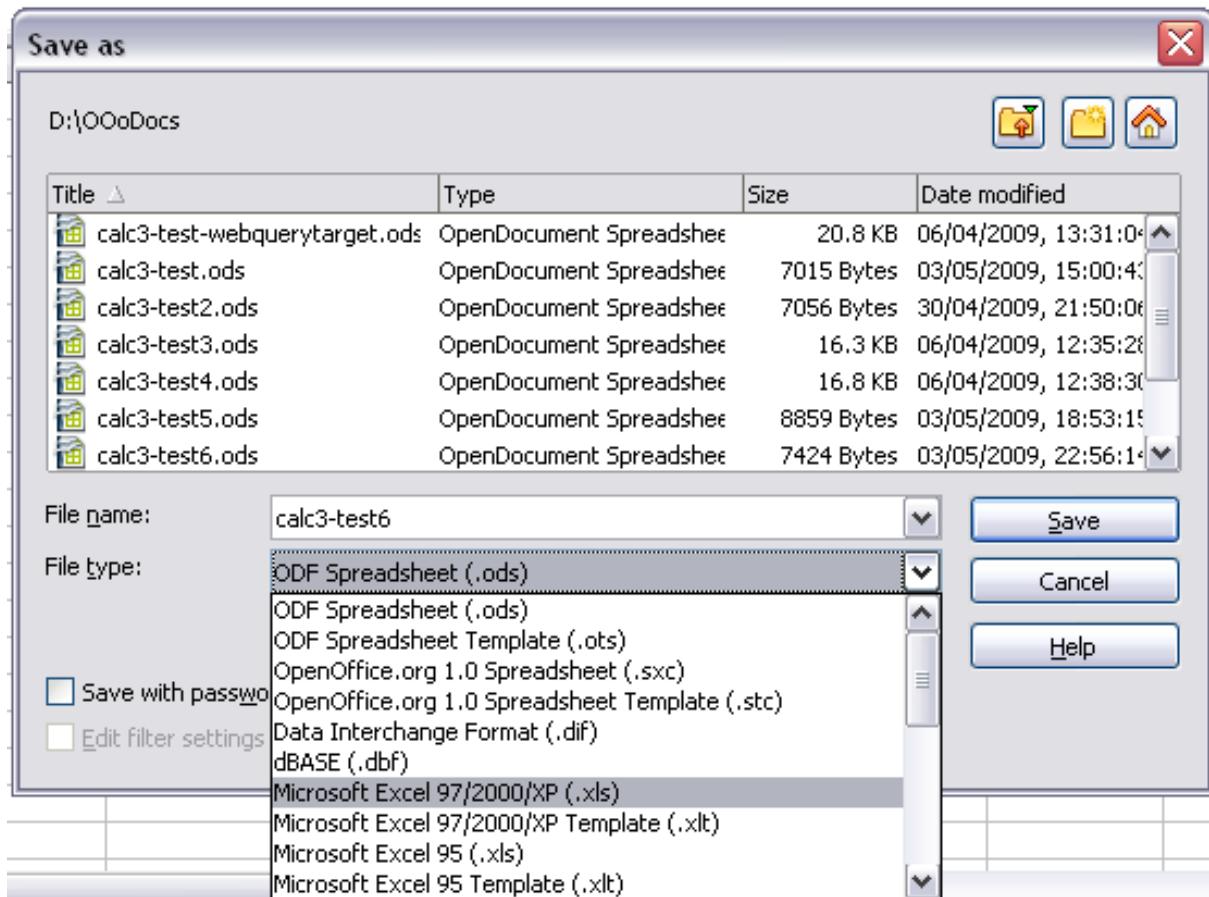


Figure 16. Saving a spreadsheet in Microsoft Excel format

Caution



From this point on, *all changes you make to the spreadsheet will occur only in the Microsoft Excel document*. You have changed the name and file type of your document. If you want to go back to working with the *.ods version of your spreadsheet, you must open it again.

Tip

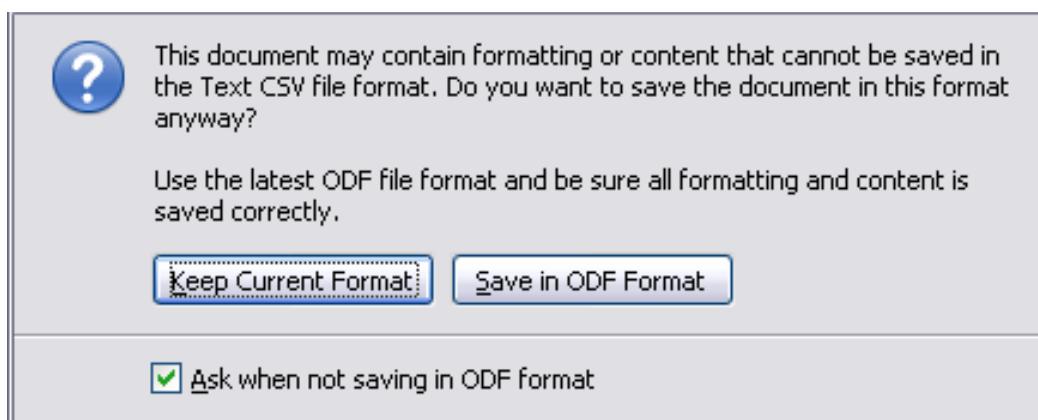
To have Calc save documents by default in a Microsoft Excel file format, go to **Tools → Options → Load/Save → General**. In the section named *Default file format and ODF settings*, under *Document type*, select **Spreadsheet**, then under *Always save as*, select your preferred file format.

Saving as a CSV file

To save a spreadsheet as a comma separated value (CSV) file:

- 1) Choose **File** → **Save As**.
- 2) In the *File name* box, type a name for the file.
- 3) In the *File type* list, select **Text CSV (.csv)** and click **Save**.

You may see the message box shown below. Click **Keep Current Format**.



- 4) In the Export of text files dialog, select the options you want and then click **OK**.

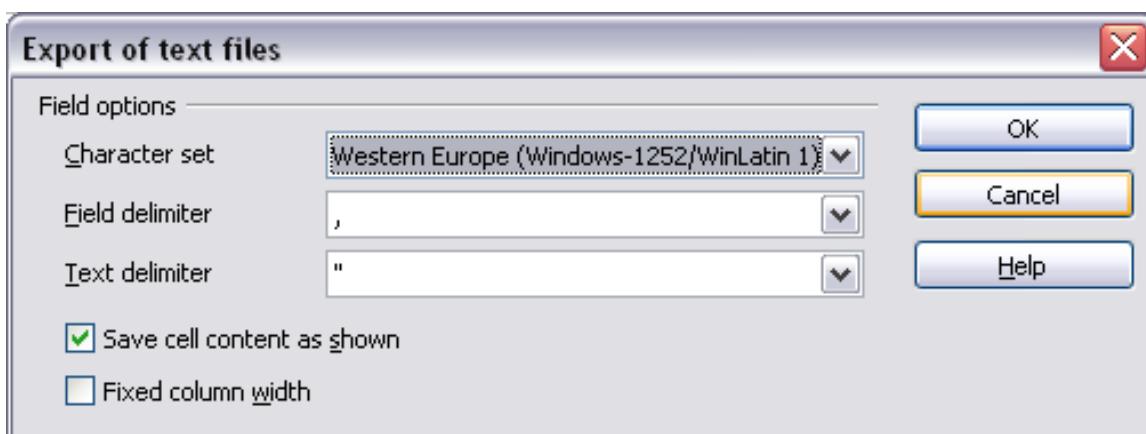


Figure 17: Choosing options when exporting to Text CSV

Saving in other formats

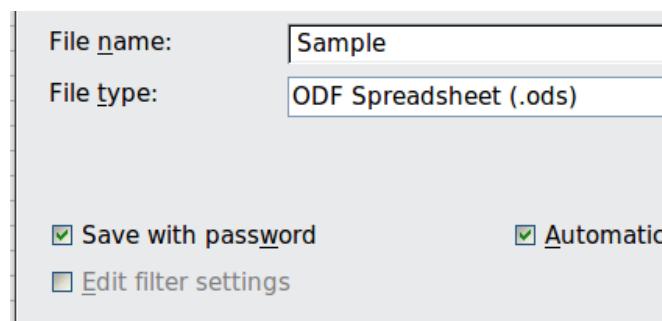
Calc can save spreadsheets in a range of formats, including HTML (Web pages), through the Save As dialog. Calc can also export spreadsheets to the PDF and XHTML file formats. See Chapter 6, Printing, Exporting, and E-mailing, for more information.

Password protection

Calc provides two levels of document protection: read-protect (file cannot be viewed without a password) and write-protect (file can be viewed in read-only mode but cannot be changed without a password). Thus you can make the content available for reading by a selected group of people and for reading and editing by a different group. This behavior is compatible with Microsoft Excel file protection.

- 1) Use **File** → **Save As** when saving the document. (You can also use **File** → **Save** the first time you save a new document.)

- 2) On the Save As dialog, type the file name, select the **Save with password** option, and then click **Save**.



- 3) The Set Password dialog opens.



Figure 18: Two levels of password protection

Here you have several choices:

- To read-protect the document, type a password in the two fields at the top of the dialog box.
- To write-protect the document, click the **More Options** button and select the **Open file read-only** checkbox.
- To write-protect the document but allow selected people to edit it, select the **Open file read-only** checkbox and type a password in the two boxes at the bottom of the dialog box.

- 4) Click **OK** to save the file. If either pair of passwords do not match, you receive an error message. Close the message box to return to the Set Password dialog box and enter the password again.

Caution



LibreOffice uses a very strong encryption mechanism that makes it almost impossible to recover the contents of a document if you lose the password.

Navigating within spreadsheets

Calc provides many ways to navigate within a spreadsheet from cell to cell and sheet to sheet. You can generally use whatever method you prefer.

Going to a particular cell

Using the mouse

Place the mouse pointer over the cell and click.

Using a cell reference

Click on the little inverted black triangle just to the right of the Name Box (Figure 8). The existing cell reference will be highlighted. Type the cell reference of the cell you want to go to and press *Enter*. Cell references are case insensitive: a3 or A3, for example, are the same. Or just click into the Name Box, backspace over the existing cell reference, and type in the cell reference you want and press *Enter*.

Using the Navigator

Click on the Navigator button in the Standard toolbar (or press *F5*) to display the Navigator. Type the cell reference into the top two fields, labeled Column and Row, and press *Enter*. In Figure 31 on page 37, the Navigator would select cell A7. For more about using the Navigator, see page 36.

Moving from cell to cell

In the spreadsheet, one cell normally has a darker black border. This black border indicates where the *focus* is (see Figure 19). The focus indicates which cell is enabled to receive input. If a group of cells is selected, they have a highlight color (usually gray), with the focus cell having a dark border.

	A	B	C
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

	A	B	C
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Figure 19. (left) One selected cell and (right) a group of selected cells

Using the mouse

To move the focus using the mouse, simply move the mouse pointer to the cell where you want the focus to be and click the left mouse button. This action changes the focus to the new cell. This method is most useful when the two cells are a large distance apart.

Using the Tab and Enter keys

- Pressing *Enter* or *Shift+Enter* moves the focus down or up, respectively.
- Pressing *Tab* or *Shift+Tab* moves the focus to the right or to the left, respectively.

Using the arrow keys

Pressing the arrow keys on the keyboard moves the focus in the direction of the arrows.

Using Home, End, Page Up and Page Down

- *Home* moves the focus to the start of a row.
- *End* moves the focus to the column furthest to the right that contains data.
- *Page Down* moves the display down one complete screen and *Page Up* moves the display up one complete screen.
- Combinations of *Control* (often represented on keyboards as *Ctrl*) and *Alt* with *Home*, *End*, *Page Down (PgDn)*, *Page Up (PgUp)*, and the arrow keys move the focus of the current cell in other ways. Table 1 describes the keyboard shortcuts for moving about a spreadsheet.

Tip

Use one of the four *Alt+Arrow* key combinations to resize the height or width of a cell. (For example: *Alt+↓* increases the height of a cell.)

Table 1. Moving from cell to cell using the keyboard

Key Combination	Movement
→	Right one cell
←	Left one cell
↑	Up one cell
↓	Down one cell
<i>Control+→</i>	To the next column to the right containing data in that row or to Column AMJ
<i>Control+←</i>	To the next column to the left containing data in that row or to Column A
<i>Control+↑</i>	To the next row above containing data in that column or to Row 1
<i>Control+↓</i>	To the next row below containing data in that column or to Row 65536
<i>Control+Home</i>	To Cell A1
<i>Control+End</i>	To lower right-hand corner of the rectangular area containing data
<i>Alt+Page Downn</i>	One screen to the right (if possible)
<i>Alt+Page Up</i>	One screen to the left (if possible)
<i>Control+Page Down</i>	One sheet to the right (in sheet tabs)
<i>Control+Page Up</i>	One sheet to the left (in sheet tabs)
<i>Tab</i>	To the next cell on the right

Key Combination	Movement
<i>Shift+Tab</i>	To the next cell on the left
<i>Enter</i>	Down one cell (unless changed by user)
<i>Shift+Enter</i>	Up one cell (unless changed by user)

Customizing the effect of the Enter key

You can customize the direction in which the *Enter* key moves the focus, by selecting **Tools** → **Options** → **LibreOffice Calc** → **General**.

The four choices for the direction of the *Enter* key are shown on the right hand side of Figure 20. It can move the focus down, right, up, or left. Depending on the file being used or on the type of data being entered, setting a different direction can be useful.

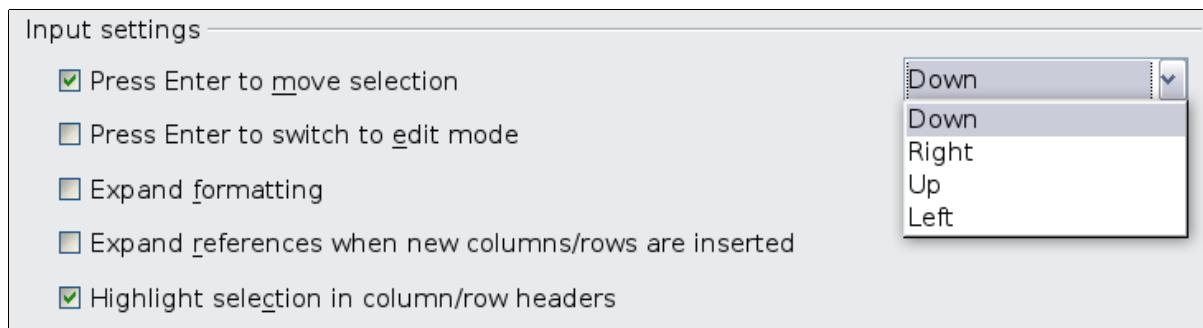


Figure 20: Customizing the effect of the *Enter* key

The *Enter* key can also be used to switch into and out of the editing mode. Use the first two options under *Input settings* in Figure 20 to change the *Enter* key settings.

Moving from sheet to sheet

Each sheet in a spreadsheet is independent of the others, though they can be linked with references from one sheet to another. There are three ways to navigate between different sheets in a spreadsheet.

Using the keyboard

Pressing *Control+Page Down* moves one sheet to the right and pressing *Control+Page Up* moves one sheet to the left.

Using the mouse

Clicking on one of the sheet tabs at the bottom of the spreadsheet selects that sheet.

If you have a lot of sheets, then some of the sheet tabs may be hidden behind the horizontal scroll bar at the bottom of the screen. If this is the case, then the four buttons at the left of the sheet tabs can move the tabs into view. Figure 21 shows how to do this.

Notice that the sheets here are not numbered in order. Sheet numbering is arbitrary; you can name a sheet as you wish.

Note

The sheet tab arrows that appear in Figure 21 only appear if you have some sheet tabs that can not be seen. Otherwise, they appear faded as in Figure 1.

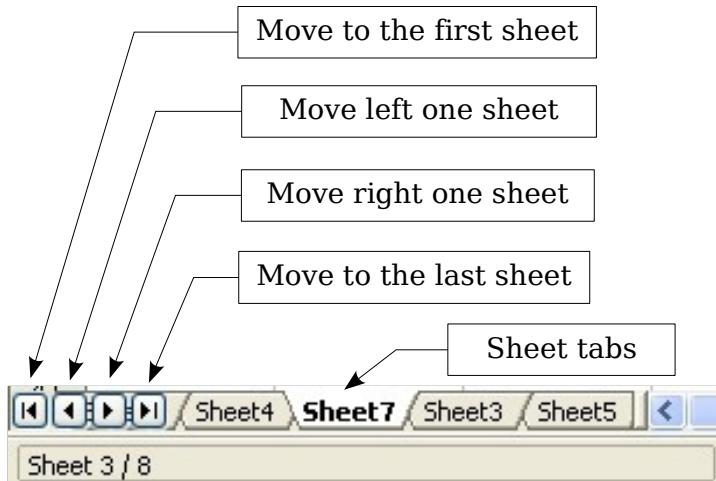


Figure 21. Sheet tab arrows

Selecting items in a sheet or spreadsheet

Selecting cells

Cells can be selected in a variety of combinations and quantities.

Single cell

Left-click in the cell. The result will look like the left side of Figure 19. You can verify your selection by looking in the Name Box.

Range of contiguous cells

A range of cells can be selected using the keyboard or the mouse.

To select a range of cells by dragging the mouse:

- 1) Click in a cell.
- 2) Press and hold down the left mouse button.
- 3) Move the mouse around the screen.
- 4) Once the desired block of cells is highlighted, release the left mouse button.

To select a range of cells without dragging the mouse:

- 1) Click in the cell which is to be one corner of the range of cells.
- 2) Move the mouse to the opposite corner of the range of cells.
- 3) Hold down the *Shift* key and click.

Tip

You can also select a contiguous range of cells by first clicking in the STD field on the status bar and changing it to EXT, before clicking in the opposite corner of the range of cells in step 3 above. If you use this method, be sure to change EXT back to STD or you may find yourself extending the selection unintentionally.

To select a range of cells without using the mouse:

- 1) Select the cell that will be one of the corners in the range of cells.
- 2) While holding down the *Shift* key, use the cursor arrows to select the rest of the range.

The result of any of these methods looks like the right side of Figure 19.

Tip

You can also directly select a range of cells using the Name Box. Click into the Name Box as described in “Using a cell reference” on page 25. To select a range of cells, enter the cell reference for the upper left-hand cell, followed by a colon (:), and then the lower right-hand cell reference. For example, to select the range that would go from A3 to C6, you would enter A3:C6.

Range of noncontiguous cells

- 1) Select the cell or range of cells using one of the methods above.
- 2) Move the mouse pointer to the start of the next range or single cell.
- 3) Hold down the *Control* key and click or click-and-drag to select another range of cells to add to the first range.
- 4) Repeat as necessary.

Tip

You can also select a noncontiguous range of cells by first clicking twice in the STD field on the status bar to change it to ADD, before clicking on a cell that you want to add to the range of cells in step 3 above. This method works best when adding single cells to a range. If you use this method, be sure to change ADD back to STD or you may find yourself adding more selections unintentionally.

Selecting columns and rows

Entire columns and rows can be selected very quickly in LibreOffice.

Single column or row

To select a single column, click on the column identifier letter (see Figure 1).

To select a single row, click on the row identifier number.

Multiple columns or rows

To select multiple columns or rows that are contiguous:

- 1) Click on the first column or row in the group.
- 2) Hold down the *Shift* key.
- 3) Click the last column or row in the group.

To select multiple columns or rows that are not contiguous:

- 1) Click on the first column or row in the group.
- 2) Hold down the *Control* key.
- 3) Click on all of the subsequent columns or rows while holding down the *Control* key.

Entire sheet

To select the entire sheet, click on the small box between the A column header and the 1 row header.

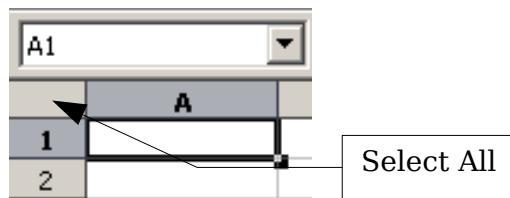


Figure 22. Select All box

You can also press *Control+A* to select the entire sheet.

Selecting sheets

You can select either one or multiple sheets. It can be advantageous to select multiple sheets at times when you want to make changes to many sheets at once.

Single sheet

Click on the sheet tab for the sheet you want to select. The active sheet becomes white (see Figure 21).

Multiple contiguous sheets

To select multiple contiguous sheets:

- 1) Click on the sheet tab for the first desired sheet.
- 2) Move the mouse pointer over the sheet tab for the last desired sheet.
- 3) Hold down the *Shift* key and click on the sheet tab.

All the tabs between these two sheets will turn white. Any actions that you perform will now affect all highlighted sheets.

Multiple noncontiguous sheets

To select multiple noncontiguous sheets:

- 1) Click on the sheet tab for the first desired sheet.
- 2) Move the mouse pointer over the sheet tab for the second desired sheet.
- 3) Hold down the *Control* key and click on the sheet tab.
- 4) Repeat as necessary.

The selected tabs will turn white. Any actions that you perform will now affect all highlighted sheets.

All sheets

Right-click any one of the sheet tabs and choose **Select All Sheets** from the context menu.

Working with columns and rows

Inserting columns and rows

Columns and rows can be inserted individually or in groups.

Note

When you insert a single new column, it is inserted to the *left* of the highlighted column. When you insert a single new row, it is inserted *above* the highlighted row. Cells in the new columns or rows are formatted like the corresponding cells in the column or row before (or to the left of) which the new column or row is inserted.

Single column or row

Using the **Insert** menu:

- 1) Select the cell, column, or row where you want the new column or row inserted.
- 2) Choose either **Insert → Columns** or **Insert → Rows**.

Using the mouse:

- 1) Select the cell, column, or row where you want the new column or row inserted.
- 2) Right-click the header of the column or row.
- 3) Choose **Insert Rows** or **Insert Columns**.

Multiple columns or rows

Multiple columns or rows can be inserted at once rather than inserting them one at a time.

- 1) Highlight the required number of columns or rows by holding down the left mouse button on the first one and then dragging across the required number of identifiers.
- 2) Proceed as for inserting a single column or row above.

Deleting columns and rows

Columns and rows can be deleted individually or in groups.

Single column or row

A single column or row can be deleted by using the mouse:

- 1) Select the column or row to be deleted.
- 2) Choose **Edit → Delete Cells** from the menu bar.

Or,

- 1) Right-click on the column or row header.
- 2) Choose **Delete Columns** or **Delete Rows** from the context menu.

Multiple columns or rows

Multiple columns or rows can be deleted at once rather than deleting them one at a time.

- 1) Highlight the required columns or rows by holding down the left mouse button on the first one and then dragging across the required number of identifiers.
- 2) Proceed as for deleting a single column or row above.

Tip

Instead of deleting a row or column, you may wish to delete the contents of the cells but keep the empty row or column. See Chapter 2, Entering, Editing, and Formatting Data, for instructions.

Working with sheets

Like any other Calc element, sheets can be inserted, deleted, and renamed.

Inserting new sheets

There are several ways to insert a new sheet. The fastest method is to click on the Add Sheet button . This inserts one new sheet at that point, without opening the Insert Sheet dialog.

Use one of the other methods to insert more than one sheet, to rename the sheet at the same time, or to insert the sheet somewhere else in the sequence. The first step for all of the methods is to select the sheets that the new sheet will be inserted next to. Then use any of the following options.

- Choose **Insert → Sheet** from the menu bar.
- Right-click on the sheet tab and choose **Insert Sheet**.
- Click in an empty space at the end of the line of sheet tabs.

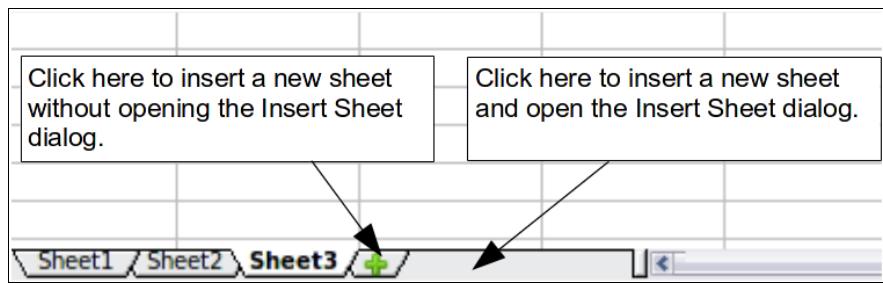


Figure 23. Creating a new sheet

Each method will open the Insert Sheet dialog (Figure 24). Here you can select whether the new sheet is to go before or after the selected sheet and how many sheets you want to insert. If you are inserting only one sheet, there is the opportunity to give the sheet a name.

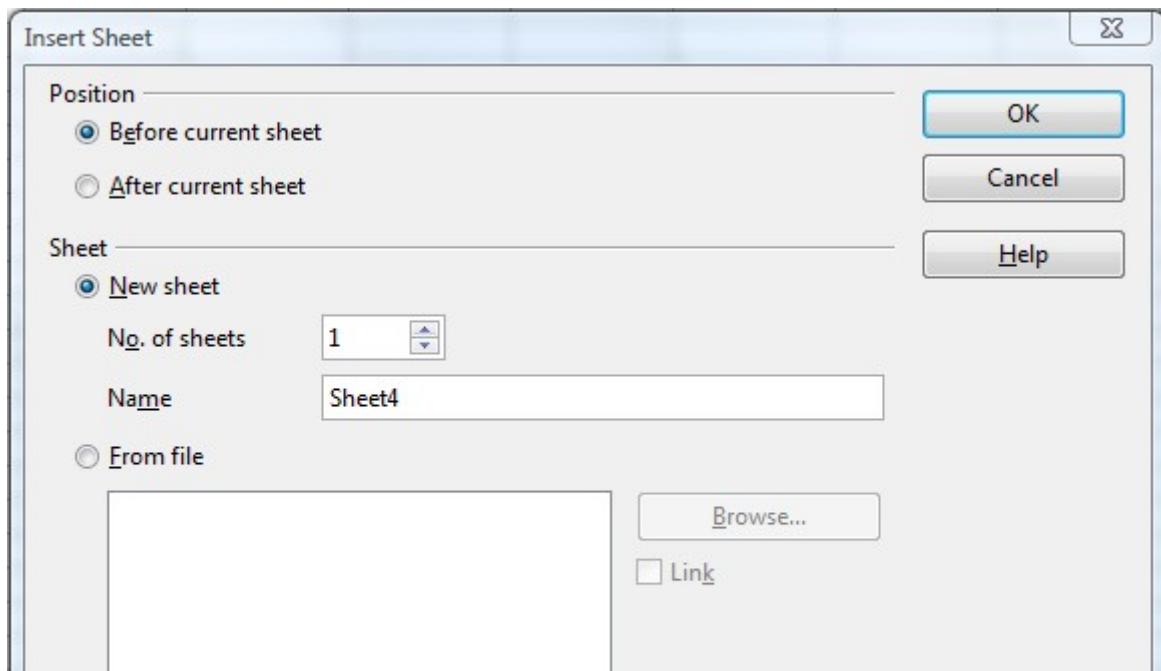


Figure 24: Insert Sheet dialog

Deleting sheets

Sheets can be deleted individually or in groups.

Single sheet

Right-click on the tab of the sheet you want to delete and choose **Delete Sheet** from the pop-up menu, or choose **Edit → Sheet → Delete** from the Menu bar. Either way, an alert will ask if you want to delete the sheet permanently. Click **Yes**.

Multiple sheets

To delete multiple sheets, select them as described earlier, then either right-click over one of the tabs and choose **Delete Sheet** from the context menu, or choose **Edit → Sheet → Delete** from the Menu bar.

Renaming sheets

The default name for a new sheet is *SheetX*, where *X* is a number. While this works for a small spreadsheet with only a few sheets, it becomes awkward when there are many sheets.

To give a sheet a more meaningful name, you can:

- Enter the name in the Name box when you create the sheet, or
- Right-click on a sheet tab and choose **Rename Sheet** from the context menu; replace the existing name with a different one.
- Double-click on a sheet tab to pop up the Rename Sheet dialog.

Note

Sheet names must start with either a letter or a number; other characters including spaces are not allowed. Apart from the first character of the sheet name, allowed characters are letters, numbers, spaces, and the underscore character. Attempting to rename a sheet with an invalid name will produce an error message.

Viewing Calc

Using zoom

Use the zoom function to change the view to show more or fewer cells in the window.

In addition to using the Zoom slider on the Status bar (see page 17), you can open the Zoom dialog and make a selection on the left-hand side.

- Choose **View → Zoom** from the Menu bar, or
- Double-click on the percentage figure in the Status bar at the bottom of the window.

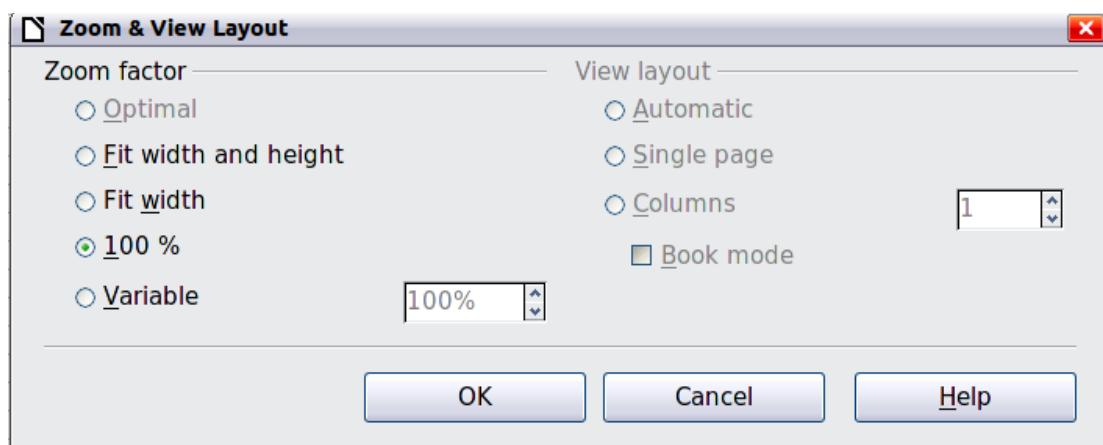


Figure 25. Zoom dialog

Optimal

Resizes the display to fit the width of the selected cells. To use this option, you must first highlight a range of cells.

Fit Width and Height

Displays the entire page on your screen.

Fit Width

Displays the complete width of the document page. The top and bottom edges of the page may not be visible.

100%

Displays the document at its actual size.

Variable

Enter a zoom percentage of your choice.

Freezing rows and columns

Freezing locks a number of rows at the top of a spreadsheet or a number of columns on the left of a spreadsheet or both. Then when scrolling around within the sheet, any frozen columns and rows remain in view.

Figure 26 shows some frozen rows and columns. The heavier horizontal line between rows 3 and 14 and the heavier vertical line between columns C and H denote the frozen areas. Rows 4 through 13 and columns D through G have been scrolled off the page. The first three rows and columns remained because they are frozen into place.

You can set the freeze point at one row, one column, or both a row and a column as in Figure 26.

Freezing single rows or columns

- 1) Click on the header for the row below where you want the freeze or for the column to the right of where you want the freeze.
- 2) Choose **Window → Freeze**.

A dark line appears, indicating where the freeze is put.

	A	B	C	H	I	J	K	L	M	N	O	P	Q	R	S	T
1				Safety Poster	Safety Contract	Safety Quiz 2	Unit Conv. Pop Qu	Element Quiz 1	Element Quiz 2	p. 36 15 & 16	Article Quiz	Lab #1	Chp. 1.1 #1-7	p. 35 ?'s	Chp. 1 Test	Penny Density
2		Total	Date	10-02	10-03	10-04	10-05	10-06	10-07	10-08	10-09	10-10	10-11	10-12	10-13	10-14
3	Average	267.5	Possible	28.0	1.0	3.0	12.0	18.0	28.0	4.0	6.0	6.0	3.5	4.0	78.0	11.0
14	78.6%	200.0	Smith, John	28.00	1.00	X	0.00	8.00	26.00	0.00	6.00	0.00	3.50	4.00	55.50	8.00
15	67.9%	181.5	Klein, Mike	28.00	1.00	1.00	11.50	8.00	6.00	0.00	5.00	6.00	3.50	3.50	47.50	10.00
16	72.7%	186.5	Johnson, Tom	27.00	1.00	3.00	0.00	13.00	6.00	0.00	6.00	6.00	3.50	3.00	47.50	9.00
17	82.6%	213.0	Doe, John	27.00	1.00	1.00	2.00	17.00	17.00	4.00	6.00	6.00	3.50	3.50	54.00	9.00
18	96.4%	258.0	Doe, Jane	28.00	1.00	3.00	9.00	16.00	28.00	4.00	6.00	6.00	3.50	4.00	79.50	10.00
19	67.3%	172.0	Kupfer, Peter	26.00	1.00	3.00	X	16.00	20.00	0.00	6.00	6.00	0.00	3.50	41.00	6.50
20	83.9%	224.5	Newton, Issac	28.00	1.00	3.00	6.00	15.00	23.00	4.00	6.00	6.00	3.50	3.50	57.50	9.00
21	80.6%	207.5	Lunak, Robert	26.00	0.00	2.00	5.00	15.00	17.00	4.00	6.00	6.00	3.50	0.00	62.50	9.00
22	78.1%	209.0	Matteson, Brittany	28.00	0.00	3.00	3.00	17.00	22.00	4.00	6.00	6.00	3.50	3.00	47.50	9.00
23	79.4%	212.5	Murphy, Kathleen	26.00	1.00	3.00	6.00	16.00	11.00	4.00	6.00	6.00	3.50	4.00	53.50	9.00

Figure 26. Frozen rows and columns

Freezing a row and a column

- 1) Click into the cell that is immediately below the row you want frozen and immediately to the right of the column you want frozen.
- 2) Choose **Window → Freeze**.

Two lines appear on the screen, a horizontal line above this cell and a vertical line to the left of this cell. Now as you scroll around the screen, everything above and to the left of these lines will remain in view.

Unfreezing

To unfreeze rows or columns, choose **Window → Freeze**. The check mark by **Freeze** will vanish.

Splitting the screen

Another way to change the view is by splitting the window, also known as splitting the screen. The screen can be split horizontally, vertically, or both. You can therefore have up to four portions of the spreadsheet in view at any one time.

Why would you want to do this? An example would be a large spreadsheet in which one of the cells has a number in it that is used by three formulas in other cells. Using the split-screen technique, you can position the cell containing the number in one section and each of the cells with formulas in the other sections. Then you can change the number in the cell and watch how it affects each of the formulas.

	A	B	C
1		Beta =	3.2000
2		A0 =	0.1000
5	A1= Beta*A0*(1-A0)	0.2880	
6	A2= Beta*A1*(1-A1)	0.6562	
7	A3= Beta*A2*(1-A2)	0.7219	
8	A4= Beta*A3*(1-A3)	0.6424	
9	A5= Beta*A4*(1-A4)	0.7351	
10	A6= Beta*A5*(1-A5)	0.6231	
11	A7= Beta*A6*(1-A6)	0.7515	
12	A8= Beta*A7*(1-A7)	0.5975	
13	A9= Beta*A8*(1-A8)	0.7696	
14	A10= Beta*A9*(1-A9)	0.5675	
15	A11= Beta*A10*(1-A10)	0.7854	
16	A12= Beta*A11*(1-A11)	0.5393	
17	A13= Beta*A12*(1-A12)	0.7951	
18			

Figure 27. Split screen example

Splitting the screen horizontally

To split the screen horizontally:

- 1) Move the mouse pointer into the vertical scroll bar, on the right-hand side of the screen, and place it over the small button at the top with the black triangle.

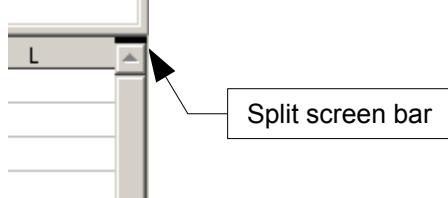


Figure 28. Split screen bar on vertical scroll bar

- 2) Immediately above this button, you will see a thick black line (Figure 28). Move the mouse pointer over this line, and it turns into a line with two arrows (Figure 29).

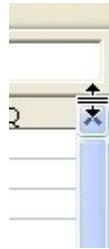


Figure 29. Split-screen bar on vertical scroll bar with cursor

- 3) Hold down the left mouse button. A gray line appears, running across the page. Drag the mouse downwards and this line follows.
- 4) Release the mouse button and the screen splits into two views, each with its own vertical scroll bar. You can scroll the upper and lower parts independently.

Notice in Figure 27, the Beta and the A0 values are in the upper part of the window and other calculations are in the lower part. Thus, you can make changes to the Beta and A0 values and watch their effects on the calculations in the lower half of the window.

Tip

You can also split the screen using a menu command. Click in a cell immediately below and to the right of where you wish the screen to be split, and choose **Window → Split**.

Splitting the screen vertically

To split the screen vertically:

- 1) Move the mouse pointer into the horizontal scroll bar at the bottom of the screen and place it over the small button on the right with the black triangle.

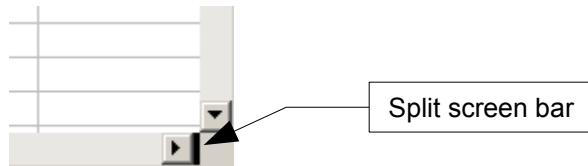


Figure 30: Split bar on horizontal scroll bar

- 2) Immediately to the right of this button is a thick black line (Figure 30). Move the mouse pointer over this line and it turns into a line with two arrows.
- 3) Hold down the left mouse button, and a gray line appears, running up the page. Drag the mouse to the left and this line follows.
- 4) Release the mouse button, and the screen is split into two views, each with its own horizontal scroll bar. You can scroll the left and right parts of the window independently.

Removing split views

To remove a split view, do any of the following:

- Double-click on each split line.
- Click on and drag the split lines back to their places at the ends of the scroll bars.
- Choose **Window → Split** to remove all split lines at the same time.

Using the Navigator

In addition to the cell reference boxes (labeled Column and Row), the Navigator provides several other ways to move quickly through a spreadsheet and find specific items.

To open the Navigator, click its icon on the Standard toolbar, or press **F5**, or choose **View → Navigator** on the Menu bar, or double-click on the Sheet Sequence Number in the Status Bar. You can dock the Navigator to either side of the main Calc window or leave it floating. (To dock or float the Navigator, hold down the **Control** key and double-click in an empty area near the icons at the top.)

The Navigator displays lists of all the objects in a spreadsheet document, grouped into categories. If an indicator (plus sign or arrow) appears next to a category, at least one object of this kind exists. To open a category and see the list of items, click on the indicator.

To hide the list of categories and show only the icons at the top, click the **Contents** icon . Click this icon again to show the list.

Table 2 summarizes the functions of the icons at the top of the Navigator.

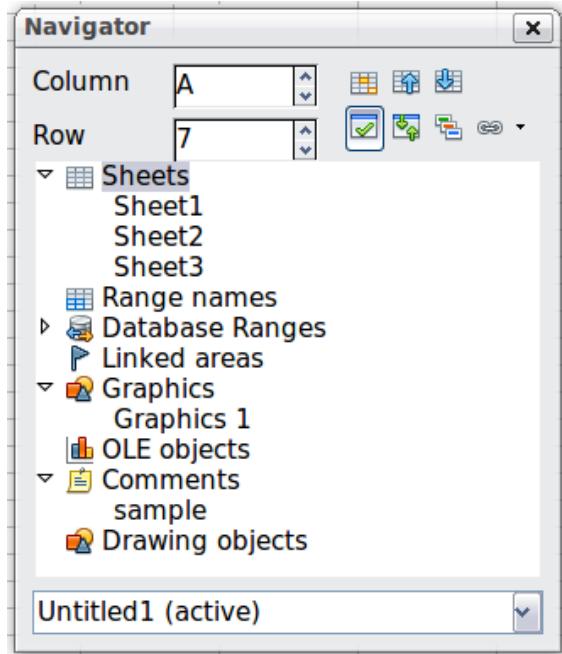


Figure 31: The Navigator in Calc

Table 2: Function of icons in the Navigator

Icon	Action
	Data Range. Specifies the current data range denoted by the position of the cell cursor.
	Start/End. Moves to the cell at the beginning or end of the current data range, which you can highlight using the Data Range button.
	Contents. Shows or hides the list of categories.
	Toggle. Switches between showing all categories and showing only the selected category.
	Displays all available scenarios. Double-click a name to apply that scenario. See Chapter 9, Data Analysis, for more information.
	Drag Mode. Choose hyperlink, link, or copy. See “Choosing a drag mode” for details.

Moving quickly through a document

The Navigator provides several convenient ways to move around a document and find items in it:

- To jump to a specific cell in the current sheet, type its cell reference in the Column and Row boxes at the top of the Navigator and press the *Enter* key; for example, in Figure 31 the cell reference is A7.
- When a category is showing the list of objects in it, double-click on an object to jump directly to that object's location in the document.
- To see the content in only one category, highlight that category and click the **Toggle** icon. Click the icon again to display all the categories.
- Use the **Start** and **End** icons to jump to the first or last cell in the selected data range.

Tip

Ranges, scenarios, pictures, and other objects are much easier to find if you have given them informative names when creating them, instead of keeping Calc's default Graphics 1, Graphics 2, Object 1, and so on, which may not correspond to the position of the object in the document.

Choosing a drag mode

Sets the drag and drop options for inserting items into a document using the Navigator.

Insert as Hyperlink

Creates a hyperlink when you drag and drop an item into the current document.

Insert as Link

Inserts the selected item as a link where you drag and drop an object into the current document.

Insert as Copy

Inserts a copy of the selected item where you drag and drop in the current document. You cannot drag and drop copies of graphics, OLE objects, or indexes.

Using document properties

To open the Properties dialog for a document, choose **File → Properties**.

The Properties dialog has six tabs. The information on the *General* page and the *Statistics* page is generated by the program. Other information (the name of the person on the Created and Modified lines of the *General* page) is derived from the User Data page in **Tools → Options**.

The *Internet* page is relevant only to HTML documents. The file sharing options on the *Security* page are discussed elsewhere in this book.

Use the *Description* and *Custom Properties* pages to hold:

- Metadata to assist in classifying, sorting, storing, and retrieving documents. Some of this metadata is exported to the closest equivalent in HTML and PDF; some fields have no equivalent and are not exported.
- Information that changes. You can store data for use in fields in your document; for example, the title of the document, contact information for a project participant, or the name of a product might change during the course of a project.

This dialog can be used in a template, where the field names can serve as reminders to users of information they need to include.

You can return to this dialog at any time and change the information you entered. When you do so, all of the references to that information will change wherever they appear in the document. For example, on the *Description* page (Figure 32) you might need to change the contents of the *Title* field from the draft title to the final title.

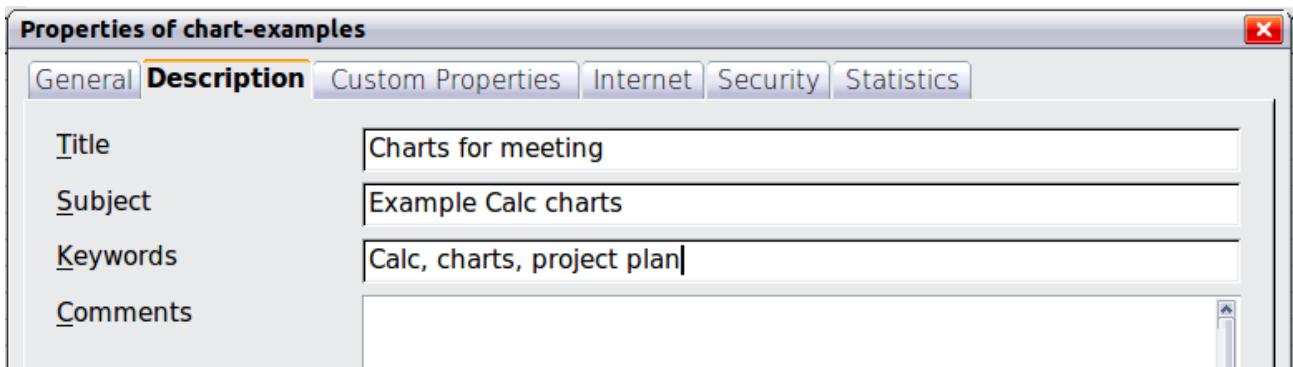


Figure 32: The Description page of the document's Properties dialog

Use the *Custom Properties* page (Figure 33) to store information that does not fit into the fields supplied on the other pages of this dialog box.

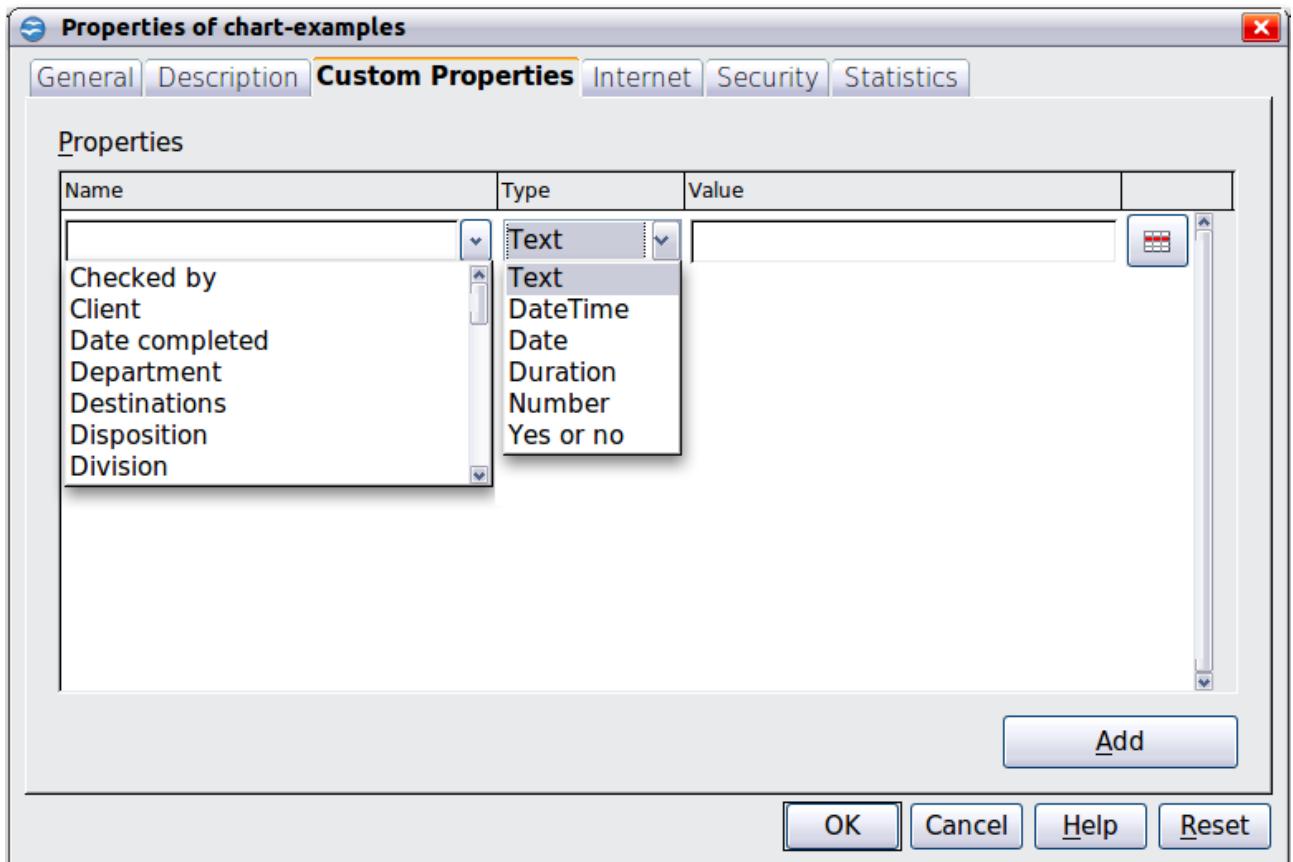


Figure 33: Custom Properties page, showing drop-down lists of names and types

When the Custom Properties page is first opened in a new document, it may be blank. However, if the new document is based on a template, this page may contain fields.

Click **Add** to insert a row of boxes into which you can enter your custom properties.

- The *Name* box includes a drop-down list of typical choices; scroll down to see all the choices. If none of the choices meet your needs, you can type a new name into the box.
- In the *Type* column, you can choose from text, date+time, date, number, duration, or yes/no for each field. You cannot create new types.
- In the *Value* column, type or select what you want to appear in the document where this field is used. Choices may be limited to specific data types depending on the selection in

the Type column; for example, if the Type selection is Date, the Value for that property is limited to a date.

To remove a custom property, click the button at the end of the row.

Tip

To change the format of the Date value, go to **Tools** → **Options** → **Languages** and change the Locale setting. Be careful! This change affects all open documents, not just the current one.



LibreOffice
The Document Foundation

Chapter 2

Entering, Editing, and Formatting Data

Introduction

You can enter data into Calc in several ways: using the keyboard, the mouse (dragging and dropping), the Fill tool, and selection lists. Calc also provides the ability to enter information into multiple sheets of the same document at the same time.

After entering data, you can format and display it in various ways.

Entering data using the keyboard

Most data entry in Calc can be accomplished using the keyboard.

Entering numbers

Click in the cell and type in the number using the number keys on either the main keyboard or the numeric keypad.

To enter a negative number, either type a minus (–) sign in front of it or enclose it in parentheses (brackets), like this: **(1234)**.

By default, numbers are right-aligned and negative numbers have a leading minus symbol.

Entering text

Click in the cell and type the text. Text is left-aligned by default.

Entering numbers as text

If a number is entered in the format **01481**, Calc will drop the leading 0. (Exception: see Tip below.) To preserve the leading zero, for example for telephone area codes, type an apostrophe before the number, like this: **'01481**.

The data is now treated as text and displayed exactly as entered. Typically, formulas will treat the entry as a zero and functions will ignore it.

Tip

Numbers can have leading zeros and still be regarded as numbers (as opposed to text) if the cell is formatted appropriately. Right-click on the cell and chose **Format Cells → Numbers**. Adjust the *Leading zeros* setting to add leading zeros to numbers.

Note

When a plain apostrophe is used to allow a leading 0 to be displayed, it is not visible in the cell after the *Enter* key is pressed. If “smart quotes” are used for apostrophes, the apostrophe remains visible in the cell.

To choose this type of apostrophe, use **Tools → AutoCorrect Options → Localized Options**. Select the **Replace** option for apostrophes to activate this function. The selection of the apostrophe type affects both Calc and Writer.

Caution



When a number is formatted as text, take care that the cell containing the number is not used in a formula because Calc will ignore the value.

Entering dates and times

Select the cell and type the date or time. You can separate the date elements with a slash (/) or a hyphen (–) or use text such as 10 Oct 03. Calc recognizes a variety of date formats. You can separate time elements with colons such as 10:43:45.

Entering special characters

A “special” character is one not found on a standard English keyboard. For example, © ¾ æ ç ñ ö ø ¢ are all special characters. To insert a special character:

- 1) Place the cursor in your document where you want the character to appear.
- 2) Click **Insert → Special Character** to open the Special Characters dialog (Figure 34).
- 3) Select the characters (from any font or mixture of fonts) you wish to insert, in order; then click **OK**. The selected characters are shown in the bottom left of the dialog. As you select each character, it is shown alone at the bottom right, along with the numerical code for that character.

Note

Different fonts include different special characters. If you do not find a particular special character you want, try changing the *Font* selection.

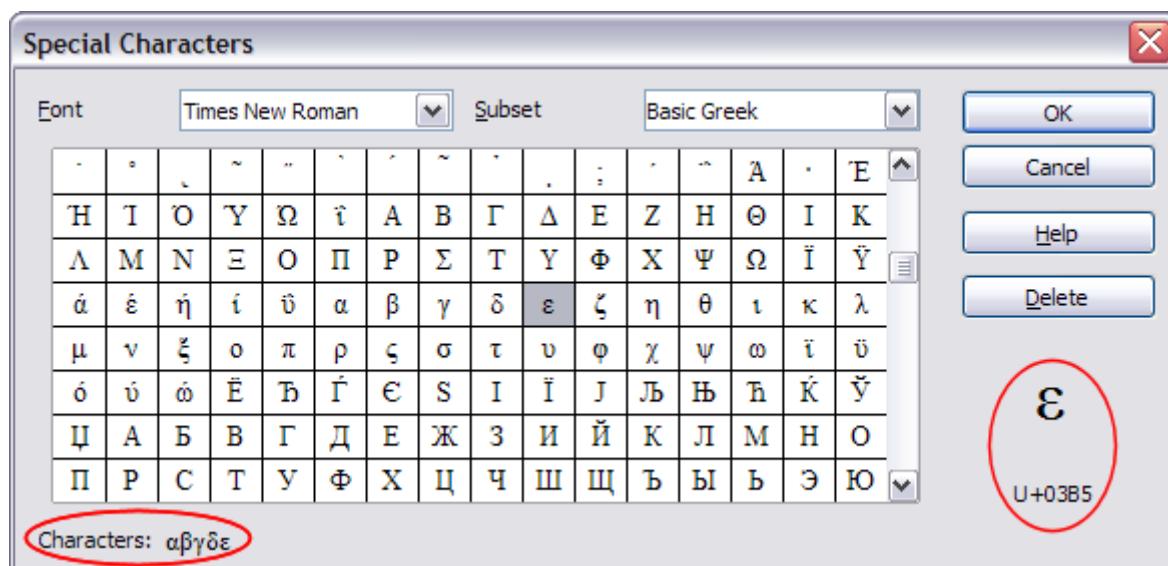


Figure 34: The Special Characters dialog

Inserting dashes

To enter en and em dashes, you can use the *Replace dashes* option under **Tools → AutoCorrect Options → Options tab**. This option replaces two hyphens, under certain conditions, with the corresponding dash.

In the following table, the A and B represent text consisting of letters A to z or digits 0 to 9.

Text that you type:	Result
A - B (A, space, hyphen, space, B)	A – B (A, space, en-dash, space, B)
A -- B (A, space, hyphen, hyphen, space, B)	A – B (A, space, en-dash, space, B)
A--B (A, hyphen, hyphen, B)	A—B (A, em-dash, B)
A-B (A, hyphen, B)	A-B (unchanged)
A -B (A, space, hyphen, B)	A -B (unchanged)
A --B (A, space, hyphen, hyphen, B)	A –B (A, space, en-dash, B)

Deactivating automatic changes

Calc automatically applies many changes during data input, unless you deactivate those changes. You can also immediately undo any automatic changes with *Ctrl+Z*.

AutoCorrect changes

Automatic correction of typing errors, replacement of straight quotation marks by curly (custom) quotes, and starting cell content with an uppercase (capital) letter are controlled by **Tools** → **AutoCorrect Options**. Go to the *Options* or *Replace* tabs to deactivate any of the features that you do not want. On the *Replace* tab, you can also delete unwanted word pairs and add new ones as required.

AutoInput

When you are typing in a cell, Calc automatically suggests matching input found in the same column. To turn the AutoInput on and off, set or remove the check mark in front of **Tools** → **Cell Contents** → **AutoInput**.

Automatic date conversion

Calc automatically converts certain entries to dates. To ensure that an entry that looks like a date is interpreted as text, type an apostrophe at the beginning of the entry. The apostrophe is not displayed in the cell.

Speeding up data entry

Entering data into a spreadsheet can be very labor-intensive, but Calc provides several tools for removing some of the drudgery from input.

The most basic ability is to drop and drag the contents of one cell to another with a mouse. Many people also find AutoInput helpful. Calc also includes several other tools for automating input, especially of repetitive material. They include the Fill tool, selection lists, and the ability to input information into multiple sheets of the same document.

Using the Fill tool on cells

At its simplest, the Fill tool is a way to duplicate existing content. Start by selecting the cell to copy, then drag the mouse in any direction (or hold down the Shift key and click in the last cell you want to fill), and then choose **Edit** → **Fill** and the direction in which you want to copy: Up, Down, Left or Right.

Caution

Choices that are not available are grayed out, but you can still choose the opposite direction from what you intend, which could cause you to overwrite cells accidentally.

Tip

A shortcut way to fill cells is to grab the “handle” in the lower right-hand corner of the cell and drag it in the direction you want to fill. If the cell contains a number, the number will fill in series. If the cell contains text, the same text will fill in the direction you chose.

	A	B
1	Original	
2		
3		
4		
5		
6		
7		
8		
9		
10	Original	
11		
12		

	A	B
1	Original	
2	Original	
3	Original	
4	Original	
5	Original	
6	Original	
7	Original	
8	Original	
9	Original	
10	Original	
11		
12		

Figure 35: Using the Fill tool

Using a fill series

A more complex use of the Fill tool is to use a fill series. The default lists are for the full and abbreviated days of the week and the months of the year, but you can create your own lists as well.

To add a fill series to a spreadsheet, select the cells to fill, choose **Edit → Fill → Series**. In the Fill Series dialog, select **AutoFill** as the *Series type*, and enter as the *Start value* an item from any defined series. The selected cells then fill in the other items on the list sequentially, repeating from the top of the list when they reach the end of the list.

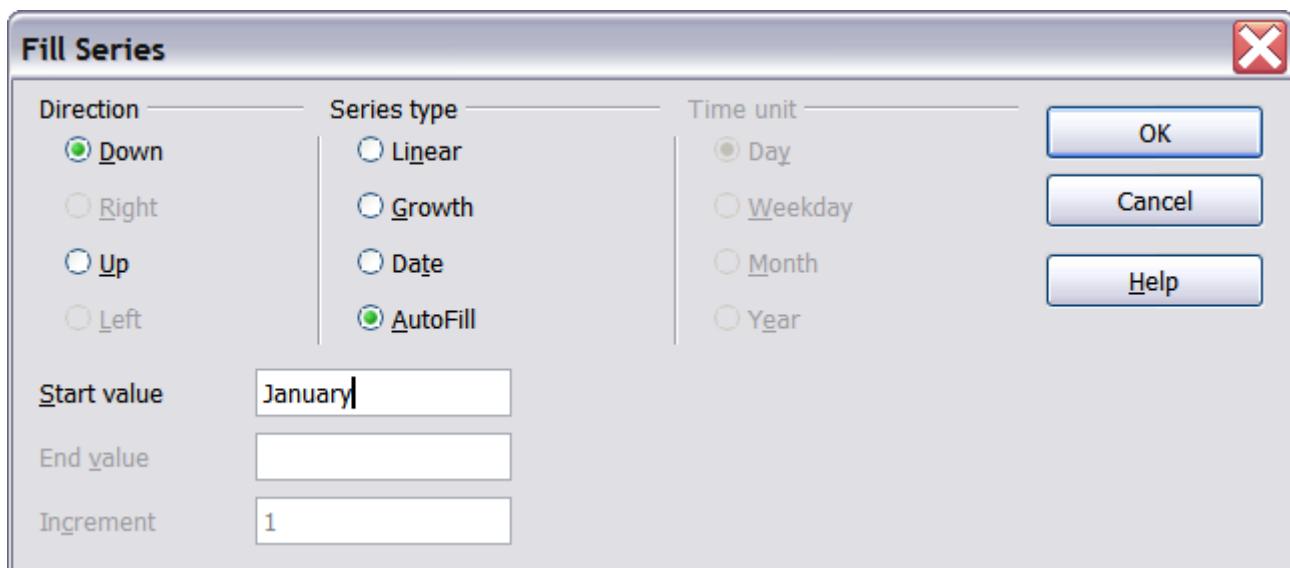


Figure 36: Specifying the start of a fill series (result is in Figure 37)

	A	B
1	January	
2	February	
3	March	
4	April	
5	May	
6	June	
7	July	
8	August	
9	September	
10	October	
11	November	
12	December	
13		

Figure 37: Result of fill series selection shown in Figure 36

You can also use **Edit → Fill → Series** to create a one-time fill series for numbers by entering the start and end values and the increment. For example, if you entered start and end values of 1 and 7 with an increment of 2, you would get the sequence of 1, 3, 5, 7.

In all these cases, the Fill tool creates only a momentary connection between the cells. Once they are filled, the cells have no further connection with one another.

Defining a fill series

To define your own fill series, go to **Tools → Options → LibreOffice Calc → Sort Lists**. This dialog shows the previously-defined series in the *Lists* box on the left, and the contents of the highlighted list in the *Entries* box.

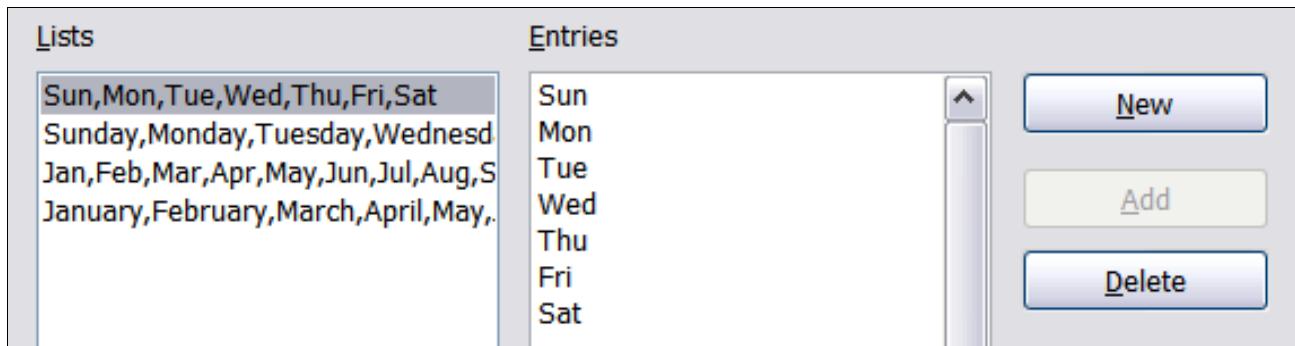


Figure 38: Predefined fill series

Click **New**. The *Entries* box is cleared. Type the series for the new list in the *Entries* box (one entry per line), and then click **Add**.

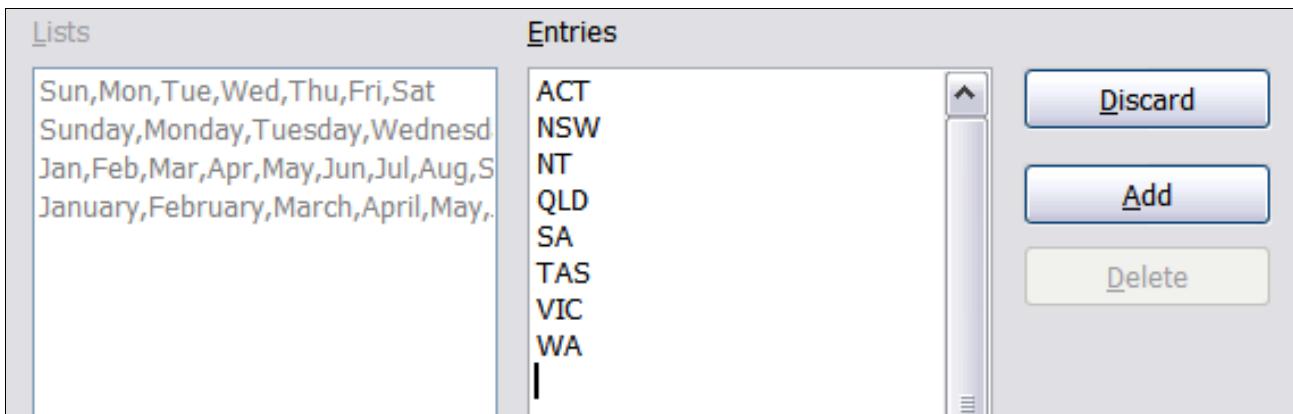


Figure 39: Defining a new fill series

Using selection lists

Selection lists are available only for text, and are limited to using only text that has already been entered in the same column.

To use a selection list, select a blank cell and press *Ctrl+D*. A drop-down list appears on any cell in the same column that either has at least one text character or whose format is defined as text. Click on the entry you require.

11	November
12	December
13	
14	
15	April
16	August
17	Decembe
18	February
19	January
20	July
21	June
22	March
23	May
24	November
25	October
26	
27	
28	
29	

Sharing content between sheets

You might want to enter the same information in the same cell on multiple sheets, for example to set up standard listings for a group of individuals or organizations. Instead of entering the list on each sheet individually, you can enter it in all the sheets at once. To do this, select all the sheets (**Edit → Sheet → Select**), then enter the information in the current one.

Caution



This technique overwrites any information that is already in the cells on the other sheets—without any warning. For this reason, when you are finished, be sure to deselect all the sheets except the one you want to edit. (*Ctrl+click* on a sheet tab to select or deselect the sheet.)

Validating cell contents

When creating spreadsheets for other people to use, you may want to make sure they enter data that is valid or appropriate for the cell. You can also use validation in your own work as a guide to entering data that is either complex or rarely used.

Fill series and selection lists can handle some types of data, but they are limited to predefined information. To validate new data entered by a user, select a cell and use **Data → Validity** to define the type of contents that can be entered in that cell. For example, a cell might require a date or a whole number, with no alphabetic characters or decimal points; or a cell may not be left empty.

Depending on how validation is set up, the tool can also define the range of values that can be entered and provide help messages that explain the content rules you have set up for the cell and what users should do when they enter invalid content. You can also set the cell to refuse invalid content, accept it with a warning, or—if you are especially well-organized—start a macro when an error is entered.

Validation is most useful for cells containing functions. If cells are set to accept invalid content with a warning, rather than refusing it, you can use **Tools → Detective → Mark Invalid Data** to find the cells with invalid data. The Detective function marks any cells containing invalid data with a circle.

Note that a validity rule is considered part of a cell's format. If you select **Format** or **Delete All** from the Delete Contents window, then it is removed. (Repeating the Detective's Mark Invalid Data command removes the invalid data circle, because the data is no longer invalid.) If you want to copy a validity rule with the rest of the cell, use **Edit → Paste Special → Paste Formats or Paste All**.

Figure 40 shows the choices for a typical validity test. Note the **Allow blank cells** option under the **Allow** list.

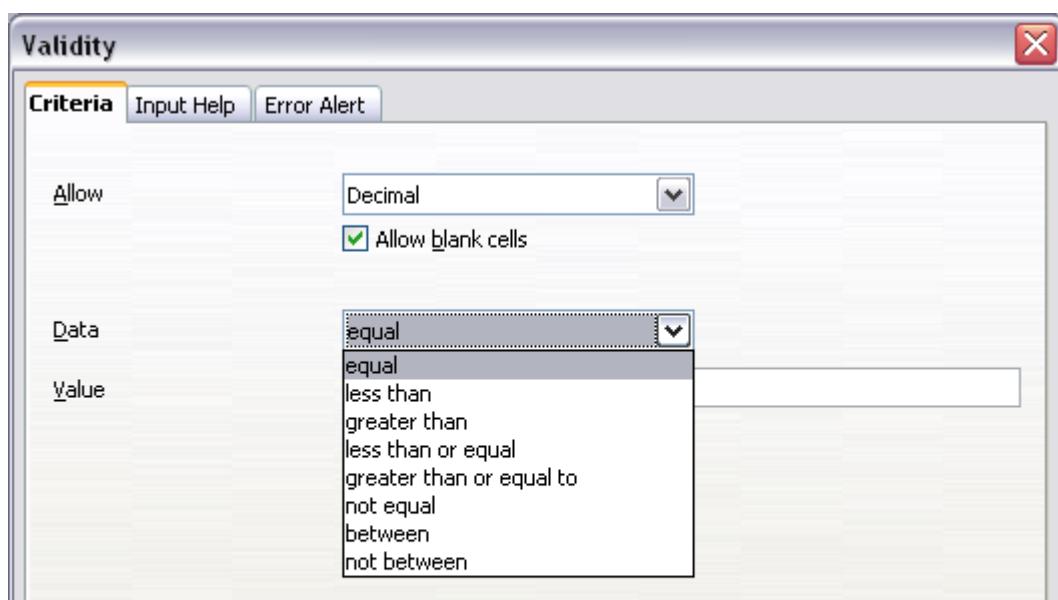


Figure 40: Typical validity test choices

The validity test options vary with the type of data selected from the *Allow* list. For example, Figure 41 shows the choices when a cell must contain a cell range.

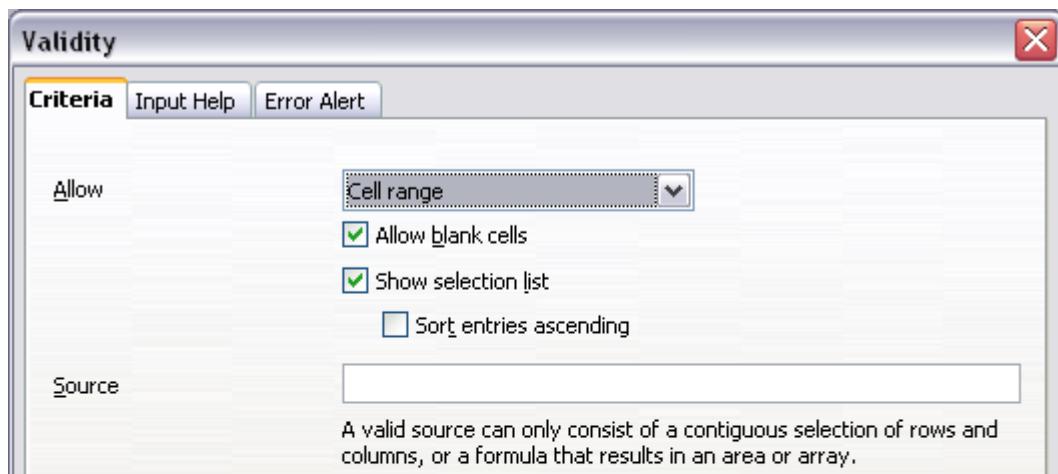


Figure 41: Validity choices for a cell range

To provide input help for a cell, use the Input Help page of the Validity dialog (Figure 42). To show an error message when an invalid value is entered, use the Error Alert page (Figure 43). Be sure to write something helpful, explaining what a valid entry should contain—not just “Invalid data—try again” or something similar.



Figure 42: Defining input help for a cell

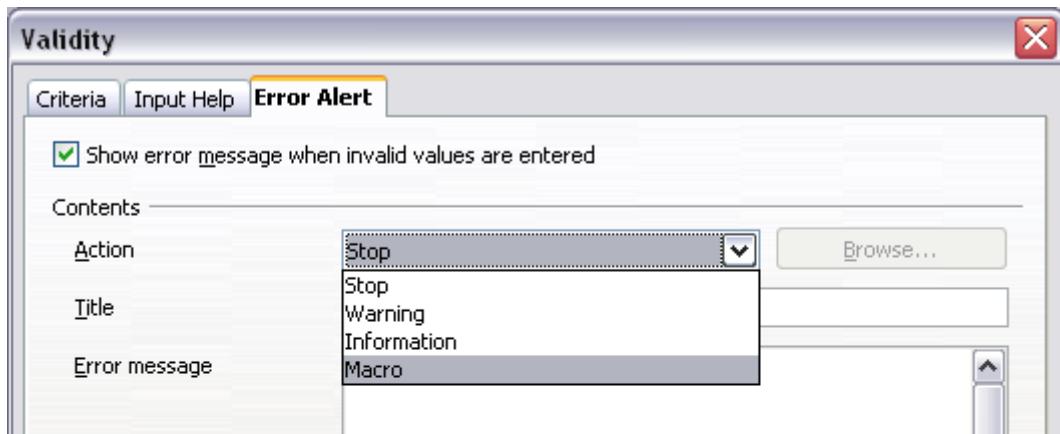


Figure 43: Defining an error message for a cell with invalid data

Editing data

Editing data is done in much the same way as entering it. The first step is to select the cell containing the data to be edited.

Removing data from a cell

Data can be removed (deleted) from a cell in several ways.

Removing data only

The data alone can be removed from a cell without removing any of the formatting of the cell. Click in the cell to select it, and then press the *Backspace* key.

Removing data and formatting

The data and the formatting can be removed from a cell at the same time. Press the *Delete* key (or right-click and choose **Delete Contents**, or use **Edit → Delete Contents**) to open the Delete Contents dialog (Figure 44). From this dialog, different aspects of the cell can be deleted. To delete everything in a cell (contents and format), check **Delete all**.

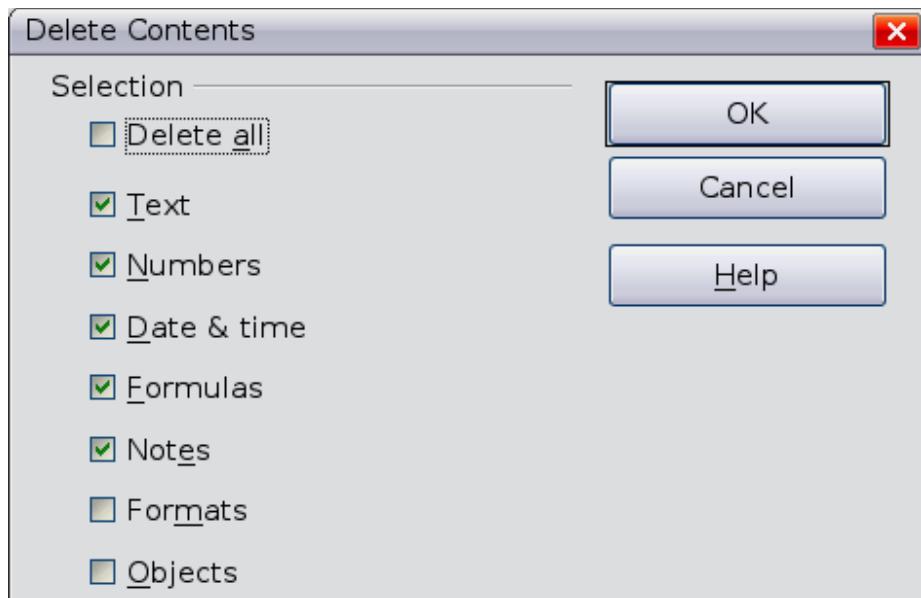


Figure 44: Delete Contents dialog

Replacing all the data in a cell

To remove data and insert new data, simply type over the old data. The new data will retain the original formatting.

Changing part of the data in a cell

Sometimes it is necessary to change the contents of a cell without removing all of the contents, for example when the phrase "See Dick run" is in a cell and it needs to be changed to "See Dick run fast." It is often useful to do this without deleting the old cell contents first.

The process is the similar to the one described above, but you need to place the cursor inside the cell. You can do this in two ways.

Using the keyboard

After selecting the appropriate cell, press the *F2* key and the cursor is placed at the end of the cell. Then use the keyboard arrow keys to move the cursor through the text in the cell.

Using the mouse

Using the mouse, either double-click on the appropriate cell (to select it and place the cursor in it for editing), or single-click to select the cell and then move the mouse pointer up to the input line and click into it to place the cursor for editing.

Formatting data

The data in Calc can be formatted in several ways. It can either be edited as part of a cell style so that it is automatically applied, or it can be applied manually to the cell. Some manual formatting can be applied using toolbar icons. For more control and extra options, select the appropriate cell or cells range, right-click on it, and select **Format Cells**. All of the format options are discussed below.

Note

All the settings discussed in this section can also be set as a part of the cell style. See Chapter 4, Using Styles and Templates, for more information.

Formatting multiple lines of text

Multiple lines of text can be entered into a single cell using automatic wrapping or manual line breaks. Each method is useful for different situations.

Using automatic wrapping

To set text to wrap at the end of the cell, right-click on the cell and select **Format Cells** (or choose **Format → Cells** from the menu bar, or press *Ctrl+1*). On the *Alignment* tab (Figure 46), under Properties, select **Wrap text automatically**. The results are shown below (Figure 45).

Figure 45: Automatic text wrap

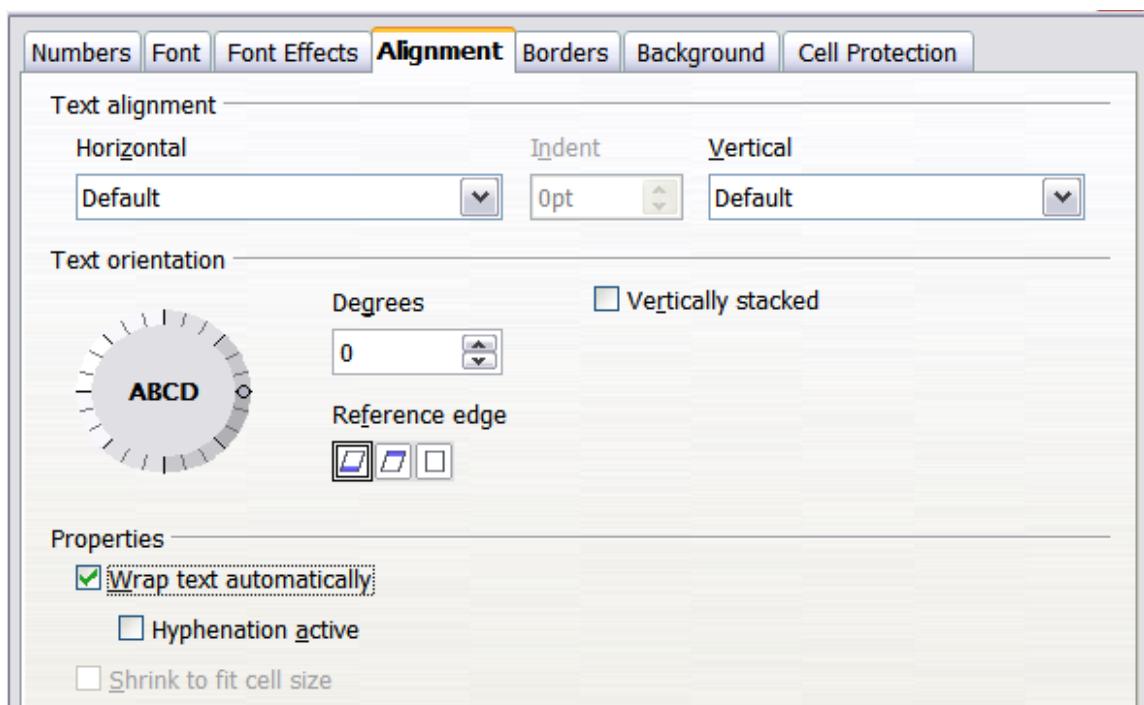


Figure 46: Format Cells → Alignment dialog

Using manual line breaks

To insert a manual line break while typing in a cell, press *Ctrl+Enter*. This method does not work with the cursor in the input line. When editing text, first double-click the cell, then single-click at the position where you want the line break.

When a manual line break is entered, the cell width does not change. Figure 47 shows the results of using two manual line breaks after the first line of text.

This line contains manual line breaks. Lines can be spaced out this way. Also, the cell width doesn't change but the text can go on.		
--	--	--

Figure 47: Cell with manual line breaks

Shrinking text to fit the cell

The font size of the data in a cell can automatically adjust to fit in a cell. To do this, select the **Shrink to fit cell** option in the Format Cells dialog (Figure 46). Figure 48 shows the results.

The quick brown fox jumps over the lazy dog.	The quick brown fox jumps over the lazy dog.	The quick brown fox jumps over the lazy dog.
--	--	--

Figure 48: Shrinking font size to fit cells

Formatting numbers

Several different number formats can be applied to cells by using icons on the Formatting toolbar. Select the cell, then click the relevant icon. Some icons may not be visible in a default setup; click the down-arrow at the end of the Formatting bar and select other icons to display.



Figure 49: Number format icons. Left to right: currency, percentage, date, exponential, standard, add decimal place, delete decimal place.

For more control or to select other number formats, use the *Numbers* tab (Figure 50) of the Format Cells dialog.

- Apply any of the data types in the Category list to the data.
- Control the number of decimal places and leading zeros.
- Enter a custom format code.

The Language setting controls the local settings for the different formats such as the date order and the currency marker.

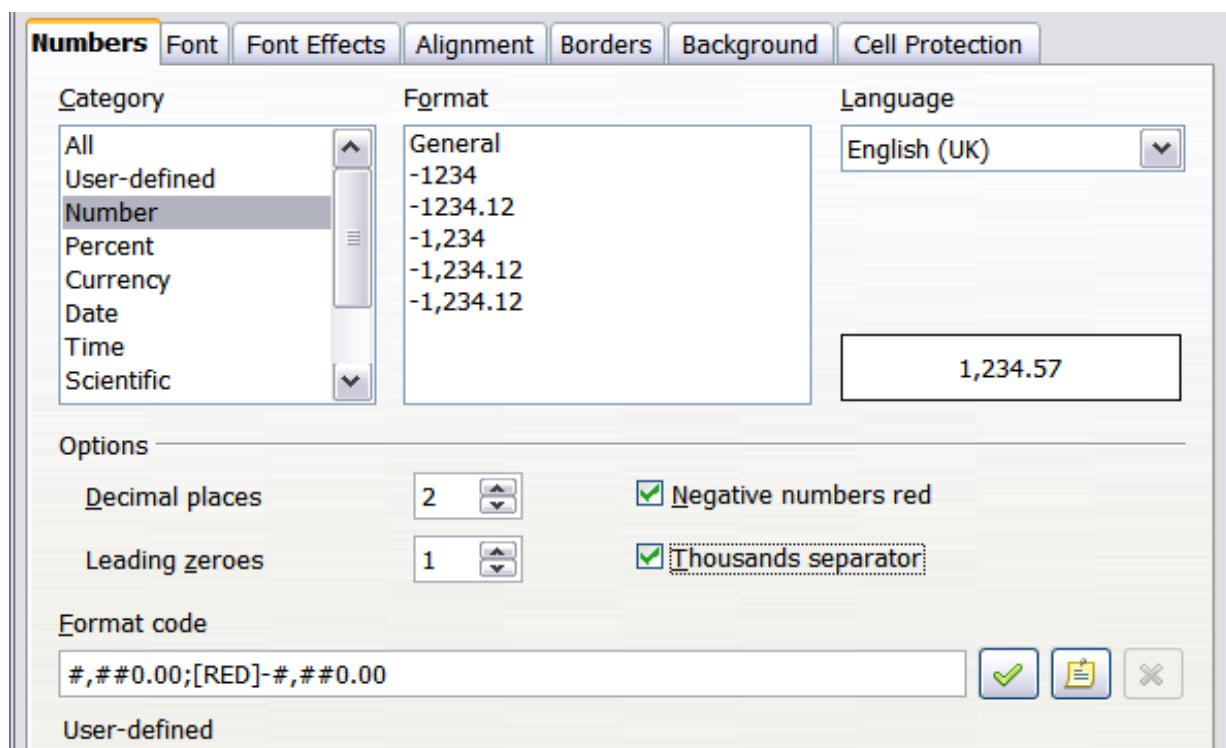


Figure 50: Format Cells → Numbers

Formatting the font

To quickly choose the font used in a cell, select the cell, then click the arrow next to the **Font Name** box on the Formatting toolbar and choose a font from the list.

Tip

To choose whether to show the font names in their font or in plain text, go to **Tools** → **Options** → **LibreOffice** → **View** and select or deselect the Show preview of fonts option in the Font Lists section. For more information, see Chapter 14, Setting Up and Customizing Calc.

To choose the size of the font, click the arrow next to the Font Size box on the Formatting toolbar. For other formatting, you can use the Bold, Italic, or Underline icons.

To choose a font color, click the arrow next to the **Font Color** icon to display a color palette. Click on the required color.

(To define custom colors, use **Tools** → **Options** → **LibreOffice** → **Colors**. See Chapter 14 for more information.)

To specify the language of the cell (useful because it allows different languages to exist in the same document and be spell checked correctly), use the *Font* tab of the Format Cells dialog. See Chapter 4 for more information.



Choosing font effects

The *Font Effects* tab (Figure 51) of the Format Cells dialog offers more font options.

Overlining and underlining

You can choose from a variety of overlining and underlining options (solid lines, dots, short and long dashes, in various combinations) and the color of the line.

Strikethrough

The strikethrough options include lines, slashes, and Xs.

Relief

The relief options are embossed (raised text), engraved (sunken text), outline, and shadow.

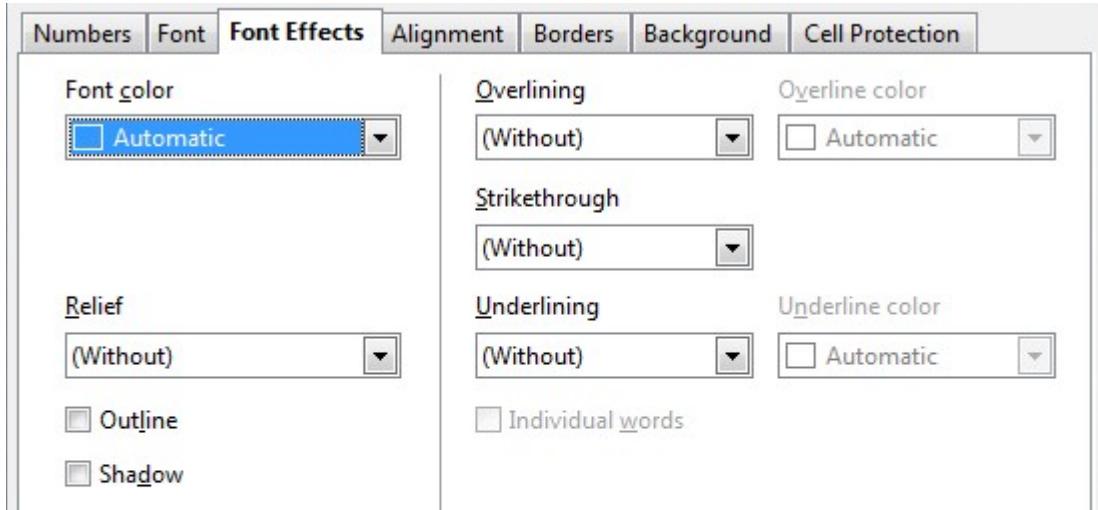


Figure 51: Format Cells → Font Effects

Setting cell alignment and orientation

Some of the cell alignment and orientation icons are not shown by default on the Formatting toolbar. To show them, click on the small arrow at the right-hand end of the toolbar and select them from the list of icons.



Figure 52: Cell alignment and orientation

Some of the alignment and orientation icons are available only if you have Asian or CTL (Complex Text Layout) languages enabled (in **Tools** → **Options** → **Language Settings** → **Languages**). If you choose an unavailable icon from the list, it does not appear on the toolbar.

For more control and other choices, use the *Alignment* tab (Figure 46) of the Format Cells dialog to set the horizontal and vertical alignment and rotate the text. If you have Asian languages enabled, then the *Text orientation* section shows an extra option (labeled **Asian layout mode**) under the **Vertically stacked** option, as shown in Figure 53.

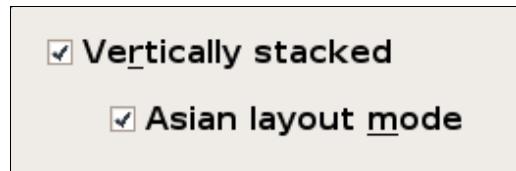


Figure 53: Asian layout mode option

The difference in results between having **Asian layout mode** on or off is shown in Figure 52.

V		
e		
r		
t		
i		
c		
a		
l		
s		
t		
a		
c		
k		

Figure 54: Types of vertical stacking

Formatting the cell borders

To quickly choose a line style and color for the borders of a cell, click the small arrows next to the **Line Style** and **Line Color** icons on the Formatting toolbar. If the **Line Style** and **Line Color** icons are not displayed in the formatting toolbar, select the down arrow on the right side of the bar, then select **Visible Buttons**. In each case, a palette of choices is displayed.

For more control, including the spacing between the cell borders and the text, use the *Borders* tab of the Format Cells dialog. There you can also define a shadow. See Chapter 4 for details.

Note

The cell border properties apply to a cell, and can only be changed if you are editing that cell. For example, if cell C3 has a top border (which would be equivalent visually to a bottom border on C2), that border can only be removed by selecting C3. It cannot be removed in C2.

Formatting the cell background

To quickly choose a background color for a cell, click the small arrow next to the **Background Color** icon on the Formatting toolbar. A palette of color choices, similar to the Font Color palette, is displayed.

(To define custom colors, use **Tools** → **Options** → **LibreOffice** → **Colors**. See Chapter 14 for more information.)

You can also use the *Background* tab of the Format Cells dialog. See Chapter 4 for details.

Autoformatting cells and sheets

You can use the AutoFormat feature to quickly apply a set of cell formats to a sheet or a selected cell range.

- 1) Select the cells that you want to format, including the column and row headers.
- 2) Choose **Format → AutoFormat**.
- 3) To select which properties (number format, font, alignment, borders, pattern, autofit width and height) to include in an AutoFormat, click **More**. Select or deselect the required options. Click **OK**.

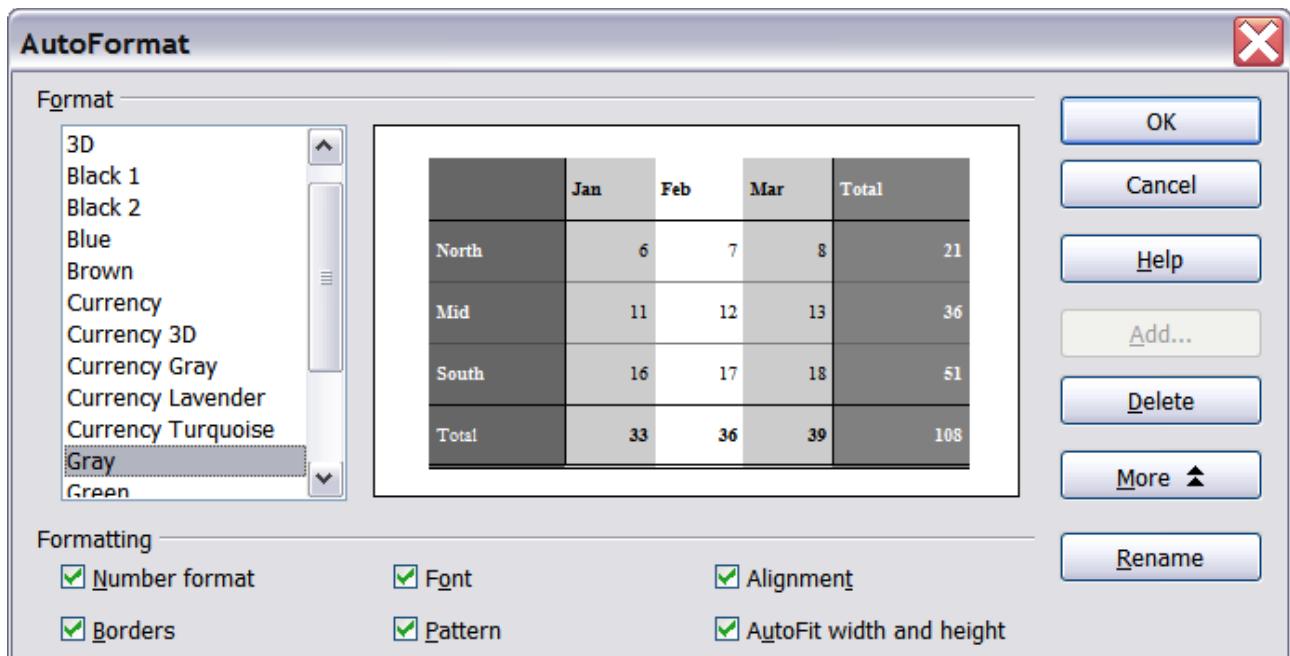


Figure 55: Choosing an AutoFormat

If you do not see any change in color of the cell contents, choose **View → Value Highlighting** from the menu bar. This function only affects cells with numerical data.

Note

If the selected cell range does not have column and row headers, AutoFormat is not available.

Defining a new AutoFormat

You can define a new AutoFormat that is available to all spreadsheets.

- 1) Format a sheet.
- 2) Choose **Edit → Select All**.
- 3) Choose **Format → AutoFormat**. The **Add** button is now active.
- 4) Click **Add**.
- 5) In the **Name** box of the Add AutoFormat dialog, type a meaningful name for the new format.
- 6) Click **OK** to save. The new format is now available in the **Format** list in the AutoFormat dialog.

Formatting spreadsheets using themes

Calc comes with a predefined set of formatting themes that you can apply to your spreadsheets.

It is not possible to add themes to Calc, and they cannot be modified. However, you can modify their styles after you apply them to a spreadsheet.

To apply a theme to a spreadsheet:

- 1) Click the **Choose Themes** icon in the Tools toolbar. If this toolbar is not visible, you can show it using **View → Toolbars → Tools**. The Theme Selection dialog appears. This dialog lists the available themes for the whole spreadsheet.



- 2) In the Theme Selection dialog, select the theme that you want to apply to the spreadsheet. As soon as you select a theme, some of the properties of the custom styles are applied to the open spreadsheet and are immediately visible.
- 3) Click **OK**. If you wish, you can now go to the Styles and Formatting window to modify specific styles. These modifications do not change the theme; they only change the appearance of this specific spreadsheet document.

Using conditional formatting

You can set up cell formats to change depending on conditions that you specify. For example, in a table of numbers, you can show all the values above the average in green and all those below the average in red.

Note

To apply conditional formatting, AutoCalculate must be enabled. Choose **Tools → Cell Contents → AutoCalculate**.

Conditional formatting depends upon the use of styles. If you are not familiar with styles, please refer to Chapter 4. An easy way to set up the required styles is to format a cell the way you want it and click the **New Style from Selection** icon in the Styles and Formatting window.

After the styles are set up, here is how to use them.

- 1) In your spreadsheet, select the cells to which you want to apply conditional formatting.
- 2) Choose **Format → Conditional Formatting** from the menu bar.
- 3) On the Conditional Formatting dialog (Figure 49), enter the conditions. Click **OK** to save. The selected cells are now formatted in the relevant style.

Cell value is / Formula is

Specifies whether conditional formatting is dependent on a *cell value* or on a *formula*. If you select *cell value is*, the **Cell Value Condition** box is displayed, as shown in the example. Here you can choose from conditions including *less than*, *greater than*, *between*, and others.

Parameter field

Enter a reference, value, or formula in the parameter field, or in both parameter fields if you have selected a condition that requires two parameters. You can also enter formulas containing relative references.

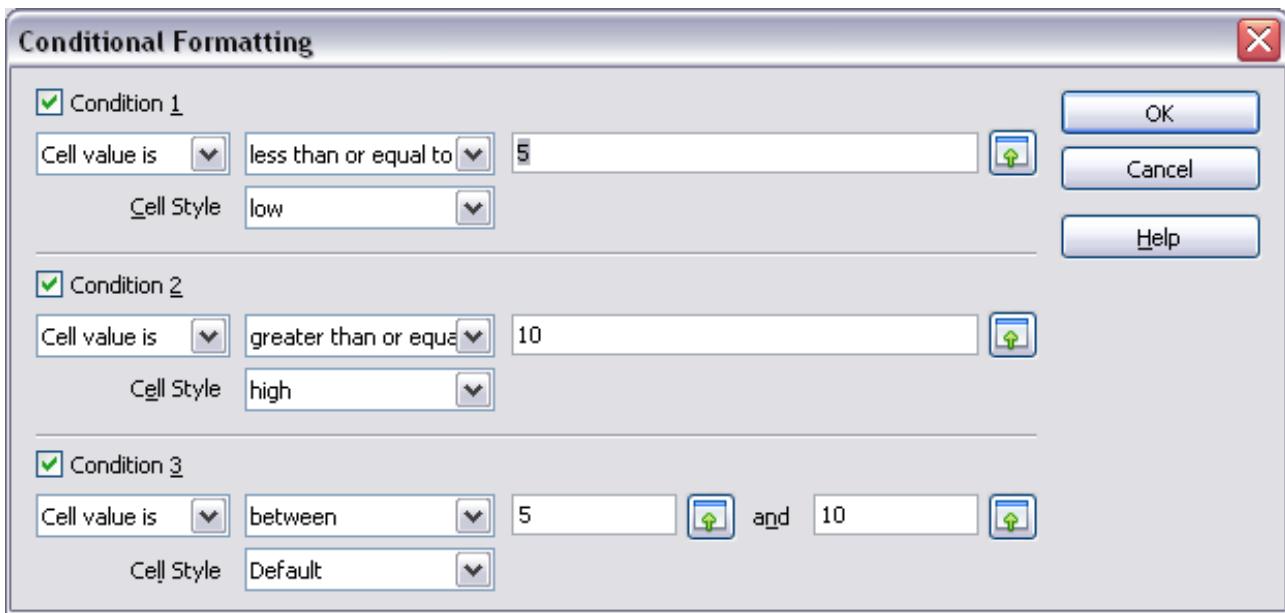


Figure 56: Conditional formatting dialog

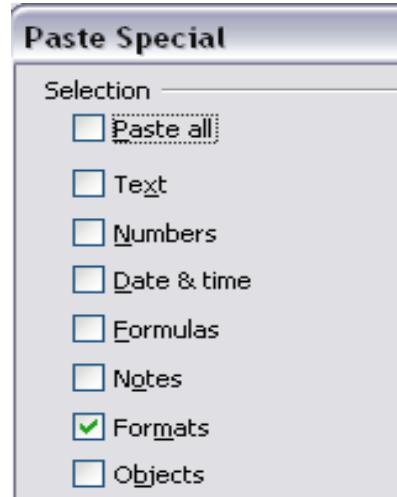
Cell style

Choose the cell style to be applied if the specified condition matches. The style must have been defined previously.

See the Help for more information and examples of use.

To apply the same conditional formatting later to other cells:

- 1) Select one of the cells that has been assigned conditional formatting.
- 2) Copy the cell to the clipboard.
- 3) Select the cells that are to receive this same formatting.
- 4) Choose **Edit → Paste Special**.
- 5) On the Paste Special dialog, in the Selection area, select *only* the **Formats** option. Make sure all other options are *not* selected. Click **OK**.



Hiding and showing data

When elements are hidden, they are neither visible nor printed, but can still be selected for copying if you select the elements around them. For example, if column B is hidden, it is copied when you select columns A and C. When you need a hidden element again, you can reverse the process, and show the element.

To hide or show sheets, rows, and columns, use the options on the Format menu or the right-click (context) menu. For example, to hide a row, first select the row, and then choose **Format → Row → Hide** (or right-click and choose **Hide**).

To hide or show selected cells, choose **Format → Cells** from the menu bar (or right-click and choose **Format Cells**). On the Format Cells dialog, go to the *Cell Protection* tab.

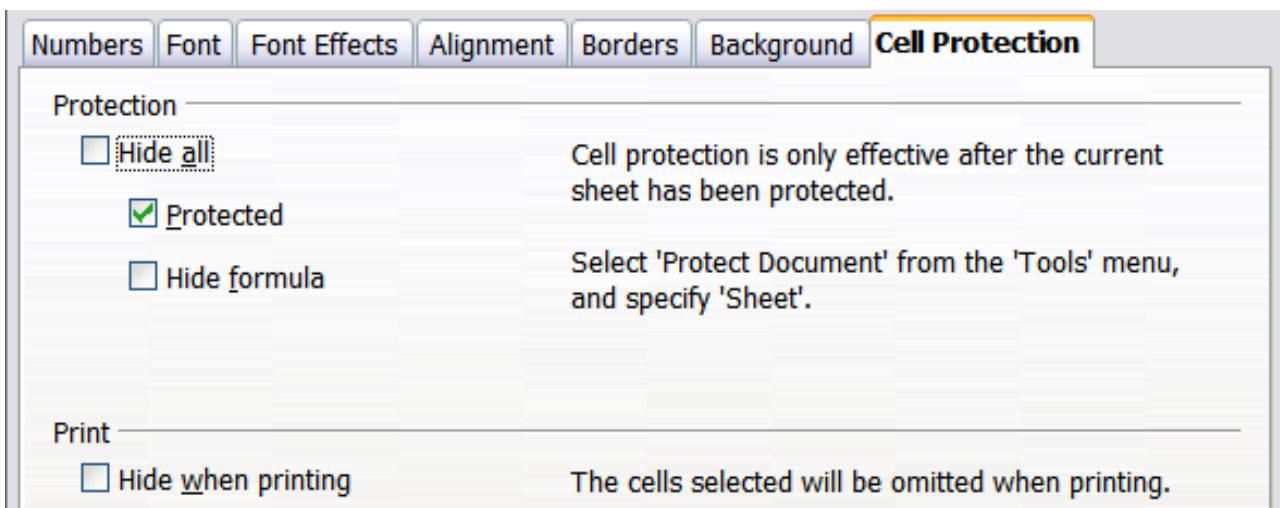


Figure 57: Hiding or showing cells

Outline group controls

If you are continually hiding and showing the same cells, you can simplify the process by creating **outline groups**, which add a set of controls for hiding and showing the cells in the group that are quick to use and always available.

If the contents of cells fall into a regular pattern, such as four cells followed by a total, then you can use **Data → Group and Outline → AutoOutline** to have Calc add outline controls based on the pattern. Otherwise, you can set outline groups manually by selecting the cells for grouping, then choosing **Data → Group and Outline → Group**. On the Group dialog, you can choose whether to group the selected cells by rows or columns.

When you close the dialog, the outline group controls are visible between either the row or column headers and the edges of the editing window. The controls resemble the tree-structure of a file-manager in appearance, and can be hidden by selecting **Data → Group and Outline → Hide Details**. They are strictly for online use, and do not print.

The basic outline controls have plus or minus signs at the start of the group to show or hide hidden cells. However, if outline groups are nested, the controls have numbered buttons for hiding the different levels.

If you no longer need a group, place the mouse cursor in any cell in it and select **Data → Group and Outline → Ungroup**. To remove all groups on a sheet, select **Data → Group and Outline → Remove**.

A1:C7					
1	2	A	B	C	
-	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				

Figure 58: Outline group controls

Filtering which cells are visible

A filter is a list of conditions that each entry has to meet in order to be displayed. You can set three types of filters from the **Data → Filter** sub-menu.

Automatic filters add a drop-down list to the top row of a column that contains commonly used filters. They are quick and convenient and almost as useful with text as with numbers, because the list includes every unique entry in the selected cells.

In addition to these unique entries, automatic filters include the option to display all entries, the ten highest numerical values, and all cells that are empty or not empty, as well as a standard filter that you can customize (see below). However, they are somewhat limited. In particular, they do not allow regular expressions, so you cannot use them to display cell contents that are similar but not identical.

Standard filters are more complex than automatic filters. You can set as many as three conditions as a filter, combining them with the operators *AND* and *OR*. Standard filters are mostly useful for numbers, although a few of the conditional operators, such as = and < > can also be used for text.

Other conditional operators for standard filters include options to display the largest or smallest values, or a percentage of them. Useful in themselves, standard filters take on added value when they are used to further refine automatic filters.

Advanced filters are structured similarly to standard filters. The differences are that advanced filters are not limited to three conditions, and their criteria are not entered in a dialog. Instead, advanced filters are entered in a blank area of a sheet, then referenced by the advanced filter tool in order to apply them.

Sorting records

Sorting rearranges the visible cells on the sheet. In Calc, you can sort by up to three criteria, which are applied one after another. Sorts are handy when you are searching for a particular item, and become even more powerful after you have filtered data.

In addition, sorting is often useful when you add new information. When a list is long, it is usually easier to add new information at the bottom of the sheet, rather than inserting rows in the proper places. After you have added the information, you can sort it to update the sheet.

Highlight the cells to be sorted, then select **Data → Sort** to open the Sort dialog (Figure 39) or click the **Sort Ascending** or **Sort Descending** toolbar buttons. Using the dialog, you can sort the selected cells using up to three columns, in either ascending (A-Z, 1-9) or descending (Z-A, 9-1) order.



Tip

You can define a custom sort order if the supplied alphanumeric ones do not fit your requirements. See “Defining a fill series” on page 46 for instructions.

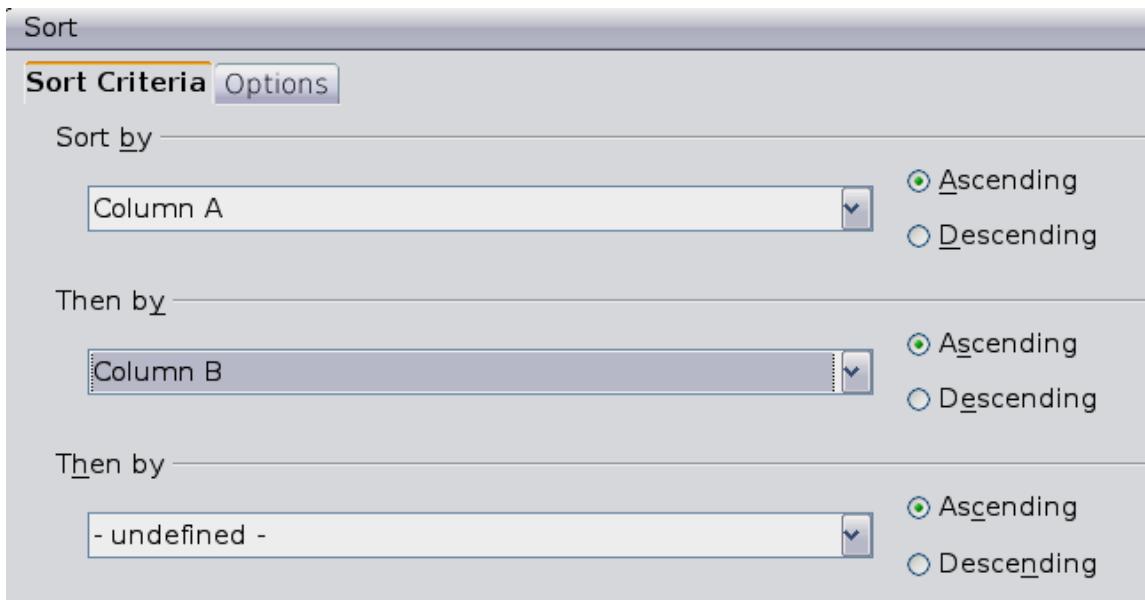


Figure 59: Choosing the criteria and order of sorting

On the *Options* tab of the Sort dialog (Figure 38), you can choose the following options.

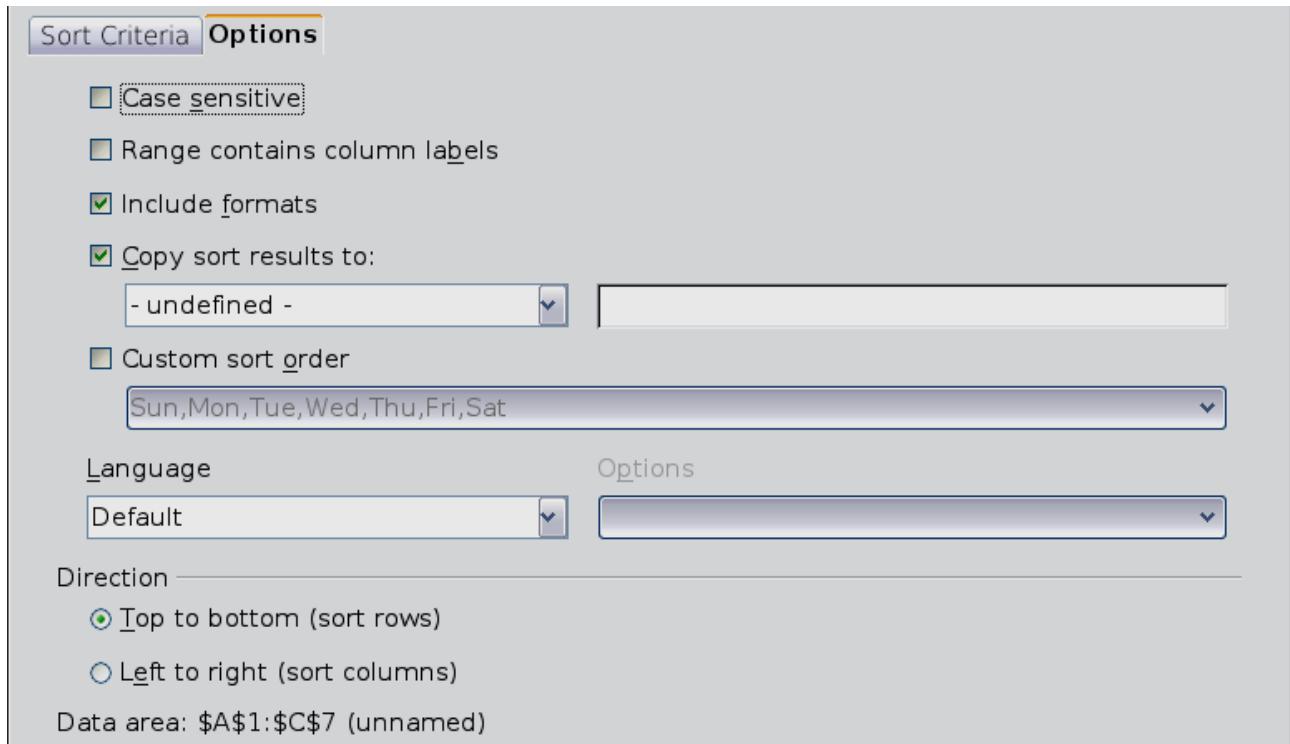


Figure 60: Options for sorting

Case sensitive

If two entries are otherwise identical, one with an upper case letter is placed before one with a lower case letter in the same position if the sort is descending; if the sort is ascending, then the entry with an upper case letter is placed after one with a lower case letter in the same position.

Range contains column labels

Does not include the column heading in the sort.

Include formats

A cell's formatting is moved with its contents. If formatting is used to distinguish different types of cells, then use this option.

Copy sort results to

Sets a spreadsheet address to which to copy the sort results. If a range is specified that does not have the necessary number of cells, then cells are added. If a range contains cells that already have content, then the sort fails.

Custom sort order

Select the box, then choose from the drop-down list one of the sort orders defined in **Tools → Options → LibreOffice Calc → Sort Lists**.

Direction

Sets whether rows or columns are sorted. The default is to sort by columns unless the selected cells are in a single column.

Finding and replacing in Calc

Calc has two ways to find text within a document: the Find toolbar for fast text searching and the Find & Replace dialog.

Using the Find toolbar

The Find toolbar is located by default on the right-hand end of the Standard toolbar. You can hide or show the Find toolbar using **View → Toolbars → Find**.



Type a search term in the Find box, and then click the Find Next (down-arrow) or Find Previous (up-arrow) button. To find other occurrences of the same term, continue clicking the button.

Using the Find & Replace dialog

To display the **Find & Replace** dialog (Figure 35), use the keyboard shortcut *Control+F* or choose **Edit → Find & Replace** from the menu bar.

In spreadsheet documents you can search for text, formulas, and styles. You can navigate from one occurrence to the next using **Find**, or you can highlight all matching cells at once using **Find All**, then apply another format or replace the cell contents by other content.

Text and numbers in cells may have been entered directly or may be the result of a calculation. The search method you use depends on the type of data you are searching for.

Tip

Cell contents can be formatted in different ways. For example, a number can be formatted as a currency, to be displayed with a currency symbol. You see the currency symbol in the cell, but you cannot search for it.

By default, Calc searches the current sheet. To search through all sheets of the document, click **More Options**, then select *Search in all sheets* option.

Caution



Use **Replace All** with caution; otherwise, you may end up with some highly embarrassing mistakes. A mistake with **Replace All** might require a manual, word-by-word search to fix, if it is not discovered in time to undo it.

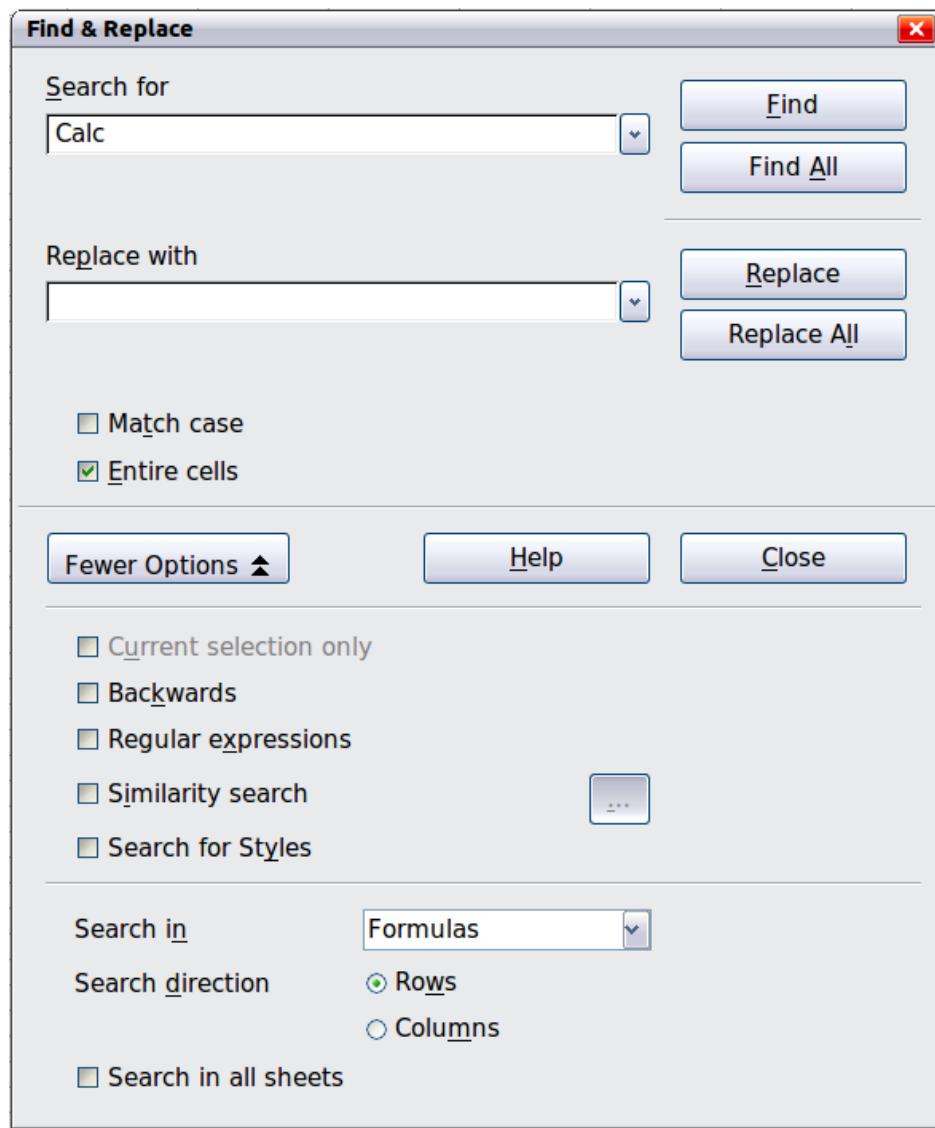


Figure 61: Expanded Find & Replace dialog

Finding and replacing formulas or values

You can use the Find & Replace dialog to search in formulas or in the displayed values that result from a calculation.

- 1) To open the Find & Replace dialog, use the keyboard shortcut **Control+F** or select **Edit → Find & Replace**.
- 2) Click **More Options** to expand the dialog.
- 3) Select **Formulas** or **Values** in the **Search in** drop-down list.
 - Formulas finds parts of the formulas.
 - Values finds the results of the calculations.
- 4) Type the text you want to find in the **Search for** box.
- 5) To replace the text with different text, type the new text in the **Replace with** box.
- 6) When you have set up your search, click **Find**. To replace text, click **Replace** instead.

Finding and replacing text

- 1) Open the Find & Replace dialog, click **More Options** to expand the dialog, and select **Values or Notes** in the *Search in* drop-down list.
- 2) Type the text you want to find in the *Search for* box.
- 3) To replace the text with different text, type the new text in the *Replace with* box.
- 4) Click **Find**, **Find All**, **Replace**, or **Replace All**.

When you click **Find**, Calc selects the next cell that contains your text. You can edit the text, then click **Find** again to advance to the next found cell. If you closed the dialog, you can press **Ctrl+Shift+F** to find the next cell without opening the dialog.

When you click **Find All**, Calc selects all cells that contain your entry. Now you can, for example, apply a cell style to all of them at once.

Finding and replacing cell styles

To quickly change all the paragraphs of one (unwanted) style to another (preferred) style:

- 1) On the expanded Find & Replace dialog, select **Search for Styles**. The *Search for* and *Replace with* boxes now contain a list of styles.
- 2) Select the styles you want to search for and replace.
- 3) Click **Find**, **Find All**, **Replace**, or **Replace All**.

Using wildcards (regular expressions)

Wildcards (also known as *regular expressions*) are combinations of characters that instruct LibreOffice how to search for something. Regular expressions are very powerful but not very intuitive. They can save time and effort by combining multiple finds into one.

To use wildcards and regular expressions when searching and replacing:

- 1) On the Find & Replace dialog, click **More Options** to see more choices. On this expanded dialog, select the **Regular expressions** option.
- 2) Type the search text, including the wildcards, in the *Search for* box and the replacement text (if any) in the *Replace with* box.
- 3) Click **Find**, **Find All**, **Replace**, or **Replace All** (not recommended).

Tip

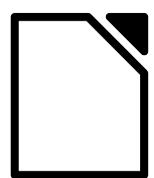
The online help describes many of the regular expressions and their uses.

The following points may be of interest to Calc users:

- In Calc, regular expressions are applied separately to each cell. This means that a search for **r.d** will match **red** in cell A1 but will not match **r** in cell A2 and **d** (or **ed**) in cell A3. (The regular expression **r.d** means the system will try to match **r** followed by any other character followed by **d**.)
- When a match is found, the entire cell is highlighted but only the text found will be replaced. For example, searching for **brown** will result in highlighting a cell containing **redbrown clay**, and choosing nothing in the *Replace with* box leaves the cell containing **red clay**.
- If Find is used twice in a row, and the second time the **Current selection only** box is activated, then the second search will evaluate the *whole* of each selected cell, *not* just the strings that caused the cells to be selected in the first search. For example, searching for **joh?n**, then activating **Current selection only** and searching for **sm.th** will find cells containing **Jon Smith** and **Smythers, Johnathon**.

- If a cell contains a hard line break (entered by *Ctrl+Enter*), it may be found by using the regular expression `\n`. For example, if a cell contains **red [hard line break] clay** then searching for **d\ncl** and entering nothing in the *Replace with* box leaves the cell containing **relay**.
- The hard line break acts to mark “end of text” (similar to “end of paragraph” in Writer), found by the regular expression special character `$`, in addition to the end of text in the cell. For example, if a cell contains **red [hard line break] clay** then a search for **d\$** replacing with **al** leaves the cell with **real [hard line break] clay**. Note that with this syntax the hard line break is not replaced.
- Using `\n` in the *Replace with* box will replace with the literal characters `\n`, not a hard line break.
- The Find & Replace dialog has an option to search within formulas, values, or notes. This option applies to any search, not just one using regular expressions. Searching with the *Formulas* option for **SUM** would find a cell containing the formula **=SUM(A1:A6)** as well as a cell containing the simple text **SUMMARY**.
- Searching for the regular expression `^$` will not find empty cells. This is intentional, to avoid performance issues when selecting a huge number of cells. Note that empty cells will not be found even if you are only searching a selection.
- Finding cell contents using the regular expression `.+` (or similar) and replacing them with `&` effectively re-enters the cell contents without any formatting. This technique can be used to remove formatting automatically applied by Calc when importing data from the clipboard or from badly formatted files. For example, to convert text strings consisting of digits into actual numbers, first format the cells as numbers and then perform the search and replace.

See Chapter 7, Using Formulas and Functions, for the use of regular expressions within formulas.



LibreOffice
The Document Foundation

Chapter 3 *Creating Charts and Graphs*

Presenting information visually

Introduction

Charts and graphs can be powerful ways to convey information to the reader. OpenOffice.org Calc offers a variety of different chart and graph formats for your data.

Using Calc, you can customize charts and graphs to a considerable extent. Many of these options enable you to present your information in the best and clearest manner.

For readers who are interested in effective ways to present information graphically, two excellent introductions to the topic are William S. Cleveland's *The elements of graphing data*, 2nd edition, Hobart Press (1994) and Edward R. Tufte's *The Visual Display of Quantitative Information*, 2nd edition, Graphics Press (2001).

Creating a chart

To demonstrate the process of making charts and graphs in Calc, we will use the small table of data in Figure 62.

	A	B	C	D	
1	Equipment Rentals				
2		Canoes	Boats	Motor	
3	Jan	12	23	47	
4	Feb	9	31	54	
5	Mar	14	27	56	
6	Apr	17	28	48	
7	May	13	19	39	
8	Jun	8	27	52	
9					

Figure 62: Table of data for charting examples

To create a chart, first highlight (select) the data to be included in the chart. The selection does not need to be in a single block, as shown in Figure 63; you can also choose individual cells or groups of cells (columns or rows). See Chapter 1, Introducing Calc, for more about selecting cells and ranges of cells.

	A	B	C	D	
1	Equipment Rentals				
2		Canoes	Boats	Motor	
3	Jan	12	23	47	
4	Feb	9	31	54	
5	Mar	14	27	56	
6	Apr	17	28	48	
7	May	13	19	39	
8	Jun	8	27	52	
9					
10					

Figure 63: Selecting data for plotting

Next, open the Chart Wizard dialog using one of two methods.

- Choose **Insert** → **Chart** from the menu bar.
- Or, click the **Chart** icon on the main toolbar.

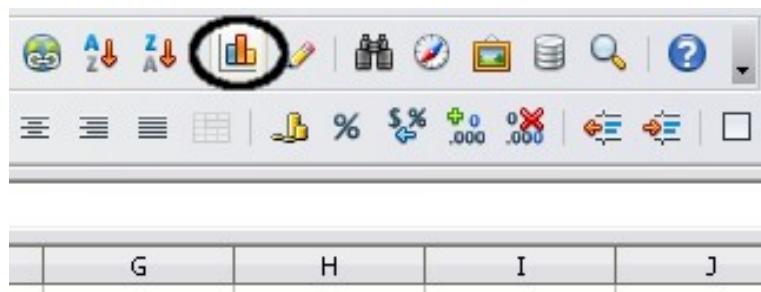


Figure 64: Insert chart from main toolbar

Either method inserts a sample chart on the worksheet, opens the Formatting toolbar, and opens the Chart Wizard, as shown in Figure 65.

Tip

Before choosing the Chart Wizard, place the cursor anywhere in the area of the data. The Chart Wizard will then do a fairly good job of guessing the range of the data. Just be careful that you have not included the title of your chart.

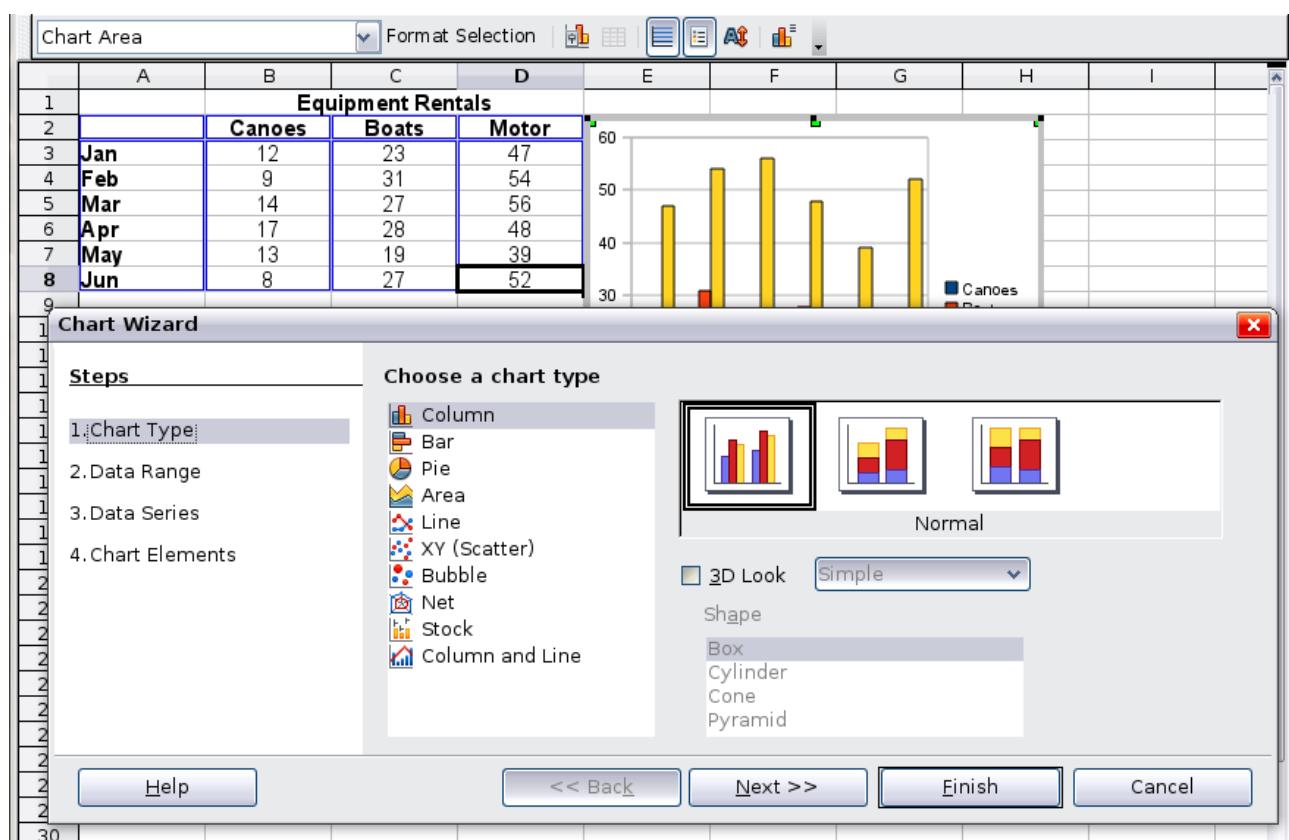


Figure 65: Chart Wizard, Step 1—Choose a chart type

Choosing a chart type

The Chart Wizard includes a sample chart with your data. This sample chart updates to reflect the changes you make in the Chart Wizard.

The Chart Wizard has three main parts: a list of steps involved in setting up the chart, a list of chart types, and the options for each chart type. At any time you can go back to a previous step and change selections.

Calc offers a choice of 10 basic chart types, with a few options for each type of chart. The options vary according to the type of chart you pick.

The first tier of choice is for two-dimensional (2D) charts. Only those types which are suitable for 3D (Column, Bar, Pie, and Area) give you an option to select a 3D look.

On the *Choose a chart type* page (Figure 65), select a type by clicking on its icon. The preview updates every time you select a different type of chart, and provides a good idea of what the finished chart will look like.

The current selection is highlighted (shown with a surrounding box) on the *Choose a chart type* page. The chart's name is shown just below the icons. For the moment, we will stick to the Column chart and click on **Next** again.

Changing data ranges and axes labels

In Step 2, Data Range, you can manually correct any mistakes you have made in selecting the data.

On this page you can also change the way you are plotting the data by using the rows—rather than the columns—as data series. This is useful if you use a style of chart such as Donut or Pie to display your data.

Lastly, you can choose whether to use the first row or first column, or both, as labels on the axes of the chart.

You can confirm what you have done so far by clicking the **Finish** button, or click **Next** to change some more details of the chart.

We will click **Next** to see what we can do to our chart using the other pages of the Wizard.



Figure 66: Changing data ranges and axes labels

Selecting data series

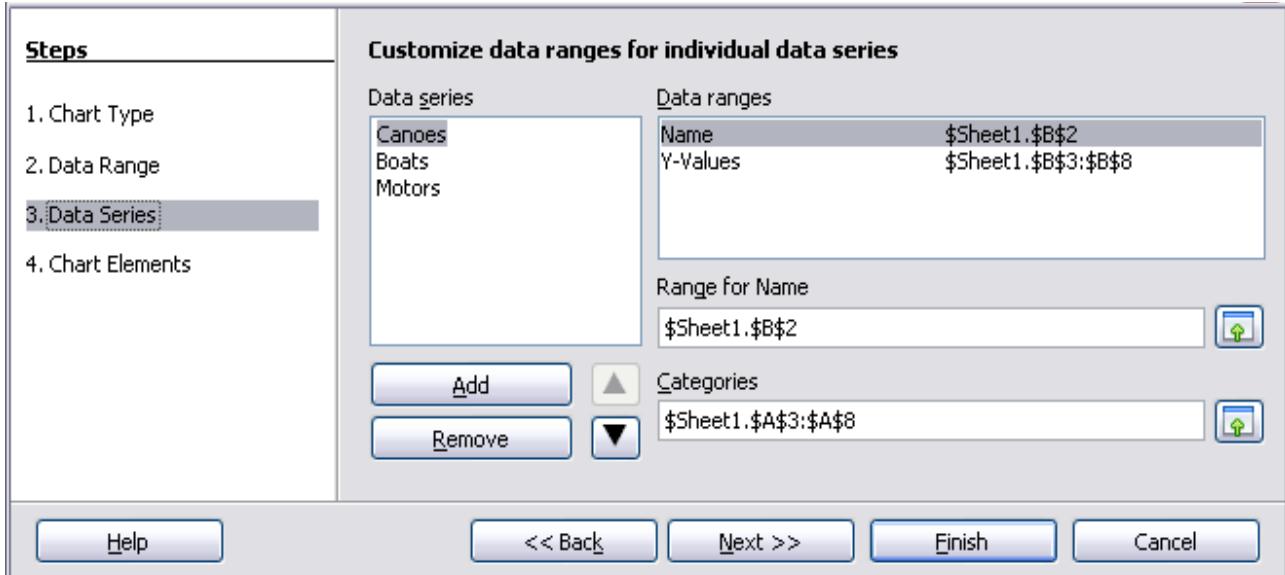


Figure 67: Amending data series and ranges

On the Data Series page, you can fine tune the data that you want to include in the chart. Perhaps you have decided that you do not want to include the data for canoes. If so, highlight **Canoes** in the **Data series** box and click on **Remove**. Each named data series has its ranges and its individual Y-values listed. This is useful if you have very specific requirements for data in your chart, as you can include or leave out these ranges.

Tip

You can click the Shrink button next to the *Range for Name* box to work on the spreadsheet itself. This is handy if your data ranges are larger than ours and the Chart Wizard is in the way.

Another way to plot any unconnected columns of data is to select the first data series and then select the next series while holding down the *Ctrl* key. Or you can type the columns in the text boxes. The columns must be separated by semi-colons. Thus, to plot **B3:B11** against **G3:G11**, type the selection range as **B3:B11;G3:G11**.

The two data series you are selecting must be in separate columns or rows. Otherwise Calc will assume that you are adding to the same data series.

Click **Next** to deal with titles, legend and grids.

Adding or changing titles, legend, and grids

On the Chart Elements page (Figure 68), you can give your chart a title and, if desired, a subtitle. Use a title that draws the viewers' attention to the purpose of the chart: what you want them to see. For example, a better title for this chart might be *The Performance of Motor and Other Rental Boats*.

It may be of benefit to have labels for the x axis or the y axis. This is where you give viewers an idea as to the proportion of your data. For example, if we put Thousands in the y axis label of our graph, it changes the scope of the chart entirely. For ease of estimating data you can also display the x or y axis grids by selecting the *Display grids* options.

You can leave out the legend or include it and place it to the left, right, top or bottom.

To confirm your selections and complete the chart, click **Finish**.

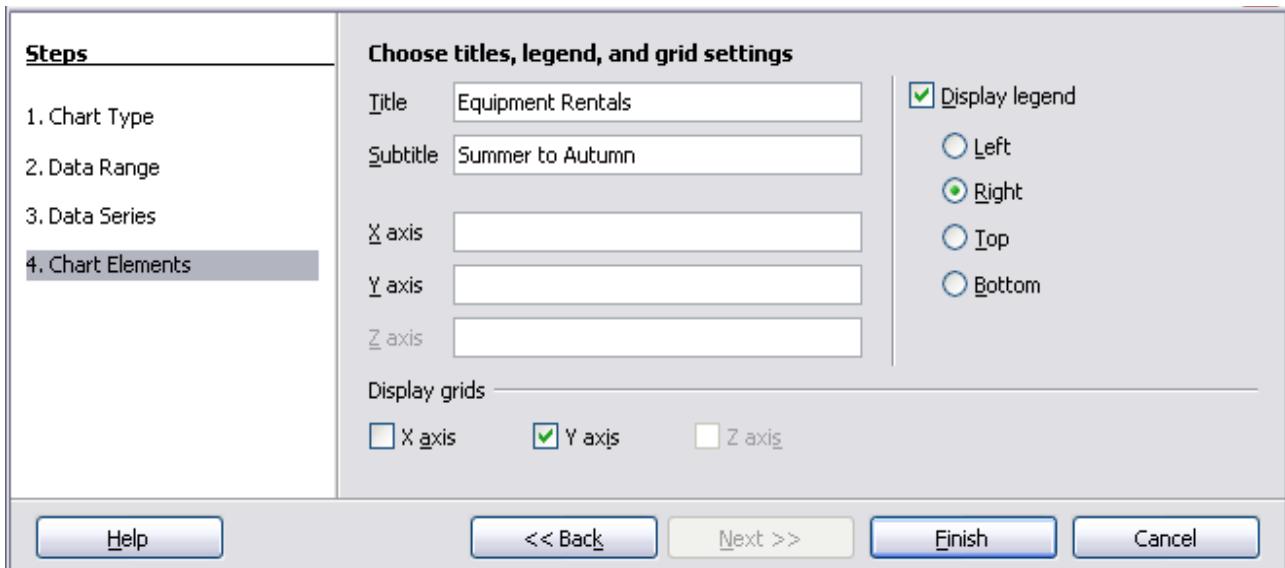


Figure 68: Titles, legend and grids

Editing charts

After you have created a chart, you may find things you would like to change. Calc provides tools for changing the chart type, chart elements, data ranges, fonts, colors, and many other options, through the **Insert** and **Format** menus, the right-click (context) menu, and the Chart toolbar.

Changing the chart type

You can change the chart type at any time. To do so:

- 1) First select the chart by double-clicking on it. The chart should now be surrounded by a gray border.
- 2) Then do one of the following:
 - Choose **Format → Chart Type** from the menu bar.
 - Click the chart type icon  on the Formatting toolbar.
 - Right-click on the chart and choose **Chart Type**.

In each case, a dialog similar to the one in Figure 65 opens. See page 70 for more information.

Adding or removing chart elements

Figures 69 and 70 show the elements of 2D and 3D charts.

The default 2D chart includes only two of those elements:

- *Chart wall* contains the graphic of the chart displaying the data.
- *Chart area* is the area surrounding the chart graphic. The (optional) chart title and the legend (key) are in the chart area.

The default 3D chart also has the *chart floor*, which is not available in 2D charts.

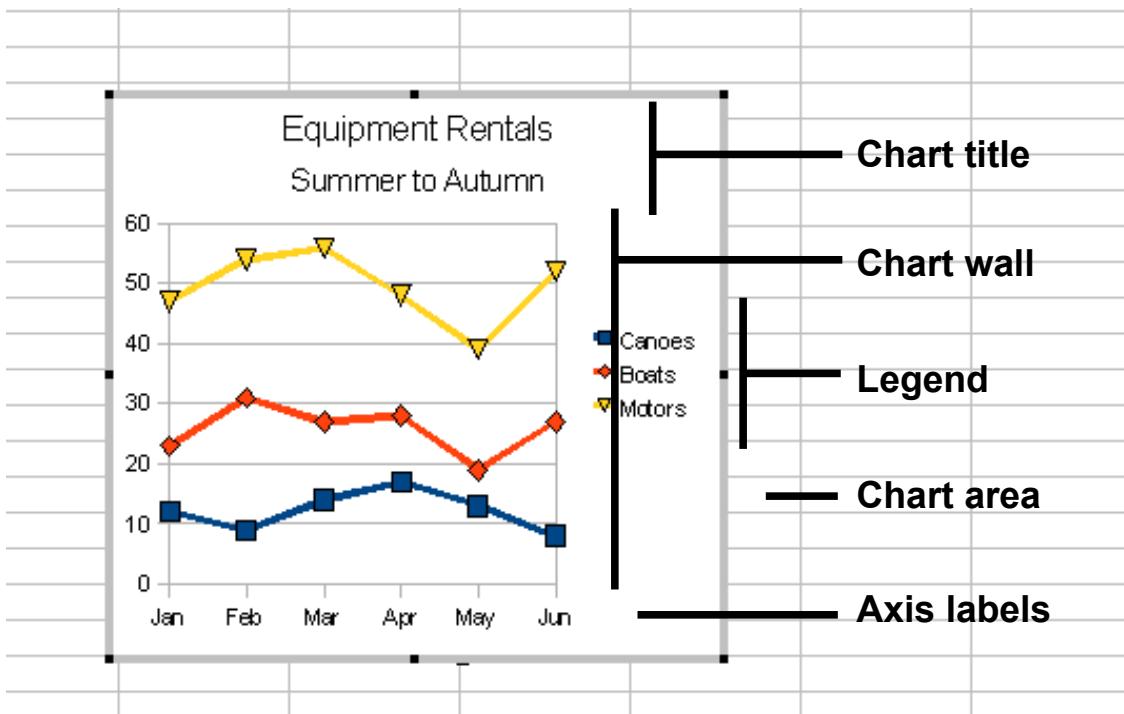


Figure 69: Elements of 2D chart

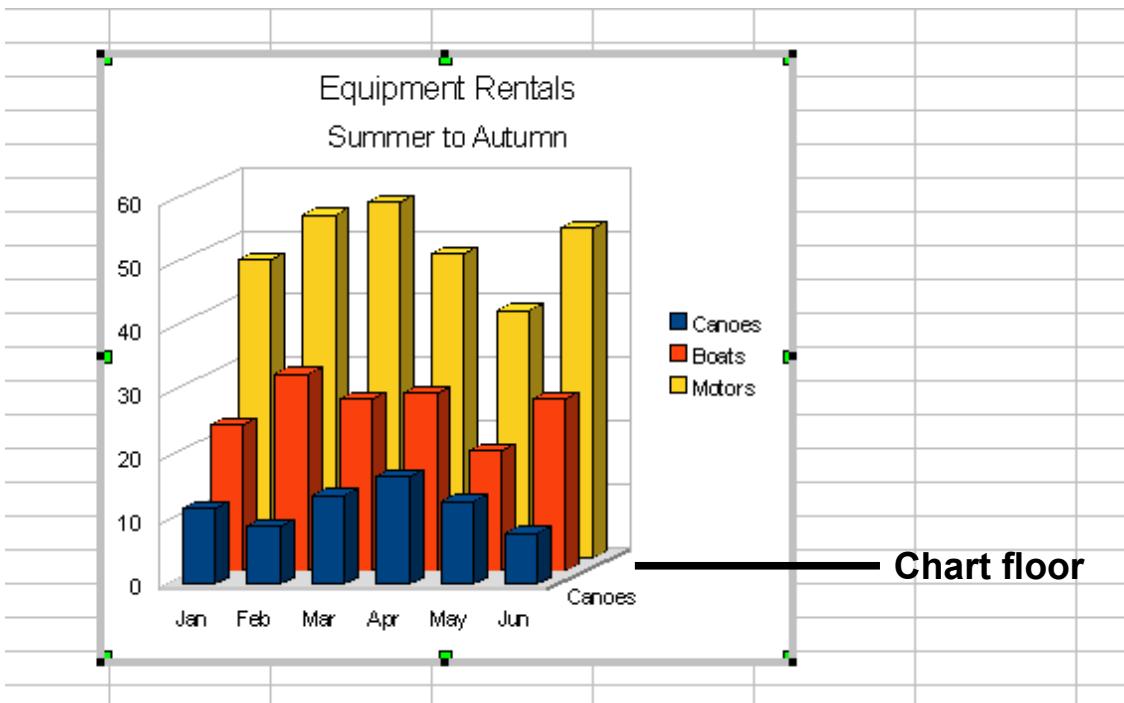


Figure 70: Elements of 3D chart

You can add other elements using the commands on the **Insert** menu. The various choices open dialogs in which you can specify details.

First select the chart so the green sizing handles are visible. This is done with a single click on the chart.

The dialogs for Titles, Legend, Axes, and Grids are self-explanatory. The others are a bit more complicated, so we'll take a look at them here.

Data labels

Data labels put information about each data point on the chart. They can be very useful for presenting detailed information, but you need to be careful to not create a chart that is too cluttered to read.

Choose **Insert → Data Labels**. The options are as follows.

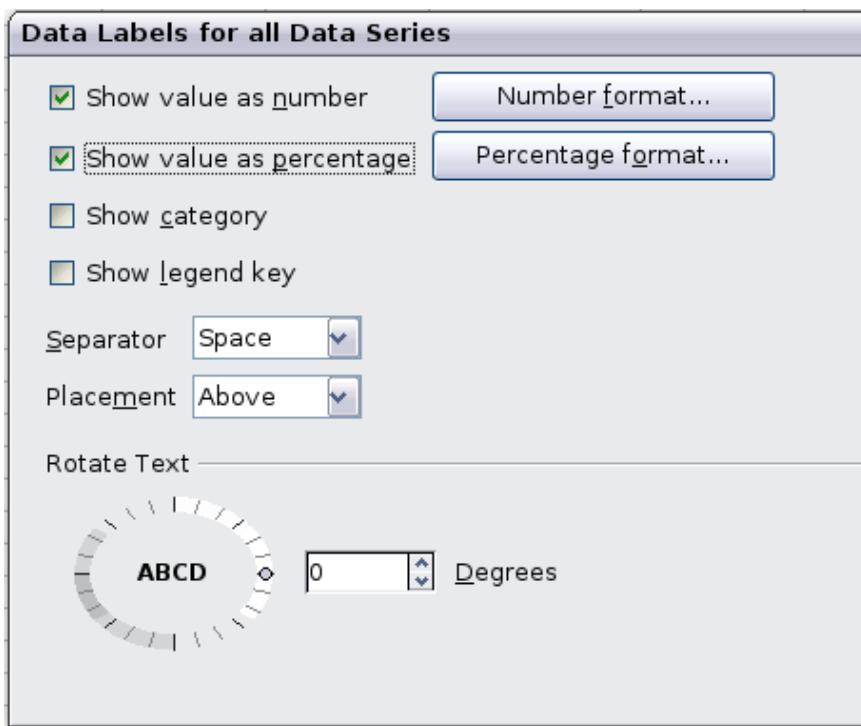


Figure 71: Data Labels dialog

Show value as number

Displays the numeric values of the data points. When selected, this option activates the **Number format...** button.

Number format...

Opens the Number Format dialog, where you can select the number format. This dialog is very similar to the one for formatting numbers in cells, described in Chapter 2, Entering, Editing, and Formatting Data.

Show value as percentage

Displays the percentage value of the data points in each column. When selected, this option activates the **Percentage format...** button.

Percentage format...

Opens the Number Format dialog, where you can select the percentage format.

Show category

Shows the data point text labels.

Show legend key

Displays the legend icons next to each data point label.

Separator

Selects the separator between multiple text strings for the same object.

Placement

Selects the placement of data labels relative to the objects.

Figure 76 on page 81 shows examples of values as text (neither *Show value as number* nor *Show value as percentage* selected) and values as percentages, as well as when data values are used as substitutes for legends or in conjunction with them.

Trend lines

When you have a scattered grouping of points in a graph, you may want to show the relationship of the points. A trend line is what you need. Calc has a good selection of regression types you can use for trend lines: linear, logarithm, exponential, and power. Choose the type that comes closest to passing through all of the points.

To insert trend lines for all data series, double-click the chart to enter edit mode. Choose **Insert** → **Trend Lines**, then select the type of trend line from *None*, *Linear*, *Logarithmic*, *Exponential*, or *Power*. You can also choose whether to show the equation for the trend line and the coefficient of determination (R^2).

To insert a trend line for a single data series, first select the data series in the chart, and then right-click and choose **Insert** → **Trend Line** from the context menu. The dialog for a single trend line is similar to the one below but has a second tab (Line), where you can choose attributes (style, color, width, and transparency) of the line.

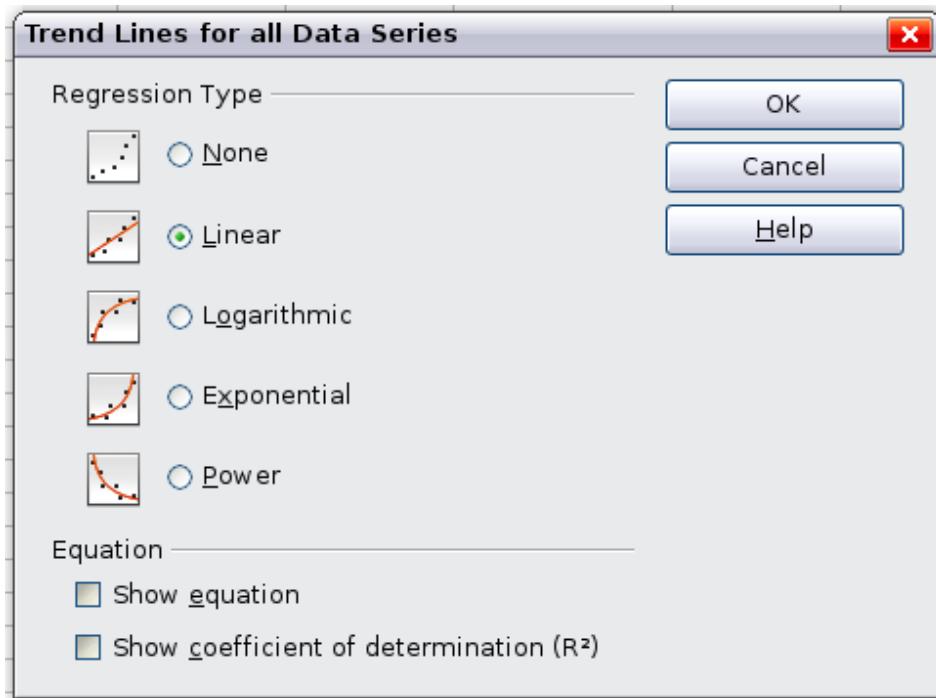


Figure 72: Trend Lines dialog

To delete a single trend line or mean value line, click the line, then press the *Del* key.

To delete all trend lines, choose **Insert** → **Trend Lines**, then select **None**.

A trend line is shown in the legend automatically.

If you insert a trend line on a chart type that uses categories, such as Line or Column, then the numbers 1, 2, 3, ... are used as x-values to calculate the trend line.

The trend line has the same color as the corresponding data series. To change the line properties, select the trend line and choose **Format Trend Line**. This opens the Line tab of the Trend Lines dialog.

To show the trend line equation, select the trend line in the chart, right-click to open the context menu, and choose **Insert Trend Line Equation**.

When the chart is in edit mode, OpenOffice.org gives you the equation of the trend line and the correlation coefficient. Click on the trend line to see the information in the status bar. To show the equation and the correlation coefficient, select the line and choose **Insert R² and Trend Line Equation**.

For more details on the regression equations, see the topic *Trend lines in charts* in the Help.

Mean value lines

If you select mean value lines, Calc calculates the average of each selected data series and places a colored line at the correct level in the chart.

Y error bars

If you are presenting data that has a known possibility of error, such as social surveys using a particular sampling method, or you want to show the measuring accuracy of the tool you used, you may wish to show error bars on the chart. Select the chart and choose **Insert → Y Error Bars**.

Several options are provided on the Error Bars dialog. You can only choose one option at a time. You can also choose whether the error indicator shows both positive and negative errors, or only positive or only negative.

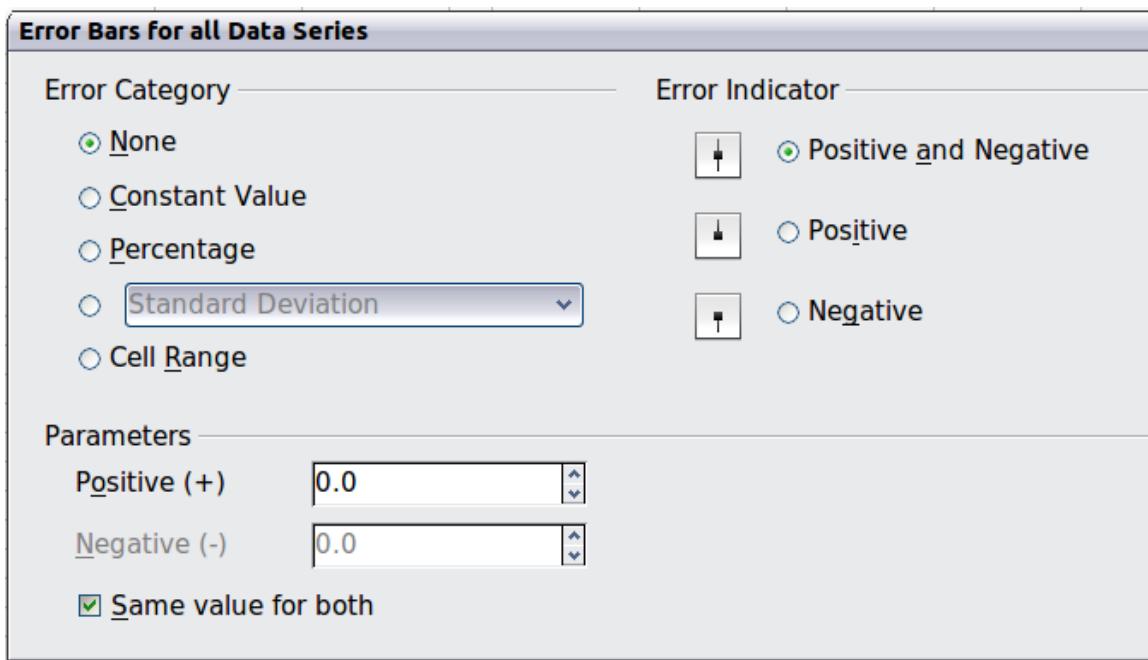


Figure 73: Specifying the parameters of error bars

- Constant value – you can have separate positive and negative values.
- Percentage – choose the error as a percentage of the data points.
- In the drop-down list:
 - Standard error
 - Variance – shows error calculated on the size of the biggest and smallest data points

- Standard deviation – shows error calculated on standard deviation
- Error margin – you designate the error
- Cell range – calculates the error based on cell ranges you select. The Parameters section at the bottom of the dialog changes to allow selection of the cell ranges.

Formatting charts

The Format menu has many options for formatting and fine-tuning the appearance of your charts.

Double-click the chart so that it is enclosed by a gray border indicating edit mode; then, select the chart element that you want to format. Choose **Format** from the menu bar, or right-click to display a context menu relevant to the selected element. The formatting choices are as follows.

Format Selection

Opens a dialog in which you can specify the area fill, borders, transparency, characters, font effects, and other attributes of the selected element of the chart (see page 82).

Position and Size

Opens a dialog (see page 85).

Arrangement

Provides two choices: **Bring Forward** and **Send Backward**, of which only one may be active for some items. Use these choices to arrange overlapping data series.

Title

Formats the titles of the chart and its axes.

Legend

Formats the location, borders, background, and type of the legend.

Axis

Formats the lines that create the chart as well as the font of the text that appears on both the X and Y axes.

Grid

Formats the lines that create a grid for the chart.

Chart Wall, Chart Floor, Chart Area

Described in the following sections.

Chart Type

Changes what kind of chart is displayed and whether it is two- or three-dimensional.

Data Ranges

Explained on page 70 (Figure 66 and Figure 67).

3D View

Formats 3D charts (see page 79).

Note

Chart Floor and **3D View** are only available for a 3D chart. These options are unavailable (grayed out) if a 2D chart is selected.

In most cases you need to select the exact element you want to format. Sometimes this can be tricky to do with the mouse, if the chart has many elements, especially if some of them are small or overlapping. If you have Tooltips turned on (in **Tools** → **Options** → **LibreOffice.org** → **General** → **Help**, select **Tips**), then as you move the mouse over each element, its name appears in the Tooltip. Once you have selected one element, you can press *Tab* to move through the other elements until you find the one you want. The name of the selected element appears in the Status Bar.

Moving chart elements

You may wish to move or resize individual elements of a chart, independent of other chart elements. For example, you may wish to move the legend to a different place. Pie charts allow moving of individual wedges of the pie (in addition to the choice of “exploding” the entire pie).

- 1) Double-click the chart so that it is enclosed by a gray border.
- 2) Double-click any of the elements—the title, the legend, or the chart graphic. Click and drag to move the element. If the element is already selected, then move the pointer over the element to get the move icon (small hand), then click, drag and move the element.
- 3) Release the mouse button when the element is in the desired position.

Note

If your graphic is 3D, round red handles appear which control the three-dimensional angle of the graphic. You cannot resize or reposition the graphic while the round red handles are showing. With the round red handles showing, *Shift + Click* to get the green resizing handles. You can now resize and reposition your 3D chart graphic. See the following tip.

Tip

You can resize the chart graphic using its green resizing handles (*Shift + Click*, then drag a corner handle to maintain the proportions). However, you cannot resize the title or the key.

Changing the chart area background

The chart area is the area surrounding the chart graphic, including the (optional) main title and key.

- 1) Double-click the chart so that it is enclosed by a gray border.
- 2) Choose **Format** → **Chart Area**.
- 3) On the Chart Area dialog, choose the desired format settings.

On the **Area** tab, you can change the color, or choose a hatch pattern, bitmap or some preset gradients. Click on the drop-down box to see the options. Patterns are probably more useful than color if you have to print out your chart in black and white.

You can also use the **Transparency** tab to change the area’s transparency. If you used a preset gradient from the **Area** tab, you can see the different parameters of which it is composed.

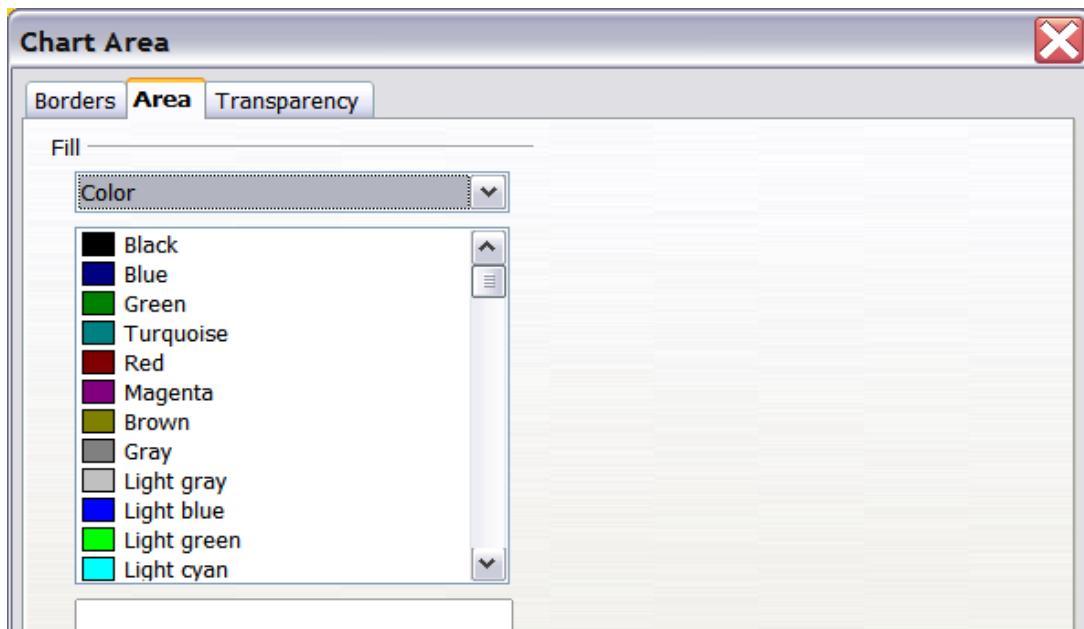


Figure 74: Chart Area dialog

Changing the chart graphic background

The chart wall is the area that contains the chart graphic.

- 1) Double-click the chart so that it is enclosed by a gray border.
- 2) Choose **Format → Chart Wall**. The Chart Wall dialog has the same formatting options as described in “Changing the chart area background” above.
- 3) Choose your settings and click **OK**.

Changing colors

If you need a different color scheme from the default for the charts in all your documents, go to **Tools → Options → Charts → Default Colors**, which has a much wider range of colors to choose from. Changes made in this dialog affect the default chart colors for any chart you make in future.

Formatting 3D charts

Use **Format → 3D View** to fine tune 3D charts. The 3D View dialog has three pages, where you can change the perspective of the chart, whether the chart uses the simple or realistic schemes, or your own custom scheme, and the illumination which controls where the shadows will fall.

Rotation and perspective

To rotate a 3D chart or view it in perspective, enter the required values on the *Perspective* page of the 3D View dialog. You can also rotate 3D charts interactively; see page 82.

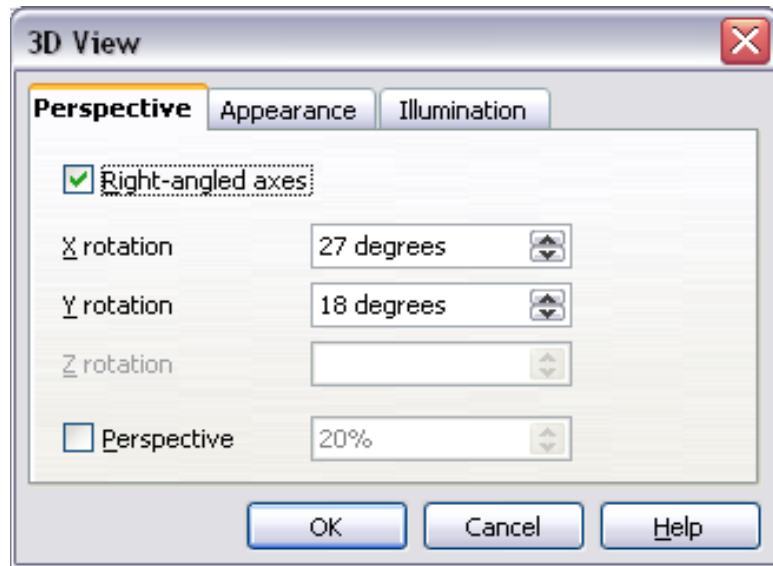


Figure 75: Rotating a chart

Some hints for using the Perspective page:

- Set all angles to 0 for a front view of the chart. Pie charts and donut charts are shown as circles.
- With Right-angled axes enabled, you can rotate the chart contents only in the X and Y direction; that is, parallel to the chart borders.
- An x value of 90, with y and z set to 0, provides a view from the top of the chart. With x set to -90, the view is from the bottom of the chart.
- The rotations are applied in the following order: x first, then y, and z last.
- When shading is enabled and you rotate a chart, the lights are rotated as if they are fixed to the chart.
- The rotation axes always relate to the page, not to the chart's axes. This is different from some other chart programs.
- Select the Perspective option to view the chart in central perspective as through a camera lens instead of using a parallel projection.

Set the focus length with the spin button or type a number in the box. 100% gives a perspective view where a far edge in the chart looks approximately half as big as a near edge.

Appearance

Use the Appearance page to modify some aspects of a 3D chart's appearance.

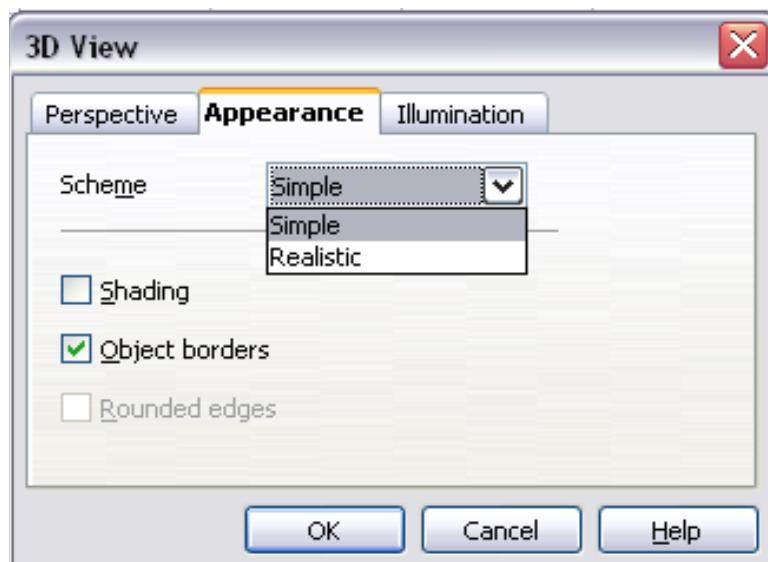


Figure 76: Modifying appearance of 3D chart

Select a scheme from the list box. When you select a scheme, the options and the light sources are set accordingly. If you select or deselect a combination of options that is not given by the Realistic or Simple schemes, you create a Custom scheme.

Select **Shading** to use the Gouraud method for rendering the surface. Otherwise, a flat method is used. The flat method sets a single color and brightness for each polygon. The edges are visible, soft gradients and spot lights are not possible. The Gouraud method applies gradients for a smoother, more realistic look. Refer to the *Draw Guide* for more details on shading.

Select **Object Borders** to draw lines along the edges.

Select **Rounded Edges** to smooth the edges of box shapes. In some cases this option is not available.

Illumination

Use the **Illumination** page (Figure 77) to set the light sources for the 3D view. Refer to the *Draw Guide* for more details on setting the illumination.

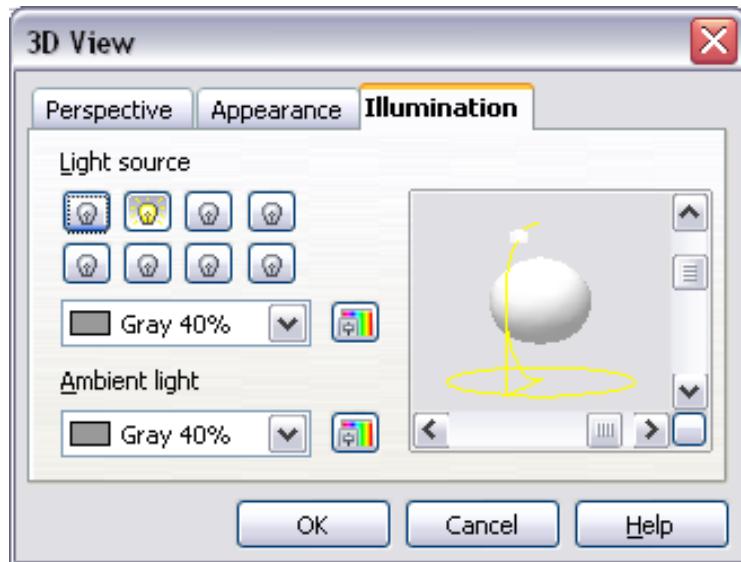


Figure 77: Setting the illumination

Click any of the eight buttons to switch a directed light source on or off. By default, the second light source is switched on. It is the first of seven normal, uniform light sources. The first light source projects a specular light with highlights.

For the selected light source, you can then choose a color and intensity in the list just below the eight buttons. The brightness values of all lights are added, so use dark colors when you enable multiple lights.

Each light source always points at the middle of the object initially. To change the position of the light source, use the small preview inside this page. It has two sliders to set the vertical and horizontal position of the selected light source.

The button in the corner of the small preview switches the internal illumination model between a sphere and a cube.

Use the Ambient light list to define the ambient light which shines with a uniform intensity from all directions.

Rotating 3D charts interactively

In addition to using the Perspective page of the 3D View dialog to rotate 3D charts, you can also rotate them interactively.

Select the Chart Wall, then hover the mouse pointer over a corner handle or the rotation symbol found somewhere on the chart. The cursor changes to a rotation icon.

Press and hold the left mouse button and drag the corner in the direction you wish. A dashed outline of the chart is visible while you drag, to help you see how the result will look.

Formatting the chart elements

Depending on the purpose of your document, for example a screen presentation or a printed document for a black and white publication, you might wish to use more detailed control over the different chart elements to give you what you need.

To format an element, left-click on the element that you wish to change, for example one of the axes. The element will be highlighted with green squares. Then, right-click and choose an item from the context menu. Each chart element has its own selection of items. In the next few sections we explore some of the options.

Formatting axes and inserting grids

Sometimes you need to have a special scale for one of the axes of your chart, or you need smaller grid intervals, or you want to change the formatting of the labels on the axis. After highlighting the axis you wish to change, right-click and choose one of the items from the context menu.

Choosing **Format → Axis → X Axis** or **Format → Axis → Y Axis** opens the dialog shown in Figure 78. The fields available on this dialog depend on the type of chart and whether it is 2D or 3D.

On the **Scale** tab, you can choose a logarithmic or linear scale (default), how many marks you need on the line, where the marks are to appear, and the increments (intervals) of the scale. You must first deselect the **Automatic** option in order to modify the value for any scale.

On the **Label** tab (Figure 79), you can choose whether to show or hide the labels and how to handle them when they won't all fit neatly into one row (for example, if the words are too long).

Not shown here are the tab with options for choosing a font, formatting the lines, and positioning the elements of the line and interval marks.

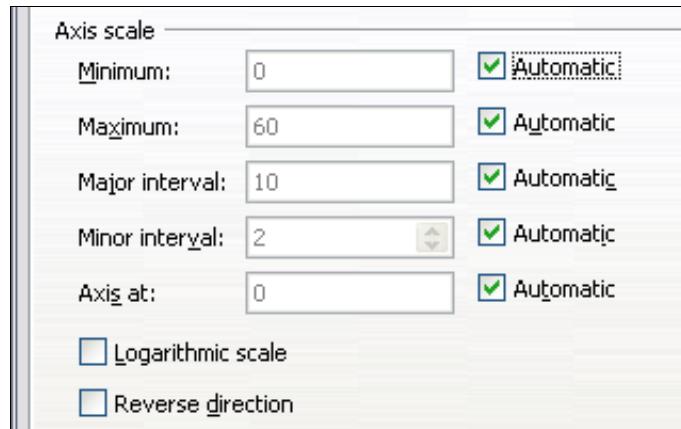


Figure 78: Formatting axis scales

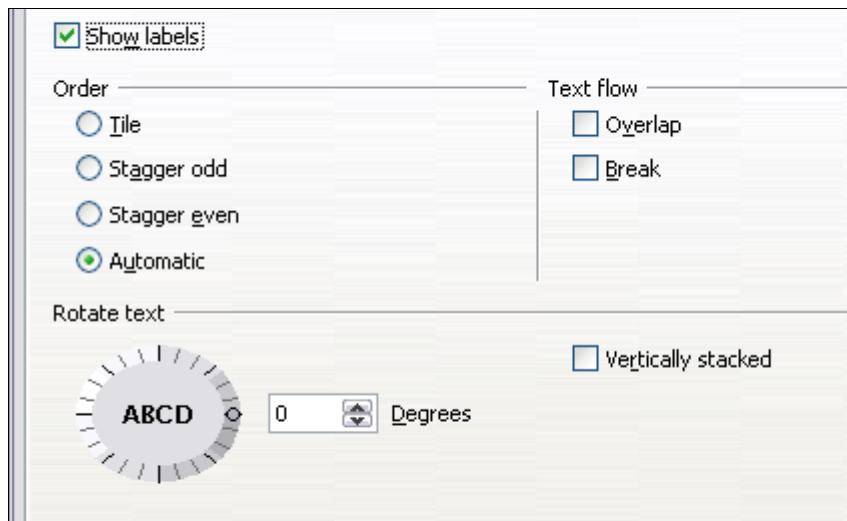


Figure 79: Formatting axis labels

Formatting data labels

You can choose properties for the labels of the data series. Carefully click on the chart element, then right-click and choose the property you want to change. This opens a dialog with several tabs where you can change the color of the label text, the size of the font, and other attributes. The Label tab is shown in Figure 79.

On the Data Labels tab, you can choose whether to:

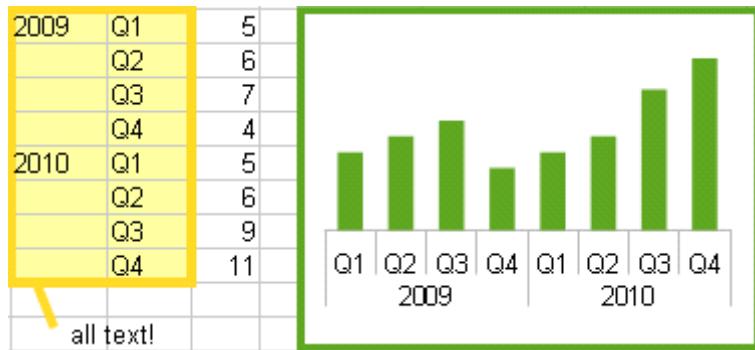
- Show the labels as text
- Show numeric values as a percentage or a number
- Include the legend box as part of the label

These choices are the same as those shown in Figure 71 on page 74.

The text for labels is taken from the column labels and it cannot be changed here. If the text needs to be abbreviated, or if it did not label your graph as you were expecting, you need to change it in the original data table.

Hierarchical axis labels

Multiple columns of categories are displayed in a hierarchical manner at the axis as shown. To get that automatically while creating a chart, make sure that all the first columns (or rows) contain text and not only numbers. You can also choose to set the ranges for categories to multiple columns on the Data Series page in the Wizard or the Data Ranges dialog.



Choosing and formatting symbols

In line and scatter charts the symbols representing the points can be changed to a different symbol shape or color through the object properties dialog. Select the data series you wish to change, right-click, and choose **Format → Data Series** from the context menu.

On the Line tab of the Data Series dialog, in the Icon section, choose from the drop-down list **Select → Symbols**. Here you can choose no symbol, a symbol from an inbuilt selection, a more exciting range from the gallery, or if you have pictures you need to use instead, you can insert them using **Select → From file**.

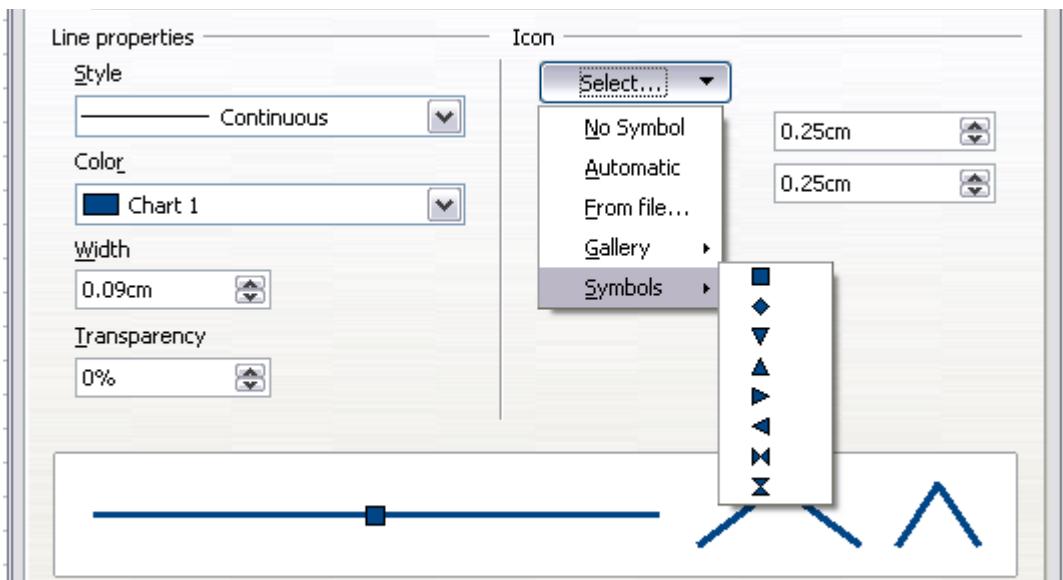
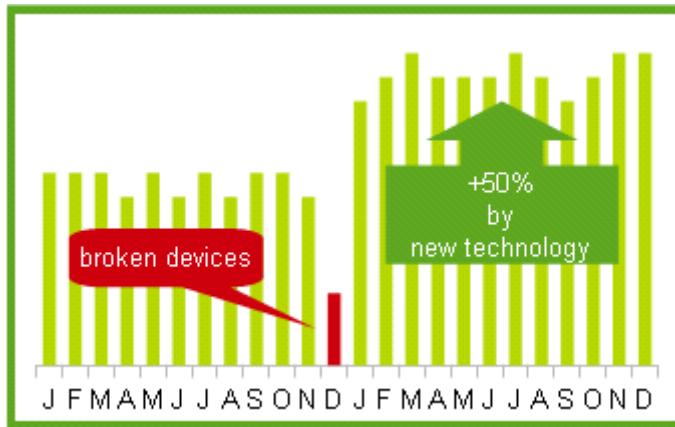


Figure 80: Symbol selection

Adding drawing objects to charts

As in the other LibreOffice components, you can use the drawing toolbar to add simple shapes such as lines, rectangles, and text objects, or more complex shapes such as symbols or block arrows. Use these additional shapes to add explanatory notes to your chart, for example.

To format the drawing objects, right-click and choose from the context menu.



Resizing and moving the chart

You can resize or move all elements of a chart at the same time, in two ways: interactively, or by using the Position and Size dialog. You may wish to use a combination of both methods: interactive for quick and easy change, then the dialog for precise sizing and positioning.

To resize a chart interactively:

- 1) Click once on the chart to select it. Green sizing handles appear around the chart.
- 2) To increase or decrease the size of the chart, click and drag one of the markers in one of the four corners of the chart. To maintain the correct ratio of the sides, hold the *Shift* key down while you click and drag.

To move a chart interactively:

- 1) Click on the chart to select it. Green sizing handles appear around the chart.
- 2) Hover the mouse pointer anywhere over the chart. When it changes to the move icon, click and drag the chart to its new location.
- 3) Release the mouse button when the element is in the desired position.

Using the Position and Size dialog

To resize or move a chart using the Position and Size dialog:

- 1) Click on the chart to select it. Green sizing handles appear around the chart.
- 2) Right-click and choose **Position and Size** from the context menu.
- 3) Make your choices on this dialog.

Position is defined as an X,Y coordinate relative to a fixed point (the *base point*), typically located at the upper left of the document. You can temporarily change this base point to make positioning or dimensioning simpler (click on the spot corresponding to the location of the base point in either of the two selection windows on the right side of the dialog—upper for positioning or lower for dimensioning).

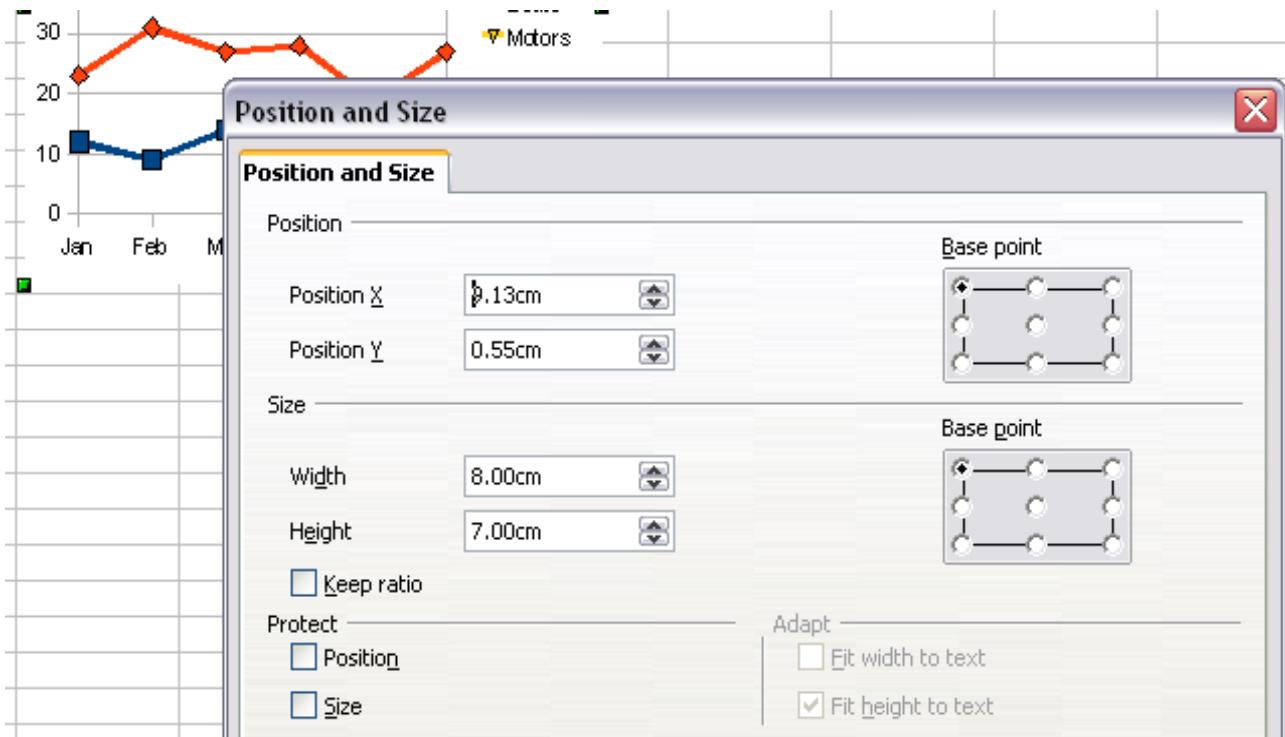


Figure 81: Defining the position and size of an object

The possible base point positions correspond to the handles on the selection frame plus a central point. The change in position lasts only as long as you have the dialog open; when you close this dialog, Calc resets the base point to the standard position.

Tip

The **Keep ratio** option is very useful. Select it to keep the ratio of width to height fixed while you change the size of an object.

Either or both the size and position can be protected so that they cannot be accidentally changed. Select the appropriate options.

Tip

If you cannot move an object, check to see if its position is protected.

Gallery of chart types

It's important to remember that while your data can be presented with a number of different charts, the message you want to convey to your audience dictates the chart you ultimately use. The following sections present examples of the types of charts that Calc provides, with some of the tweaks that each sort can have and some notes as to what purpose you might have for that chart type. For details, see the Help.

Column charts

Column charts are commonly used for data that shows trends over time. They are best for charts that have a relatively small number of data points. (For large time series a line chart would be better.) It is the default chart type, as it is one of the most useful charts and the easiest to understand.

Bar charts

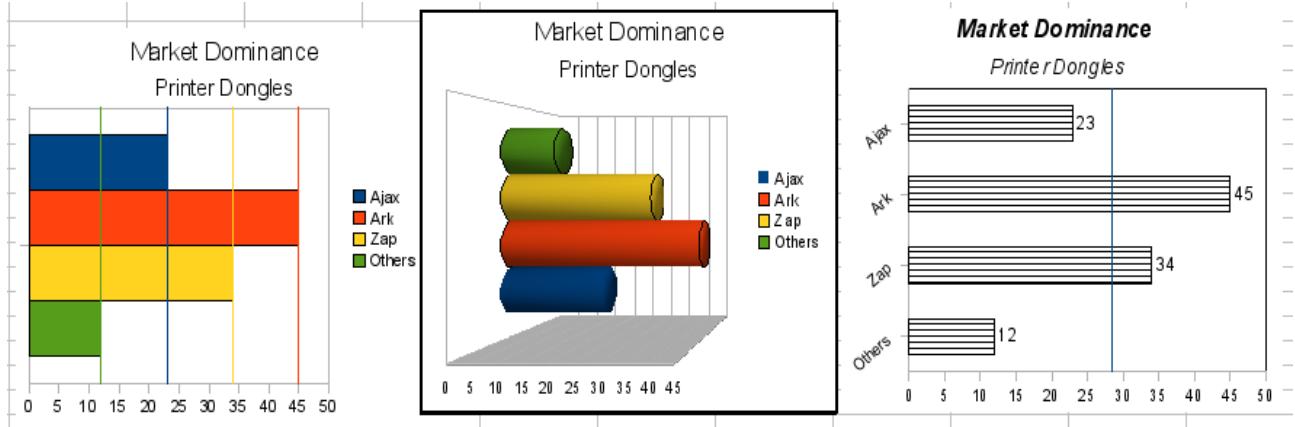


Figure 82: Three bar graph treatments.

Bar charts are excellent for giving an immediate visual impact for data comparison in cases when time is not an important factor, for example, when comparing the popularity of a few products in a marketplace.

- The first chart is achieved quite simply by using the chart wizard with **Insert → Grids**, deselecting y-axis, and using **Insert → Mean Value Lines**.
- The second chart is the 3D option in the chart wizard with a simple border and the 3D chart area twisted around.
- The third chart is an attempt to get rid of the legend and put labels showing the names of the companies on the axis instead. We also changed the colors to a hatch pattern.

Pie charts

Pie charts are excellent when you need to compare proportions. For example, comparisons of departmental spending: what the department spent on different items or what different departments spent. They work best with smaller numbers of values, about half a dozen; more than this and the visual impact begins to fade.

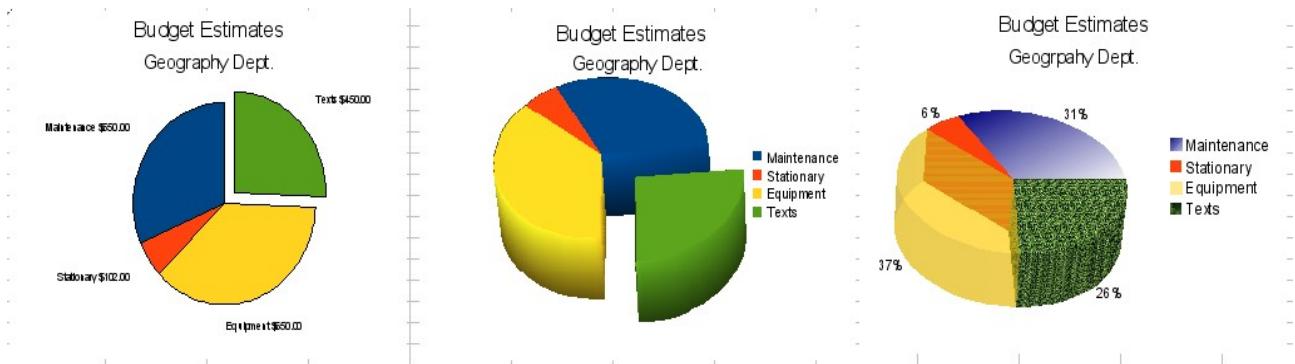


Figure 83: Pie charts

As the Chart Wizard guesses the series that you wish to include in your pie chart, you might need to adjust this initially on the Wizard's Data Ranges page if you know you want a pie chart, or by using the **Format → Data Ranges → Data Series** dialog.

You can do some interesting things with a pie chart, especially if you make it into a 3D chart. It can then be tilted, given shadows, and generally turned into a work of art. Just don't clutter it so much that your message is lost, and be careful that tilting does not distort the relative size of the segments.

You can choose in the Chart Wizard to explode the pie chart, but this is an all or nothing option. If your aim is to accentuate one piece of the pie, you can separate out one piece by carefully highlighting it after you have finished with the Chart Wizard, and dragging it out of the group. When you do this you might need to enlarge the chart area again to regain the original size of the pieces.

The effects achieved in Figure 76 are explained below.

- 2D pie chart with one part of the pie exploded: Choose **Insert → Legend** and deselect the *Display legend* box. Choose **Insert → Data Labels** and choose *Show value as number*. Then carefully select the piece you wish to highlight, move the cursor to the edge of the piece and click (the piece will have nine green highlight squares to mark it), and then drag it out from the rest of the pieces. The pieces will decrease in size, so you need to highlight the chart wall and drag it at a corner to increase the size.
- 3D pie chart with realistic schema and illumination: Choose **Format → 3D view → Illumination** where you can change the direction of the light, the color of the ambient light, and the depth of the shade. We also adjusted the 3D angle of the disc in the *Perspective* dialog on the same set of tabs.

The chart updates as you make changes, so you can immediately see the effects.

If you want to separate out one of the pieces, click on it carefully; you should see a wire frame highlight. Drag it out with the mouse and then, if necessary, increase the size of the chart wall.

- 3D pie chart with different fill effects in each portion of the pie: Choose **Insert → Data labels** and select *show value as percentage*. Then carefully select each of the pieces so that it has a wire frame highlight and right-click to get the object properties dialog; choose the *Area* tab. For one we chose a bitmap, for another a gradient and for the third we used the *Transparency* tab and adjusted the transparency to 50%.

Donut charts

Donut charts are a variation on the pie chart. To create one, choose Pie in the Chart Type dialog, and choose the third or fourth type of pie chart. For more variety, choose 3D Look.

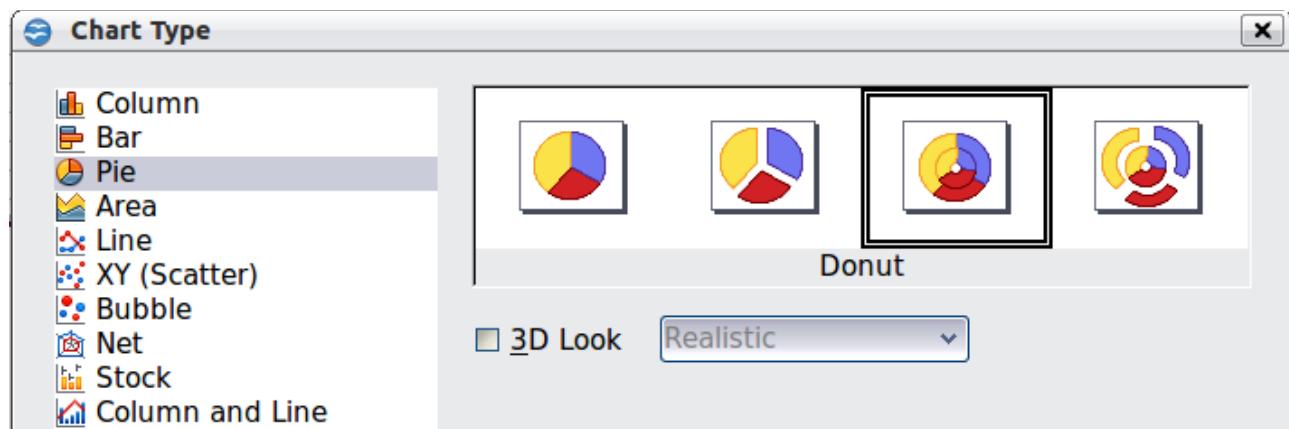


Figure 84: Choosing a donut chart

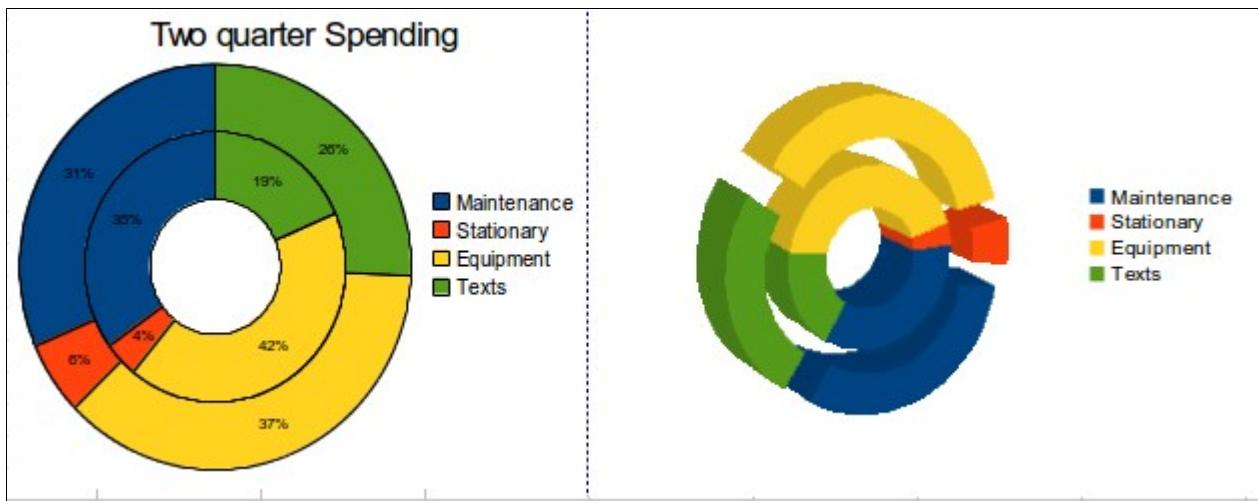


Figure 85: Examples of donut charts

Area charts

An area chart is a version of a line or column graph. It may be useful where you wish to emphasize volume of change. Area charts have a greater visual impact than a line chart, but the data you use will make a difference.

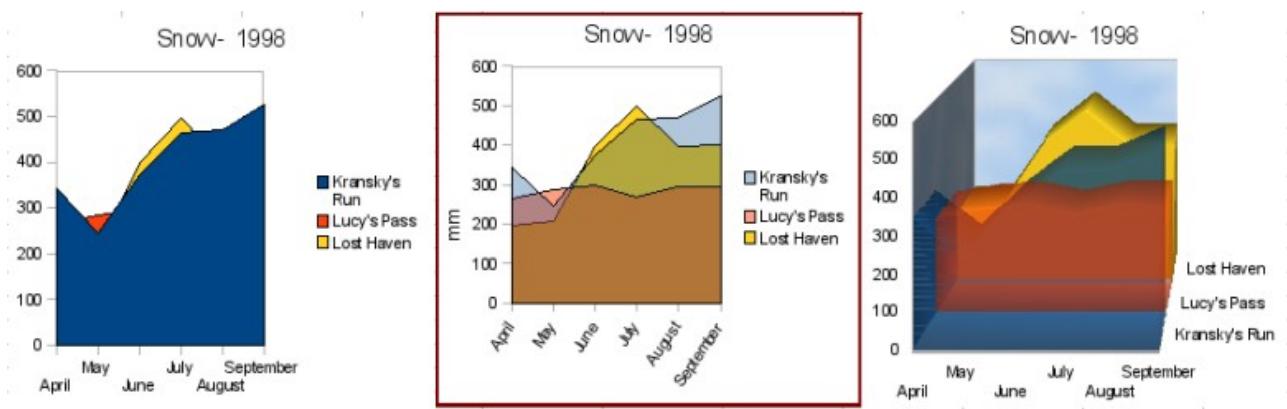


Figure 86: Area charts—the good, the bad, and the ugly

As shown in Figure 75, an area chart is sometimes tricky to use. This may be one good reason to use transparency values in an area chart. After setting up the basic chart using the Chart Wizard, do this:

- Right-click on the Y axis and choose **Delete Major Grid**. As the data overlaps, some of it is missing behind the first data series. This is not what you want. A better solution is shown in Chart 2.
- After deselecting the Y axis grid, right-click on each data series in turn and choose **Format Data Series**. On the *Transparency* tab, set Transparency to 50%. The transparency makes it easy to see the data hidden behind the first data series. Now, right-click on the X axis and choose **Format Axis**. On the *Label* tab, choose **Tile** in the *Order* section and set the Text orientation to 55 degrees. This places the long labels at an angle.
- To create the third variation, after doing the steps above, right-click and choose **Chart Type**. Choose the **3D Look** option and select **Realistic** from the drop-down list. We also twisted the chart area around and gave the chart wall a picture of the sky. As you can see, the legend turns into labels on the z-axis. But overall, though it is visually more appealing, it is more difficult to see the point you are trying to make with the data.

Other ways of visualizing the same data series are represented by the stacked area chart or the percentage stacked area chart.

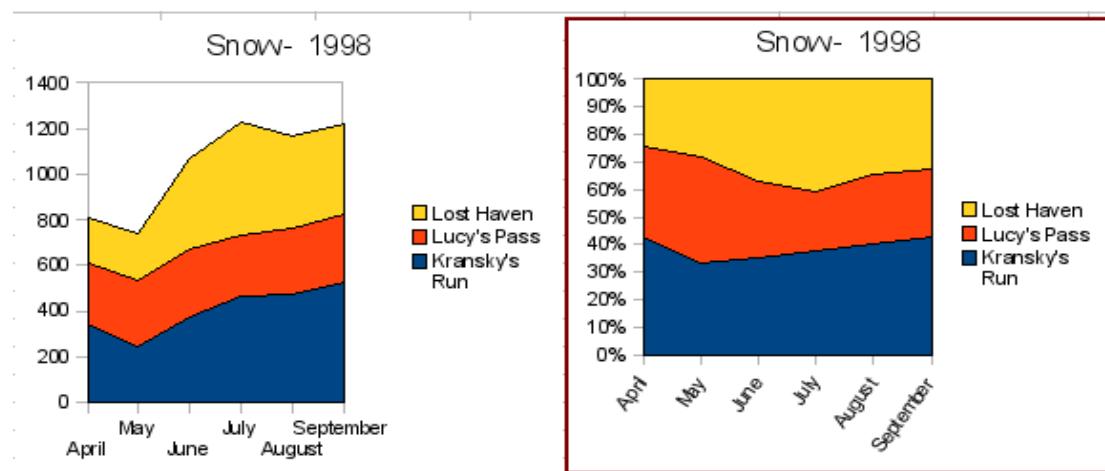


Figure 87: Stacked and percentage stacked area charts

The first does what it says: each number of each series is added to the others so that it shows an overall volume but not a comparison of the data. The percentage stacked chart shows each value in the series as a part of the whole. For example in June all three values are added together and that number represents 100%. The individual values are a percentage of that. Many charts have varieties which have this option.

Line charts

A *line chart* is a time series with a progression. It is ideal for raw data, and useful for charts with plentiful data that show trends or changes over time where you want to emphasize continuity. On line charts, the x-axis is ideal to represent time series data.

Things to do with lines: thicken them, make them 3D, smooth the contours, just use points.

3D lines confuse the viewer, so just using a thicker line often works better.

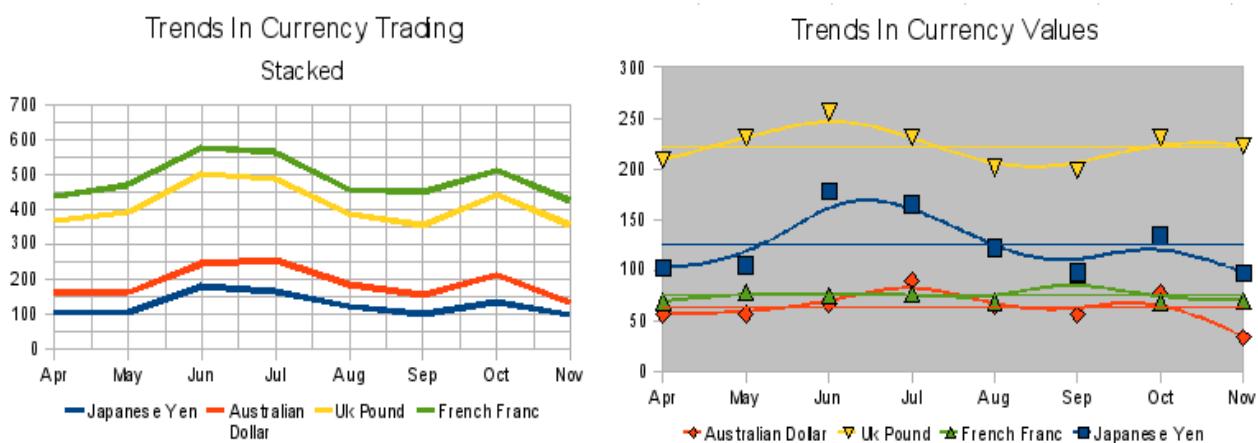


Figure 88: Line charts

Scatter or XY charts

Scatter charts are great for visualizing data that you have not had time to analyze, and they may be the best for data when you have a constant value against which to compare the data; for example, weather data, reactions under different acidity levels, conditions at altitude, or any data which matches two series of numeric data. In contrast to line charts, the x-axis are the left to right labels, which usually indicate a time series.

Scatter charts may surprise those unfamiliar with how they work. While constructing the chart, if you choose **Data Range → Data series in rows**, the first row of data represents the x-axis. The rest of the rows of data are then compared against the first row data. Figure 74 shows a comparison of three currencies with the Japanese Yen. Even though the table presents the monthly series, the chart does not. In fact the Japanese Yen does not appear; it is merely used as the constant series that all the other data series are compared against.

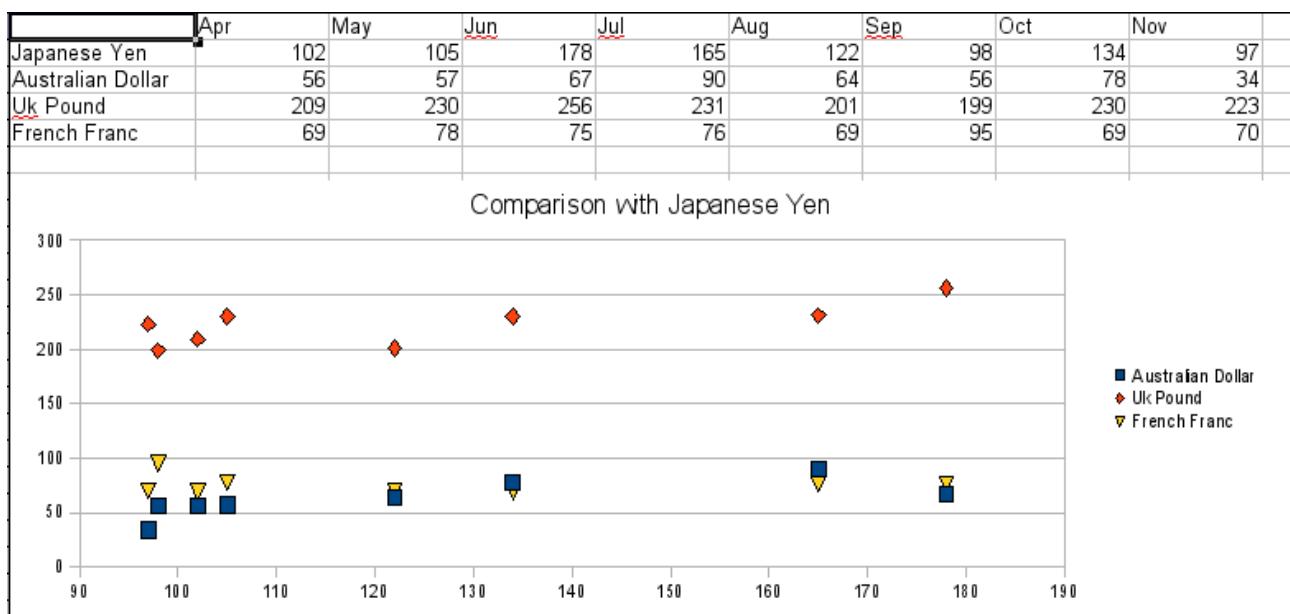


Figure 89: A particularly volatile time in the world currency market.

Bubble charts

A bubble chart is a variation of a scatter chart in which the data points are replaced with bubbles. It shows the relations of three variables in two dimensions. Two variables are used for the position on the X-axis and Y-axis, while the third is shown as the relative size of each bubble. One or more data series can be included in a single chart.

Bubble charts are often used to present financial data. The data series dialog for a bubble chart has an entry to define the data range for the bubbles and their sizes.

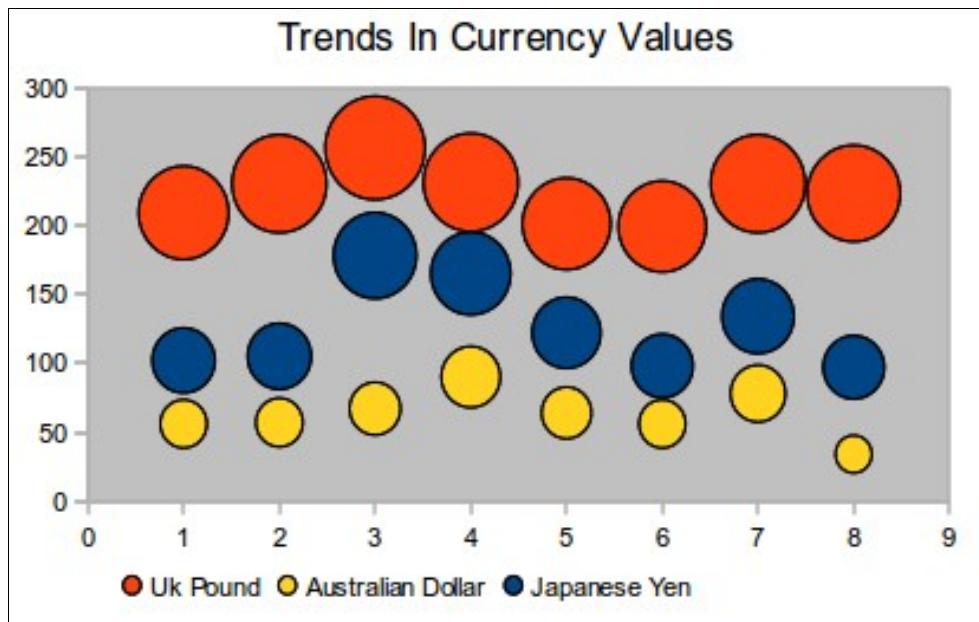


Figure 90: Bubble chart showing three data series

Net charts

A *net chart* is similar to a polar or radar chart. They are useful for comparing data that are not time series, but show different circumstances, such as variables in a scientific experiment or direction. The poles of the net chart are equivalent to the y-axes of other charts. Generally, between three and eight axes are best; any more and this type of chart becomes confusing. Before and after values can be plotted on the same chart, or perhaps expected and real results, so that differences can be compared.

Figure 73 shows two types of net charts:

- (Left): Plain net chart without grids and with just points, no lines.
- (Right): Net chart with lines, points and grid. Axes colors and labels changed. Chart area color = gradient. Points changed to fancy 3D ones.

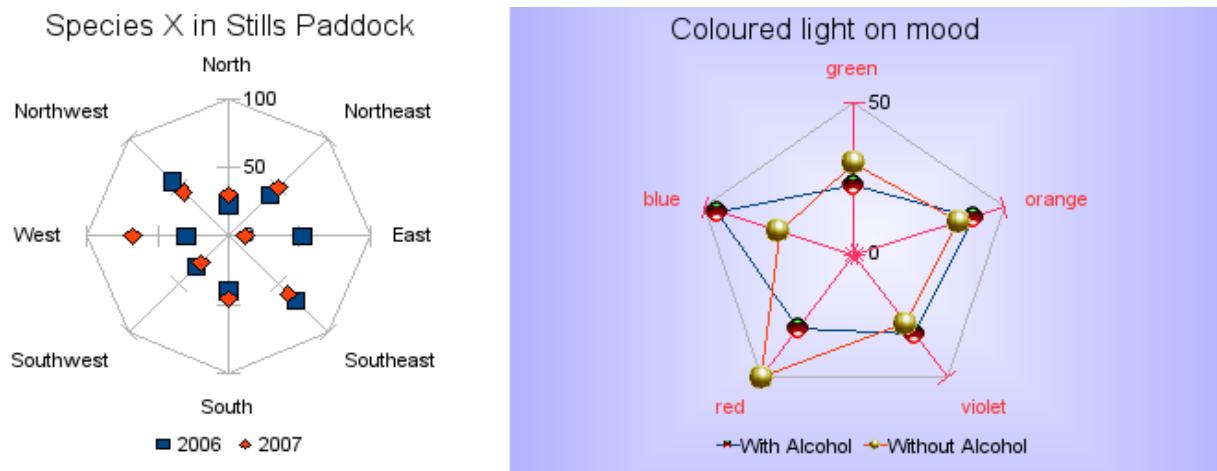


Figure 91: Two net diagrams showing totally fabricated data from totally fictional experiments.

Other varieties of net chart show the data series as stacked numbers or stacked percentages. The series can also be filled with a color (Figure 72). Partial transparency is often best for showing all the series.

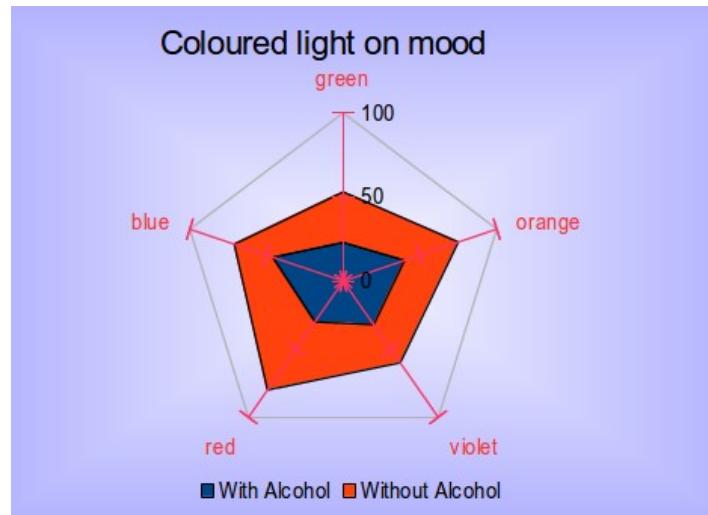


Figure 92: Filled net or radar chart

Stock charts

A stock chart is a specialized column graph specifically for stocks and shares. You can choose traditional lines, candlestick, and two-column type charts. The data required for these charts is quite specialized, with series for opening price, closing price, and high and low prices. Of course the x-axis represents a time series.

When you set up a stock chart in the Chart Wizard, the Data Series dialog is very important. You need to tell it which series is for the opening price, closing price, high and low price of the stock and so on. Otherwise the chart may be indecipherable. The sample table for this chapter needed to be changed to fit the data series.

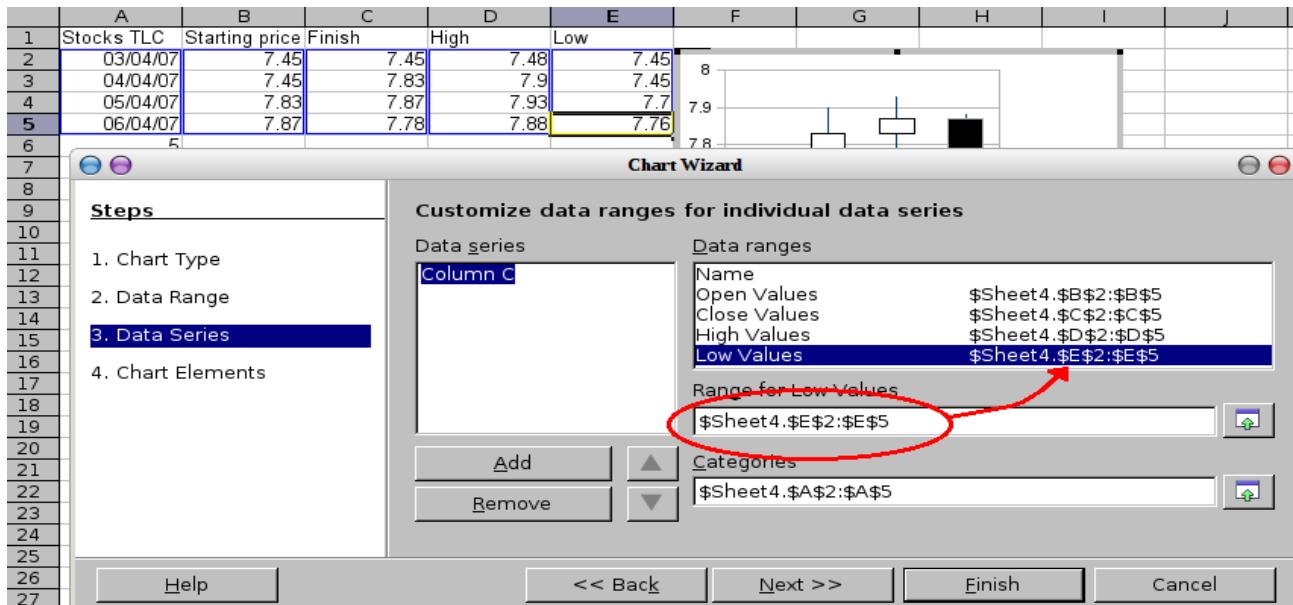


Figure 93: Adjusting data series for stock charts.

A nice touch is that OpenOffice.org Chart color-codes the rising and falling shares: white for rising and black for falling in the candlestick chart, and red and blue in the traditional line chart.

Column and line charts

A *column and line chart* is a combination of two other chart types. It is useful for combining two distinct but related data series, for example sales over time (column) and the profit margin trends (line).

You can choose the number of columns and lines in the Chart Wizard. So for example you might have two columns with two lines to represent two product lines with the sales figures and profit margins of both.

The chart in Figure 64 has manufacturing cost and profit data for two products, over a period of time (six months in 2007). To create this chart, first highlight the table and start the Chart Wizard. Choose Column and Line chart type with two lines and the data series in rows. Then give it a title to highlight the aspect you want to show. The lines are different colors at this stage and don't reflect the product relationships. When you finish with the Chart Wizard, highlight the chart, click on the line, right-click and chose **Format Data Series**.

On this tab there are a few things to change: The colors should match the products. So both Ark Manufacturing and profit are blue and Prall is red. The lines need to be more noticeable so make the lines thicker by increasing the width to 0.08.

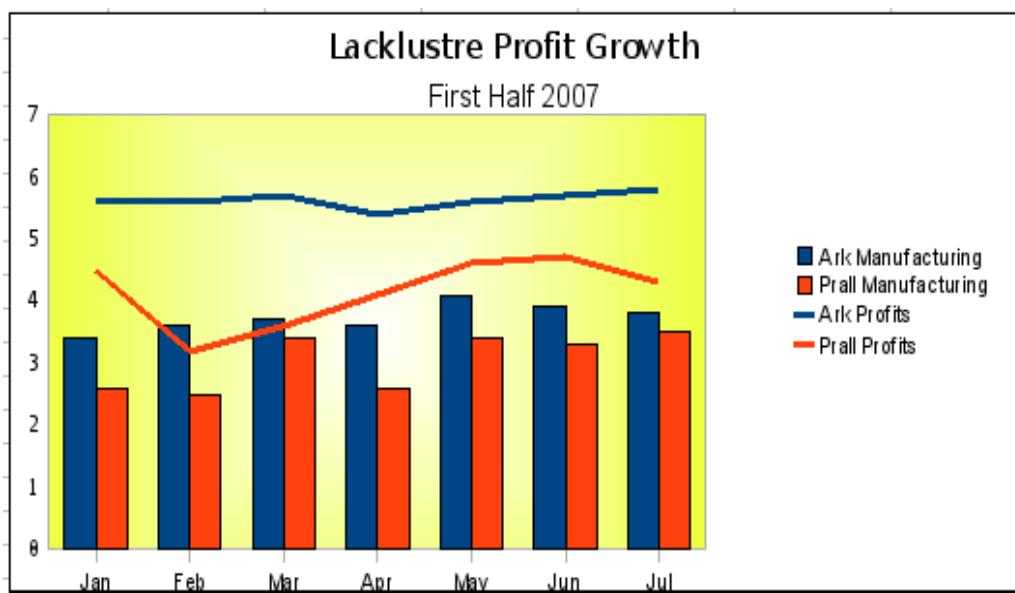
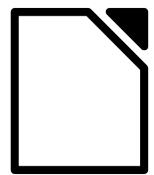


Figure 94: Column and line chart

For the background, highlight the chart wall, right-click and choose **Format Wall**. On the Area tab, change the drop-down box to show Gradient. Choose one of the preset gradient patterns and make it lighter by going to the *Transparency* tab and making the gradient 50% transparent.

To make the chart look cleaner without the grid, go to **Insert → Grids** and deselect the X-axis option.



LibreOffice
The Document Foundation

Chapter 4

Using Styles and Templates in Calc

Bringing uniformity to your spreadsheets

What is a template?

A *template* is a model that you use to create other documents. For example, you can create a template for invoices that has your company's logo and address at the top of the page. New spreadsheets created from this template will all have your company's logo and address on the first page.

Templates can contain anything that regular documents can contain, such as text, graphics, styles, and user-specific setup information such as measurement units, language, the default printer, and toolbar and menu customization.

All documents in LibreOffice are based on templates. You can create, or download and install, as many templates as you wish. If you do not specify a template when you start a new spreadsheet, the new spreadsheet is based on the default template for spreadsheets. If you have not specified a default template, LibreOffice uses the blank spreadsheet template that is installed with the program. See "Setting a default template" on page 110.

What are styles?

A *style* is a set of formats that you can apply to selected elements in a document to quickly change their appearance. When you apply a style, you apply a whole group of formats at the same time.

Many people manually format spreadsheet cells and pages without paying any attention to styles. They are used to formatting documents according to *physical* attributes. For example, for the contents of a cell you might specify the font family, font size, and any formatting such as bold or italic.

Styles are *logical* attributes. Using styles means that you stop saying "font size 14pt, Times New Roman, bold, centered", and you start saying "Title" because you have defined the "Title" style to have those characteristics. In other words, styles means that you shift the emphasis from what the text (or page, or other element) looks like, to what the text *is*.

Styles help improve consistency in a document and can greatly speed up formatting. They also make major formatting changes easy. For example, you may decide to change the appearance of all subtotals in your spreadsheet to be 10 pt. Arial instead of 8 pt. Times New Roman after you have created a 15-page spreadsheet; you can change all of the subtotals in the document by simply changing the properties for the subtotal style.

Page styles assist with printing, so you don't need to define margins, headers and footers, and other printing attributes each time you print a spreadsheet.

Types of styles in Calc

While some components of LibreOffice offer many style types, Calc offers only two:

- Cell styles include fonts, alignment, borders, background, number formats (for example, currency, date, number), and cell protection.
- Page styles include margins, headers and footers, borders and backgrounds, and the sequence for printing sheets. The page size, orientation, and other attributes of a page style apply only when a spreadsheet is printed; they are not displayed onscreen.

Cell styles

Similar to paragraph styles in LibreOffice Writer, cell styles are the most basic type of style in Calc. You can apply a cell style to a cell and that cell will follow the formatting rules of the style. A range of cell styles are supplied with LibreOffice; five are shown in Figure 95.

Initially, the styles are configured so that if you change the font family of *Default*, then all of the other styles will change to match. We will discuss how to set this up in “Creating new (custom) styles” on page 103.

	A	B	
1	Default – LibreOffice Calc Style		
2	Heading – Style		Heading1 – 90° Rotation
3	Result – LibreOffice Calc Style		
4	Result2 – LibreOffice Calc Style		
5			

Figure 95: Examples of default Calc cell styles

Page styles

Page styles in Calc are applied to sheets. Although one sheet may print on several pages (pieces of paper), only one page style can be applied to a sheet. If a spreadsheet file contains more than one sheet, the different sheets can have different page styles applied to them. So, for example, a spreadsheet might contain one sheet to be printed in landscape orientation (using the Default page style) and another sheet to be printed in portrait orientation (using the Report page style).

Two page styles are supplied with Calc: Default and Report. The major difference between these two styles is that Report is portrait-oriented and Default is landscape-oriented. You can adjust many settings using page styles. You can also define as many page styles as you wish.

Because spreadsheets are primarily used onscreen and not printed, Calc does not display the page style on the screen. If you want a spreadsheet to fit on a certain page size, you have to carefully control the column width and row height, with only **File → Page Preview** to guide you.

Despite this limitation, it's well worth defining page styles for any spreadsheets that you are likely to print. Otherwise, if a need for printing does arise, you may lose time to trial and error.

Accessing styles

The main way to access styles is through the Styles and Formatting window (shown in Figure 96). You can open this window in several ways.

- Keyboard: Press the *F11* key.
- Menu: Choose **Format → Styles and Formatting**.
- Toolbar: Click the  icon on the far left of the Formatting toolbar.

The Styles and Formatting window can be docked at the left or right of the main Calc window. To dock or undock the window, hold down the *Ctrl* key and double-click a gray part of the window next to the icons at the top.

The first button on the top left of the window, , is for cell styles and the second, , is for page styles.

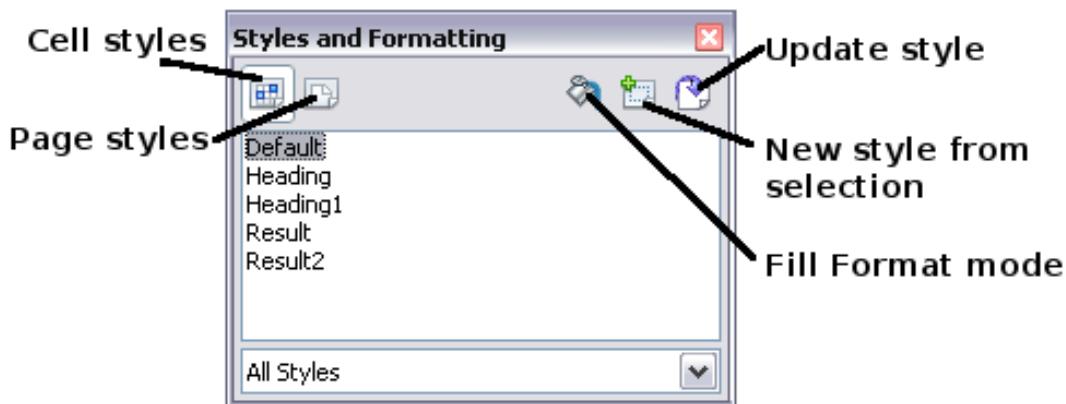


Figure 96: Styles and Formatting window

Applying cell styles

Calc provides several ways to apply cell styles:

- Using the Styles and Formatting window
- Using Fill Format mode
- Using the Apply Style list
- Assigning styles to shortcut keys

Using the Styles and Formatting window

- 1) Ensure the Styles and Formatting window is open by pressing *F11* or by selecting **Format** → **Styles and Formatting**. Choose the Cell Styles list by clicking the  icon.
- 2) Highlight the cell or group of cells to which the styles should be applied.
- 3) Double-click on the cell style name.

Using Fill Format mode

This method is quite useful when you need to apply the same style to many scattered cells.

- 1) Open the Styles and Formatting window and select the style you want to apply.
- 2) Click the **Fill Format mode** icon . The mouse pointer changes to this icon.
- 3) Position the moving icon on the cell to be styled and click the mouse button.
- 4) To quit Fill Format mode, click the **Fill Format mode** icon again or close the Styles and Formatting window.

Caution

When this mode is active, a right-click anywhere in the document undoes the last Fill Format action. Be careful not to accidentally right-click and thus undo actions you want to keep.

Using the Apply Style list

You can also add an Apply Style drop-down list to the Formatting toolbar and select a style from the list to apply it to the selected cells:

- 1) Click the down-arrow at the right-hand end of the Formatting toolbar (circled in Figure 97). On the drop-down menu, click **Visible Buttons**.

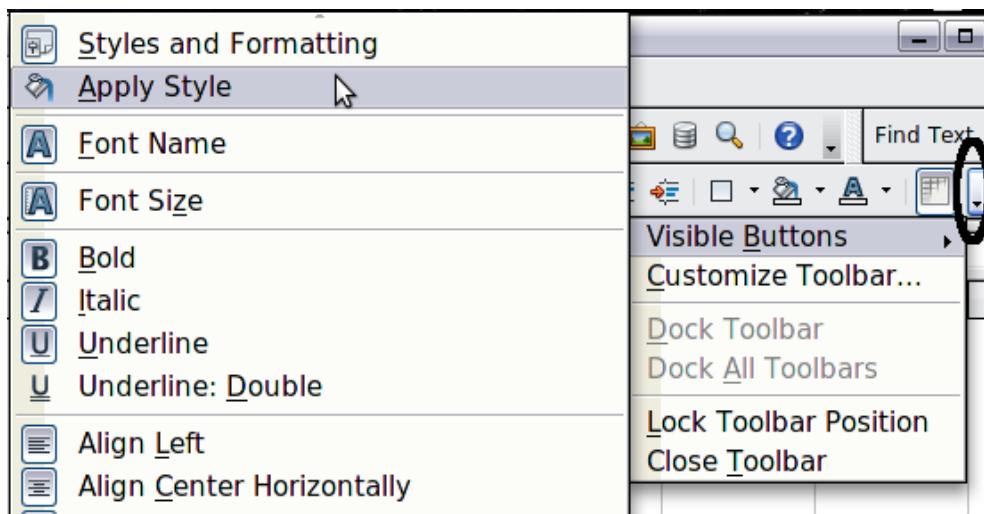


Figure 97: Adding an Apply Style list to the Formatting toolbar

- 2) On the submenu, click **Apply Style**. The menus close and the Apply Style list now appears on the toolbar between the Styles and Formatting icon and the Font Name list.

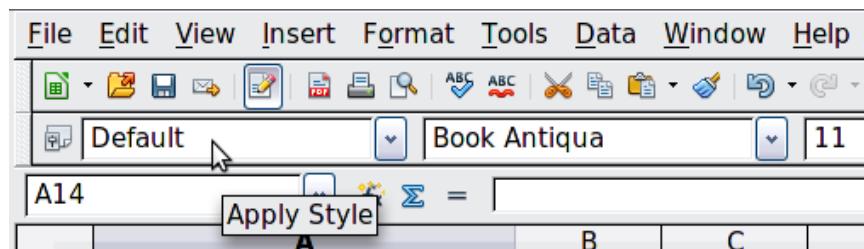


Figure 98: Location of Apply Style list

Assigning styles to shortcut keys

You can create keyboard shortcuts to apply commonly-used cell or page styles, including custom styles that you have created. See Chapter 14, Setting up and Customizing Calc, for instructions.

Applying page styles

- 1) Select the sheet to be styled (click on its sheet tab at the bottom of the screen).
- 2) In the Styles and Formatting window, choose the Page Styles list by clicking the  icon. Double-click on the required page style.

To find out which page style is in use for a selected sheet, look in status bar.

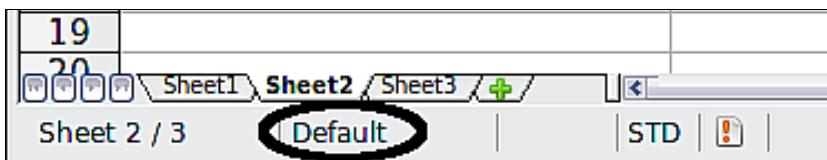


Figure 99: Status bar showing location of page style information below the sheet tabs.

Modifying styles

To modify a style, right-click on its name in the Styles and Formatting window and choose **Modify**. Make the changes in the Style dialog and click **OK** to save the changes.

You can also modify a current cell style by selecting an already formatted cell and clicking the **Update Style** button on the top right hand corner of the Styles and Formatting window.

Style organizer

Right click on the name of a style in the Styles and Formatting window and click **Modify** to open a Style dialog similar to the one shown in Figure 100.

The Style dialog has several tabs. The Organizer tab, shown in Figure 100 for cell styles, is found in all components of LibreOffice. It provides basic information about the style. The Organizer tab for page styles is similar to the one shown for cell styles.

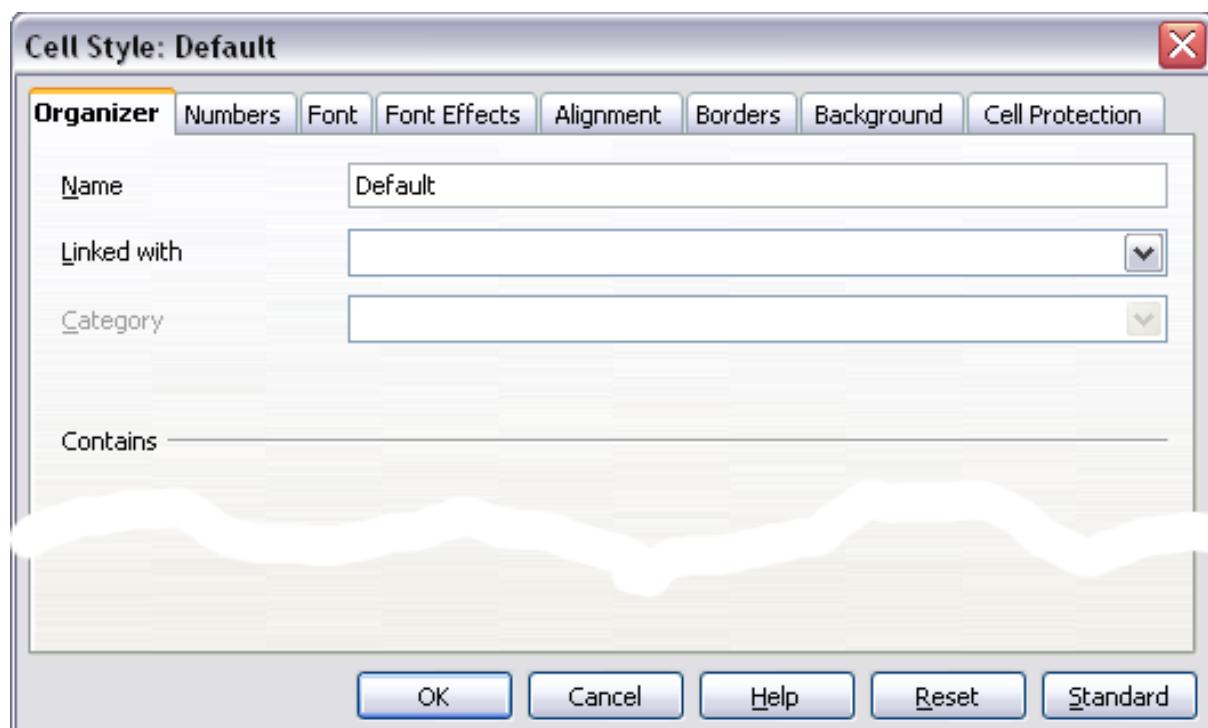


Figure 100: Organizer tab of Cell Style dialog

Name

This is the style's name. You cannot change the name of a built-in style, but you can change the name of a custom style.

Linked with

This option is only available for cell styles; page styles cannot be linked. If you link cell styles, then when you change the base style (for example, by changing the font from Times to Helvetica), all the linked styles will change as well. Sometimes this is exactly what you want; other times you do not want the changes to apply to all the linked styles. It pays to plan ahead.

For example, you can make a new style called *red*, in which the only change you want to make is for the cell text to be red. In order to make sure that the rest of the text characteristics are the same as the default style, you can link *red* with *default*. Then, any changes you make to *default* will be automatically applied to *red*.

Category

In Calc, the only option in this drop-down box is Custom styles.

Cell style options

When editing or creating cell styles, you can set several options, which are similar to those for directly formatting cells. A more detailed coverage of cell formatting is given in Chapter 2, Entering, Editing, and Formatting Data. A brief summary is provided here.

Numbers

On the *Numbers* tab, you can control the behavior of the data in a cell with this style. This includes specifying the type of data, the number of decimal places, and the language.

Font

Use the *Font* tab to choose the font for the cell's contents.

Font effects

The *Font Effects* tab offers more font options including underlining, strikethrough, and color.

Alignment

Use the *Alignment* tab to set the horizontal and vertical alignment for the data in the cells, and rotate the text.

Borders

Use the *Borders* tab to set the borders for the cells, along with a shadow.

Background

Use the *Background* tab to choose the background color for a cell.

Cell protection

Use the *Cell Protection* options to protect cells against certain types of editing.

Page style options

Several of the page style options are described in more detail in Chapter 6, Printing, Exporting, and E-mailing, because manually formatting a sheet at print time (using **Format → Page**) actually modifies the page style.

Page

Use the *Page* tab to edit the overall appearance of the page and its layout. The available options are shown in Figure 101.

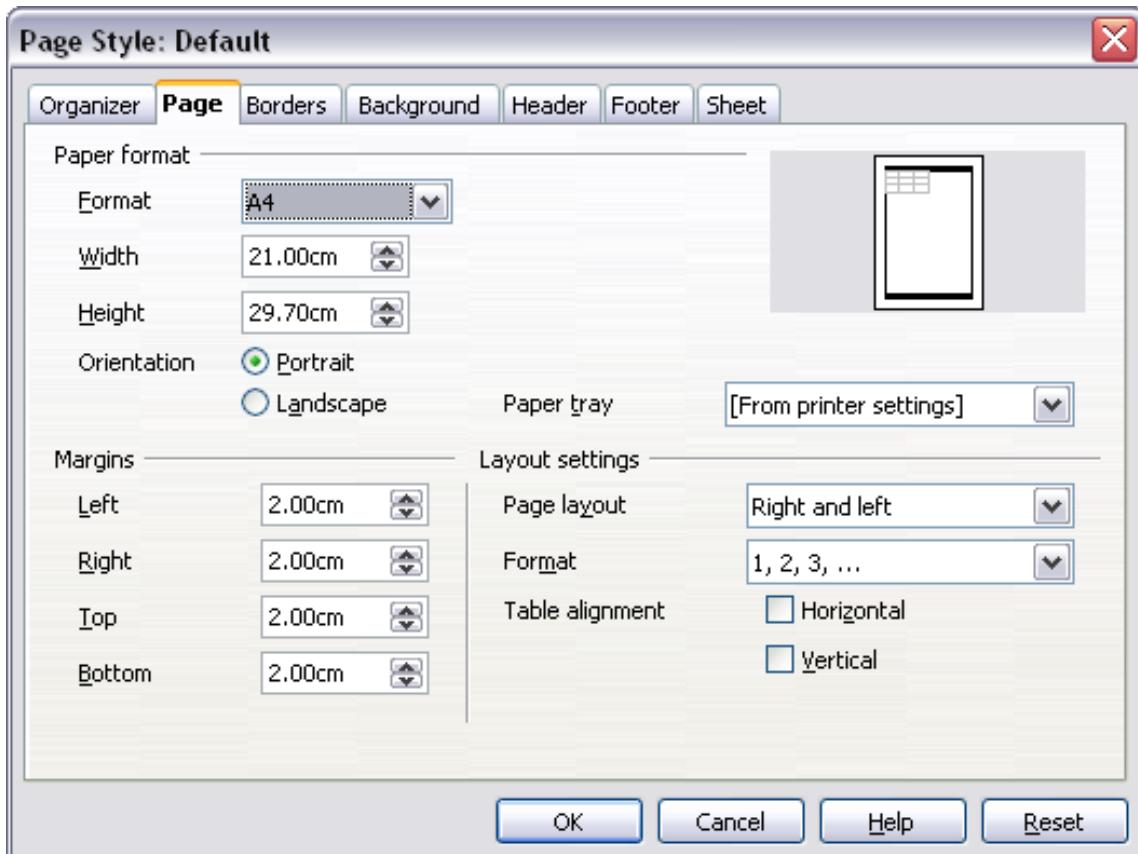


Figure 101: Page Style: Page tab

Paper format

Here you can set a generic paper type to be used. Letter or A4 are most common, but you can also use legal, tabloid, envelope sizes, or user-defined paper types. You can also define the orientation of the page and which print tray for the paper to come from (if your printer has more than one tray).

Margins

Here you can set the margins for the page.

Layout settings: Page layout

Here you can specify whether to apply the formatting to right (odd) pages only, left (even) pages only, or both right and left pages that use the current page style.

Mirrored formats the pages as if you want to bind the printed pages like a book.

The first page of a document is assumed to be an odd page.

Layout settings: Format

This area specifies the page numbering style for this page style.

Layout settings: Table alignment

This option specifies the alignment options for the cells on a printed page, either horizontal or vertical.

Borders

The Border and Background tabs for pages duplicate the tabs of the same name on cell styles, and are over-ridden by the cell style or manual settings. You may choose to ignore the Border and Background tabs altogether in page styles. Both tabs are illustrated with helpful diagrams.

Similar to formatting a cell style, use the Borders tab to choose whether the page should have borders, how large the borders should be, and how far the text will be from the borders.

Background

Use this tab to specify the background for this page style. You can apply either a solid color or a picture as a background.

Header

Use this tab to design and apply the header for this page style. For more detailed instructions on how to format the header, see Chapter 6, Printing, Exporting, and E-mailing.

Footer

Use this tab to design and apply the footer for this page style. For more detailed instructions on how to format the footer, see Chapter 6.

Sheet

By far the most important settings for Calc page styles are on the Sheet tab. Although the Sheet tab includes an option that sets the first page option, most of its settings involve exactly how your spreadsheet will print. See Chapter 6.

Creating new (custom) styles

You may want to add some new styles. You can do this in two ways:

- Creating a new style using the Style dialog
- Creating a new style from a selection

Note

New styles apply only to this document; they are not saved in the template. To save new styles in a template, see “Copying and moving styles” on page 104 and “Creating a template” on page 107.

Creating a new style using the Style dialog

To create a new style using the Style dialog, right-click in the Styles and Formatting window and choose **New** from the context menu.

(Cell styles only) If you want your new style to be linked with an existing style, first select that style and then right-click and choose **New**.

If you link styles, then when you change the base style (for example, by changing the font from Times to Helvetica), all the linked styles will change as well. Sometimes this is exactly what you want; other times you do not want the changes to apply to all the linked styles. It pays to plan ahead.

The dialogs and choices are the same for defining new styles and for modifying existing styles.

Creating a new style from a selection

You can create a new cell style by copying an existing manual format.

- 1) Open the Styles and Formatting window and choose the type of style you want to create.
- 2) In the document, select the formatted cell that you want to save as a style.
- 3) In the Styles and Formatting window, click on the **New Style from Selection** icon .
- 4) In the Create Style dialog, type a name for the new style. The list shows the names of existing custom styles of the selected type. Click **OK** to save the new style.

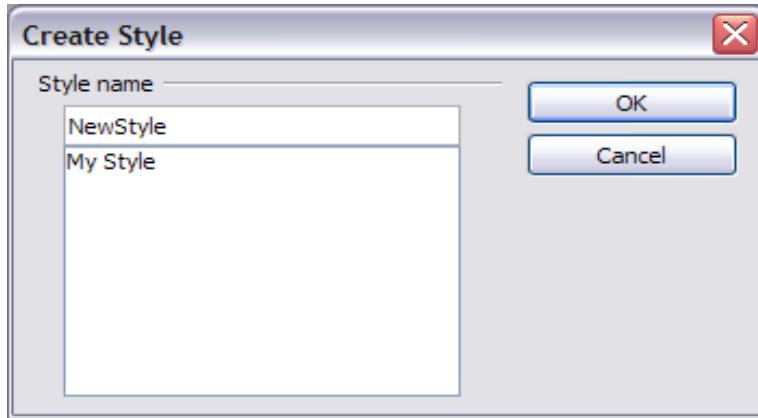


Figure 102: Naming a new style created from a selection

Creating a new style by dragging and dropping

Select a cell and drag it to the Styles and Formatting window.

Copying and moving styles

To copy a style from one spreadsheet to another, or between a spreadsheet and a template, instead of recreating it in the second spreadsheet, use the Template Management dialog.

- 1) Click **File → Templates → Organize**.
- 2) In the Template Management dialog (Figure 102), set the lists at the bottom to either Templates or Documents, as needed. The default is Templates on the left and Documents on the right.

Tip

To copy styles from a file that is not open, click the **File** button. When you return to this dialog, both lists show the selected file as well as all the currently open documents.

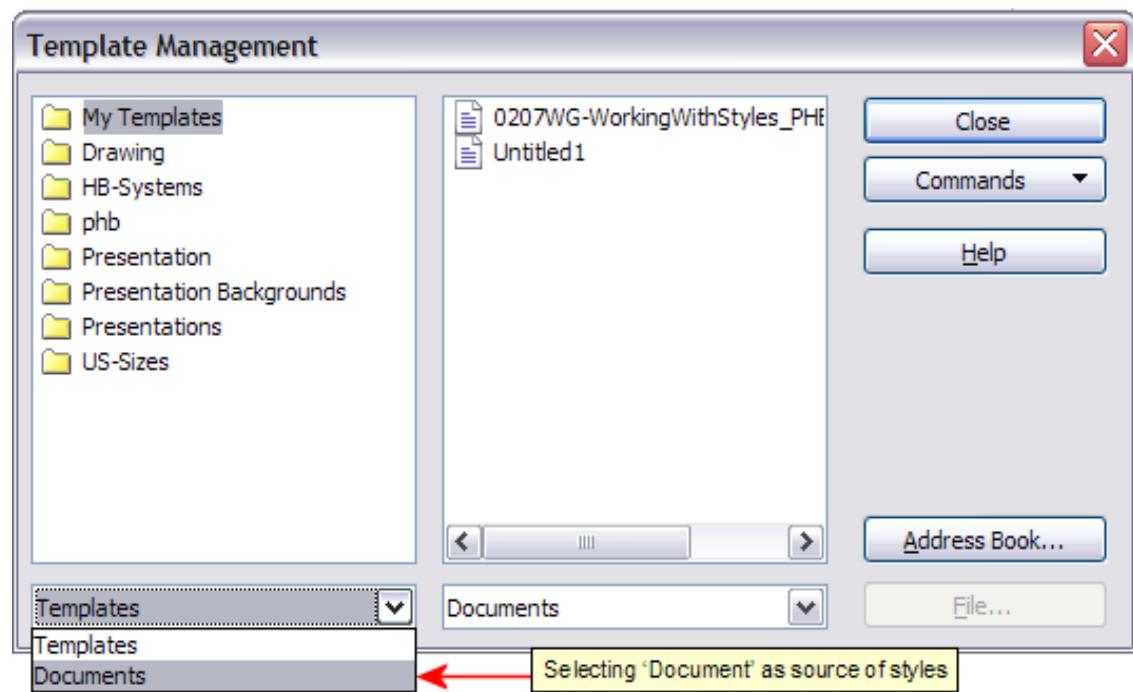


Figure 103: Choosing to copy styles from a document, not a template.

- 3) Open the folders and find the templates from and to which you want to copy. Double-click on the name of the template or document, and then double-click the Styles icon to show the list of individual styles (Figure 99).

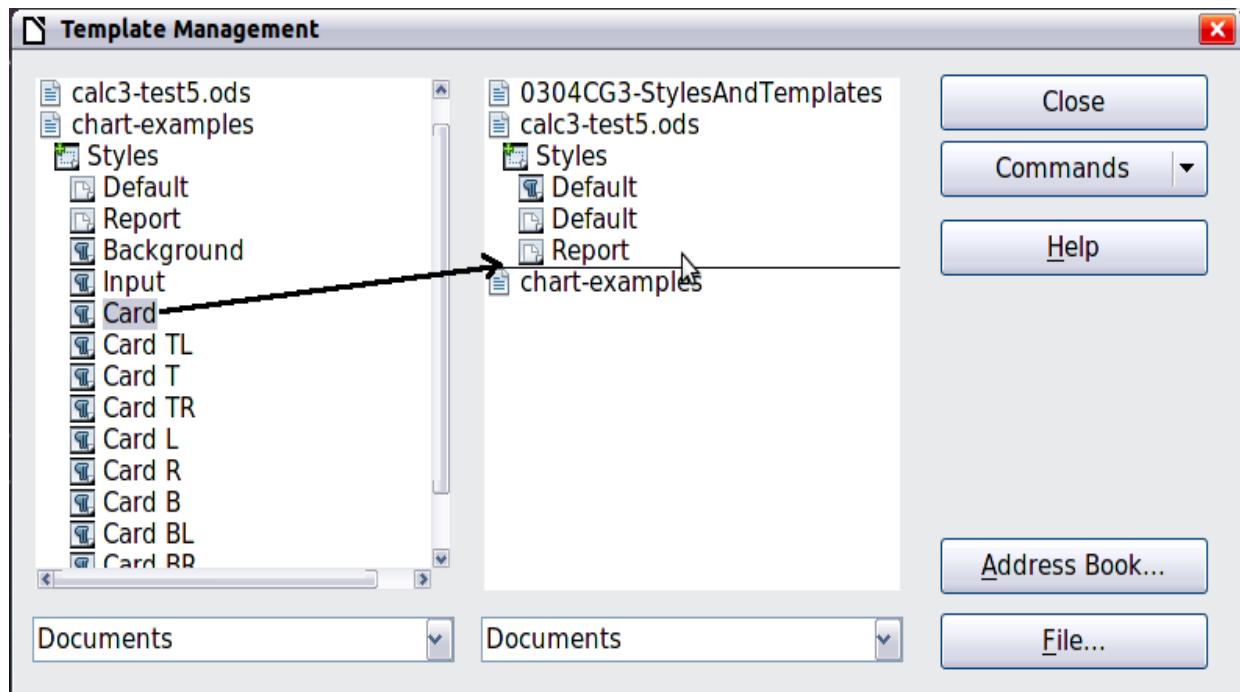


Figure 104: Copying a style from one document to another.

- 4) To copy a style, hold down the *Ctrl* key and drag the name of the style from one list to the other. To move a style, drag the name of the style without holding down the *Ctrl* key.
- 5) Repeat for each style you want to copy. If the receiving template or document has many styles, you may not see any change unless you scroll down in the list. When you are finished, click **Close**.

Deleting styles

You cannot remove (delete) any of Calc's predefined styles, even if you are not using them.

You can remove any user-defined (custom) styles; but before you do, you should make sure the styles are not in use. If an unwanted style is in use, you will want to replace it with a substitute style.

Replacing styles (and then deleting the unwanted ones) can be very useful if you are dealing with a spreadsheet that has been worked on by several people.

To delete unwanted styles, right-click on them (one at a time) in the Styles and Formatting window and click **Delete** on the context menu. Choose **Yes** in the confirmation dialog.

Creating a spreadsheet from a template

To create a spreadsheet from a template:

- 1) From the menu bar, choose **File → New → Templates and Documents**. The Templates and Documents dialog opens.

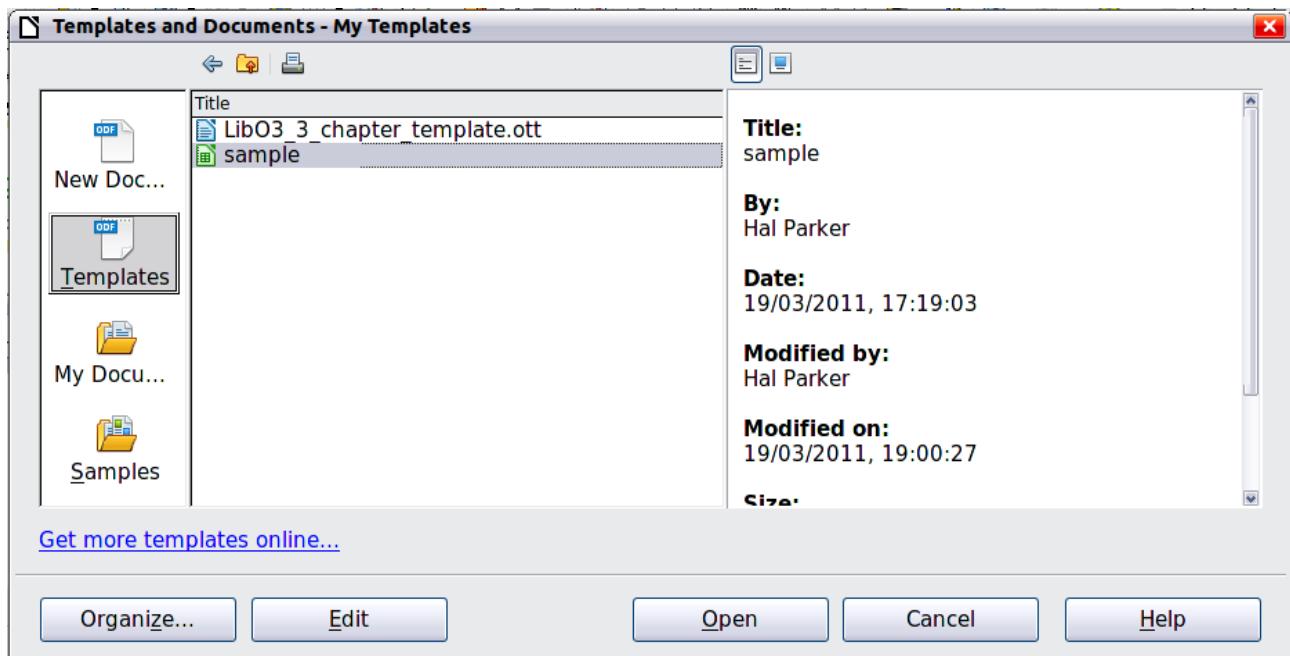


Figure 105: Templates and Documents dialog

- 2) In the box on the left, click the **Templates** icon if it is not already selected. A list of template folders appears in the center box.
- 3) Double-click the folder that contains the template that you want to use. A list of all the templates contained in that folder appears in the center box.
- 4) Select the template that you want to use. You can preview the selected template or view the template's properties:
 - To preview the template, click the **Preview** icon. A preview of the template appears in the box on the right.
 - To view the template's properties, click the **Document Properties** icon. The template's properties appear in the box on the right.
- 5) Click **Open**. The Templates and Documents dialog closes and a new document based on the selected template opens in Calc.

Creating a template

You can create a template from a document:

- 1) Open a new or existing document of the type you want to make into a template (text document, spreadsheet, drawing, presentation).
- 2) Add the content and styles that you want.
- 3) From the menu bar, choose **File → Templates → Save**. The Templates dialog opens .
- 4) In the **New template** field, type a name for the new template.
- 5) In the **Categories** list, click the category to which you want to assign the template. The category you choose has no effect on the template itself; it is simply the folder in which you save the template. Choosing an appropriate folder (category) makes it easier to find the template when you want to use it. You may wish to create a folder for Calc templates.
To learn more about template folders, see “Organizing templates” on page 111.
- 6) Click **OK** to save the new template.

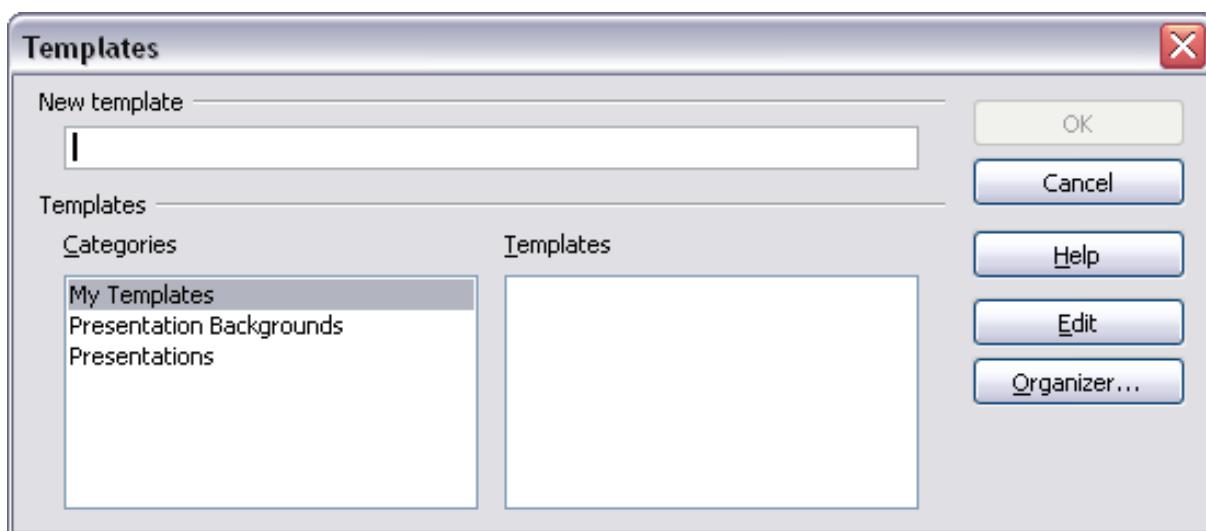


Figure 106: Saving a new template

Any settings that can be added to or modified in a document can be saved in a template. For example, below are some of the settings (although not a full list) that can be included in a Calc document and then saved as a template for later use:

- Printer settings: which printer, single sided / double sided, and paper size, and so on
- Cell and page styles to be used

Templates can also contain predefined text, saving you from having to type it every time you create a new document. For example, an invoice template might contain your company's name, address and logo.

You can also save menu and toolbar customizations in templates; see Chapter 14, Setting up and Customizing Calc, for more information.

Editing a template

You can edit a template's styles and content, and then, if you wish, you can reapply the template's styles to documents that were created from that template. (Note that you can only reapply styles. You cannot reapply content.)

To edit a template:

- 1) From the menu bar, choose **File** → **Templates** → **Organize**. The Template Management dialog opens.

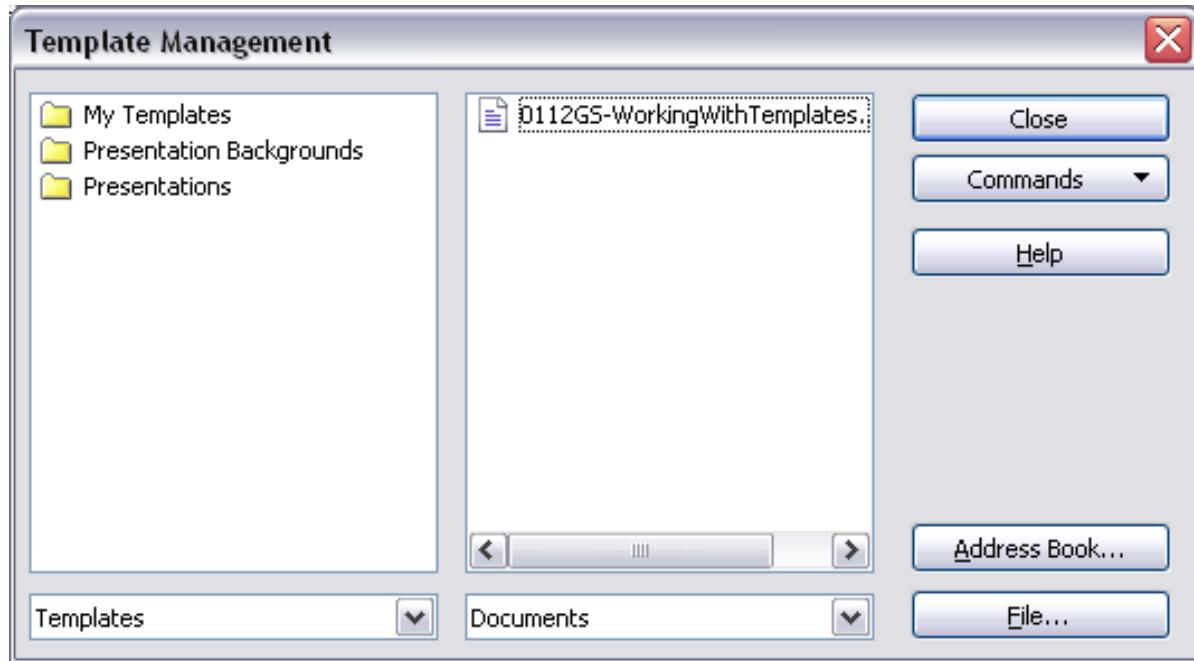


Figure 107: Template management dialog

- 2) In the box on the left, double-click the folder that contains the template that you want to edit. A list of all the templates contained in that folder appears underneath the folder name.
- 3) Select the template that you want to edit.
- 4) Click the **Commands** button and choose **Edit** from the drop-down menu.
- 5) Edit the template just as you would any other document. To save your changes, choose **File** → **Save** from the menu bar.

Updating a spreadsheet from a changed template

The next time you open a spreadsheet that was created from the changed template, the following message appears.

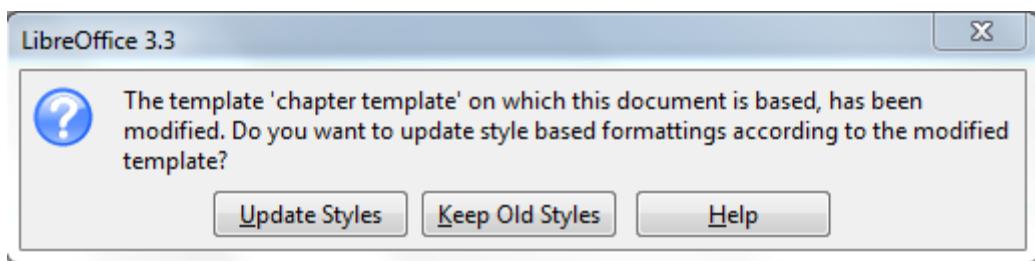


Figure 108: Update styles message

Click **Update Styles** to apply the template's changed styles to the spreadsheet. Click **Keep Old Styles** if you do not want to apply the template's changed styles to the spreadsheet (but see Caution notice below).

Caution

If you choose **Keep Old Styles** in the message box shown in Figure 98, that message will not appear again the next time you open the document after changing the template it is based on. You will not get another chance to update the styles from the template, although you can use the macro given in the Note below to re-enable this feature.

Note

To re-enable updating from a template:

- 1) Use **Tools → Macros → Organize Macros → LibreOffice Basic**. Select the document from the list, click the expansion symbol (+ or triangle), and select Standard. If Standard has an expansion symbol beside it, click that and select a module.
- 2) If the **Edit** button is active, click it. If the Edit button is not active, click **New**.
- 3) In the Basic window, enter the following:

```
Sub FixDocV3
    ' set UpdateFromTemplate
    oDocSettings = ThisComponent.createInstance( _
        "com.sun.star.document.Settings" )
    oDocSettings.UpdateFromTemplate = True
End Sub 'FixDocV3
```
- 4) Click the **Run BASIC** icon, then close the Basic window.
- 5) Save the document.

Next time when you open this document you will have the update from template feature back.

Adding templates using the Extension Manager

The Extension Manager provides an easy way to install collections of templates, graphics, macros, or other add-ins that have been “packaged” into files with a .OXT extension. See Chapter 14, Setting Up and Customizing Calc, for more about the Extension Manager.

This Web page lists many of the available extensions: <http://extensions.libreoffice.org/>.

To install an extension, follow these steps:

- 1) Download an extension package and save it anywhere on your computer.
- 2) In LibreOffice, choose **Tools → Extension Manager** from the menu bar. In the Extension Manager dialog, click **Add**.
- 3) A file browser window opens. Find and select the package of templates you want to install and click **Open**. The package begins installing. You may be asked to accept a license agreement.
- 4) When the package installation is complete, the templates are available for use through **File → New → Templates and Documents** and the extension is listed in the Extension Manager.

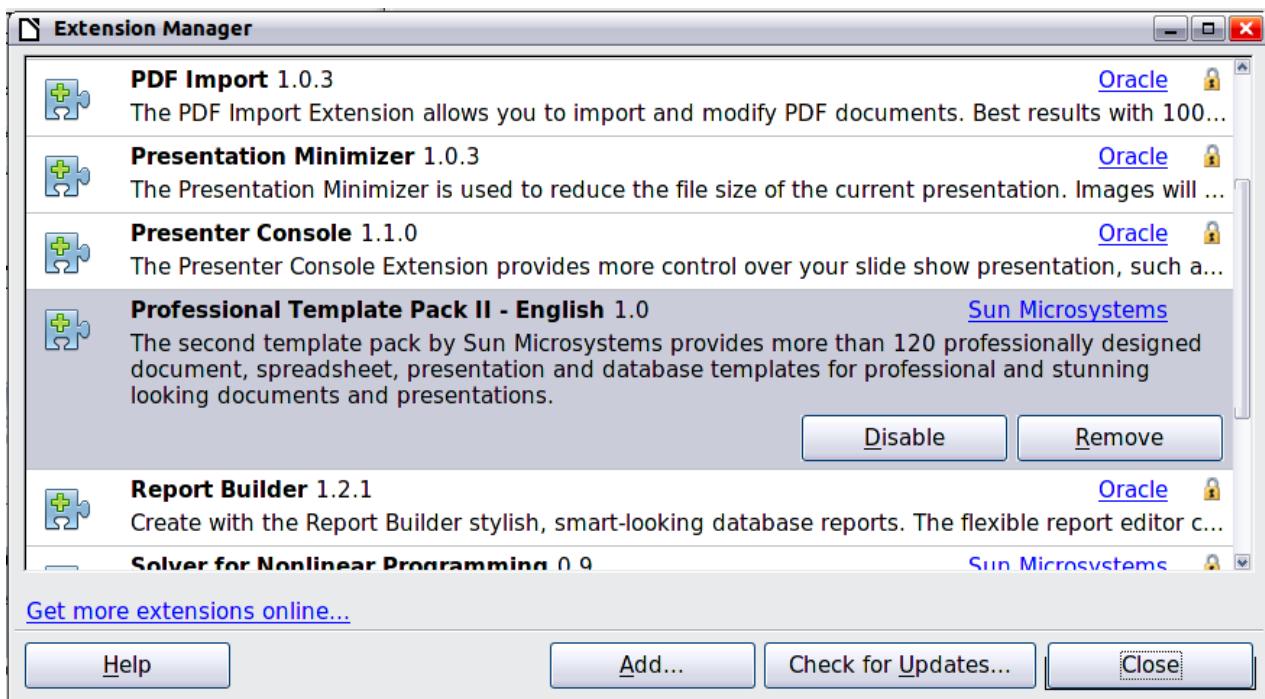


Figure 109: Newly-added package of templates

Setting a default template

If you create a document by choosing **File → New → Spreadsheet** from the menu bar, LibreOffice creates the document from the Default template for spreadsheets. You can, however, set a custom template to be the default. You can reset the default later if you choose.

Setting a custom template as the default

You can set any template to be the default, as long as it is in one of the folders displayed in the Template Management dialog.

To set a custom template as the default:

- 1) From the menu bar, choose **File → Templates → Organize**. The Template Management dialog opens.
- 2) In the box on the left, select the folder containing the template that you want to set as the default, then select the template.
- 3) Click the **Commands** button and choose **Set As Default Template** from the drop-down menu.

The next time that you create a document by choosing **File → New**, the document will be created from this template.

Resetting the default template

To re-enable LibreOffice's default spreadsheet template as the default:

- 1) In the Template Management dialog, click any folder in the box on the left.
- 2) Click the **Commands** button and choose **Reset Default Template → Spreadsheet** from the drop-down menu.

The next time that you create a spreadsheet by choosing **File → New**, it will be created from LibreOffice's default template for spreadsheets.

Associating a spreadsheet with a different template

At times you might want to associate a spreadsheet with a different template, or perhaps you're working with a spreadsheet that did not start from a template but you now want it associated with a template.

One of the major advantages of using templates is the ease of updating styles in more than one document, as described on page 108. If you update styles by copying them from a different template (as described on page 104), the document has no association with the template from which the styles were loaded—so you cannot use this method. What you need to do is associate the document with the different template.

For best results, the names of styles should be the same in the existing document and the new template. If they are not, you will need to use Search and Replace to replace the old styles with new ones. See Chapter 2, Entering, Editing, and Formatting Data, for more about replacing styles using Find and Replace.

- 1) Use **File → New → Templates and Documents**. Choose the template you want. A new file, based on the template, opens. If the template has unwanted text or graphics in it, delete them.
- 2) Open the spreadsheet you want to change. (It opens in a new window.) Press **Control+A** to select everything in the spreadsheet.
- 3) Switch to the window containing the blank spreadsheet created in step 1, and paste the content into that spreadsheet.
- 4) Save the file under a new name.

Organizing templates

LibreOffice can only use templates that are in its template folders. You can create new template folders and use them to organize your templates, and import templates into those folders. For example, you might have one template folder for report templates and another for letter templates. You can also export templates.

To begin, choose **File → Templates → Organize** from the menu bar. The Template Management dialog opens.

Note

All the actions made by the **Commands** button in the Template Management dialog can be made as well by right-clicking on the templates or the folders.

Creating a template folder

To create a template folder:

- 1) In the Template Management dialog, click any folder.
- 2) Click the **Commands** button and choose **New** from the drop-down menu. A new folder called *Untitled* appears.
- 3) Type a name for the new folder, and then press *Enter*. LibreOffice saves the folder with the name that you entered.

Deleting a template folder

You cannot delete template folders supplied with LibreOffice or installed using the Extension Manager; you can only delete template folders that you have created.

To delete a template folder:

- 1) In the Template Management dialog, select the folder that you want to delete.
- 2) Click the **Commands** button and choose **Delete** from the drop-down menu. A message box appears and asks you to confirm the deletion. Click **Yes**.

Moving a template

To move a template from one template folder to another template folder:

- 1) In the Template Management dialog, double-click the folder that contains the template you want to move. A list of the templates contained in that folder appears underneath the folder name.
- 2) Click the template that you want to move and drag it to the desired folder. If you do not have the authority to delete templates from the source folder, this action *copies* the template instead of moving it.

Deleting a template

You cannot delete templates supplied with LibreOffice or installed using the Extension Manager; you can only delete templates that you have created or imported.

To delete a template:

- 1) In the Template Management dialog, double-click the folder that contains the template you want to delete.
- 2) Click the template that you want to delete.
- 3) Click the **Commands** button and choose **Delete** from the drop-down menu. A message box appears and asks you to confirm the deletion. Click **Yes**.

Importing a template

If the template that you want to use is in a different location, you must import it into a LibreOffice template folder.

To import a template into a template folder:

- 1) In the Template Management dialog, select the folder into which you want to import the template.
- 2) Click the **Commands** button and choose **Import Template** from the drop-down menu. A standard file browser window opens.
- 3) Find and select the template that you want to import and click **Open**. The file browser window closes and the template appears in the selected folder.
- 4) If you want, type a new name for the template, and then press *Enter*.

Exporting a template

To export a template from a template folder to another location:

- 1) In the Template Management dialog, double-click the folder that contains the template you want to export.
- 2) Click the template that you want to export.
- 3) Click the **Commands** button and choose **Export Template** from the drop-down menu. The Save As window opens.
- 4) Find the folder into which you want to export the template and click **Save**.



LibreOffice
The Document Foundation

Chapter 5 *Using Graphics in Calc*

Graphics in Calc

Calc is often used to present data and make forecasts and predictions. Graphics can turn an average document into a memorable one. Calc can import various vector (line drawing) and raster (bitmap) file formats. The most commonly used graphic formats are GIF, JPG, PNG, and BMP. See the Help for a full list of the formats LibreOffice can import.

Graphics in Calc are of three basic types:

- Image files, such as photos, drawings, and scanned images
- Diagrams created using LibreOffice's drawing tools
- Charts and graphs created using LibreOffice's Chart facility

This chapter covers images and diagrams. Charts are described in Chapter 3, Creating Charts and Graphs.

Although using graphics in Calc is very similar to using graphics in any other component of LibreOffice, this chapter explains some of the differences in their use. It also covers some of the more advanced graphics functions and how they can further enhance your spreadsheet.

Note

The term *graphics* refers to both pictures and drawing objects. Often the word *images* is used when referring to pictures and other graphics that are not drawing objects.

Adding graphics (images)

Images (also called *pictures* in LibreOffice), such as corporate logos and photographs of people and products, are probably the most common types of graphics added to a Calc document. They may be downloaded from the Internet, scanned, or created with a graphics program; or they may be photos taken with a digital camera.

Images can be inserted in four ways:

- Using the Insert File dialog
- By dragging and dropping a supported file
- From the gallery
- From the clipboard by copying and pasting

Inserting an image file

Perhaps the most common way to insert graphics is to use an existing file.

To insert an image from a file, use either of the following methods:

- Insert Picture dialog
- Drag and drop

Insert Picture dialog

- 1) Click in the location in the Calc document where you want the image to appear. Do not worry too much about the exact placement of the image at this stage; placement can be changed easily as described in "Positioning graphics" on page 128.
- 2) Choose **Insert → Picture → From File** from the menu bar, or click the **Insert Picture** icon  on the Picture toolbar).

- 3) On the Insert Picture dialog, navigate to the file to be inserted, select it, and click **Open**.

Note

The picture is inserted into Calc floating above the cells and anchored to the cell in which the cursor was placed. See “Positioning graphics” on page 128 for more about positioning and anchoring graphics.

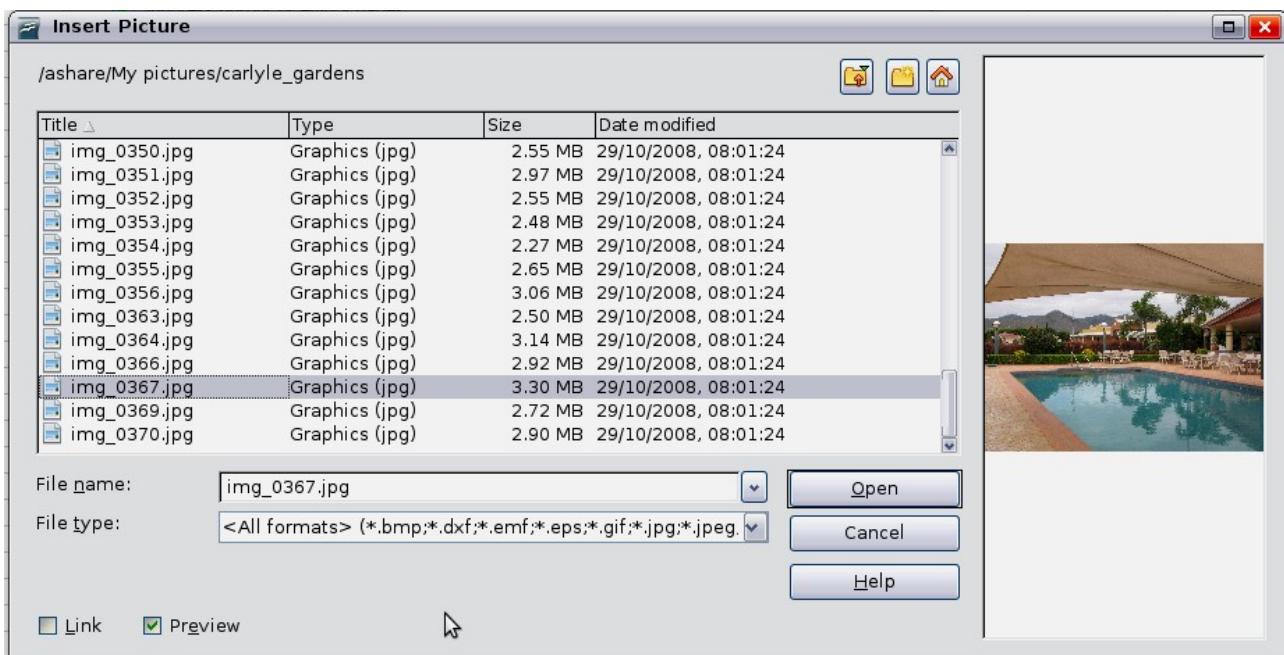


Figure 110: Inserting a picture from a file

At the bottom of the dialog are two options, **Preview** and **Link**. Select **Preview** to view a thumbnail of the selected image on the right, so you can verify that you have the correct file. The **Link** option is discussed on page 115. When the **Link** option is not selected, the picture is embedded in the Calc document.

Note

Your Insert Picture dialog may look quite different from the one shown here, depending on your operating system and your choice in **Tools → Options → LibreOffice → General** of whether to use the LibreOffice Open and Save dialogs.

Drag and drop

- 1) Open a file browser window and locate the image you want to insert.
- 2) Drag the image into the Calc document and drop it where you want it to appear. A faint vertical line marks where the image will be dropped. The picture will be anchored to the cell where it was dropped.

This method always embeds (saves a copy of) the image file in the Calc document.

Linking an image file

To create a link to the file containing the image instead of saving a copy of the image in the Calc document, use the Insert picture dialog and select the **Link** option. The image is then displayed in the document, but when the document is saved, it contains only a reference to the image file—not the image itself. The document and the image remain as two separate files, which are merged temporarily only when you open the document again.

Linking an image has two advantages and one disadvantage:

- **Advantage** – You can modify the image file separately without changing the document because the link to the file remains valid, and the modified image will appear when you next open the document. This can be a big advantage if you (or someone else, perhaps a graphic artist) is updating images.
- **Advantage** – Linking can reduce the size of the document when it is saved, because the image file itself is not included. The file size is usually not a problem on a modern computer with a reasonable amount of memory, unless the document includes many large graphics files. Calc can handle quite large files.
- **Disadvantage** – If you send the document to someone else, or move it to a different computer, you must also send the image files, or the receiver will not be able to see the linked images. You need to keep track of the location of the images and make sure the recipient knows where to put them on another machine, so the Calc document can find them. For example, you might keep images in a subfolder named Images (under the folder containing the Writer document); the recipient of the Calc file needs to put the images in a subfolder with the same name (under the folder containing the Writer document).

Note

When inserting the same image several times in the document, it might appear beneficial to create links. However, this is not necessary, as LibreOffice embeds only one copy of the image file in the document. (Deleting one or more of the copies does not affect the others.)

Embedding linked images

If you originally linked the images, you can easily embed (save in the Calc document) one or more of them later if you wish. To do so:

- 1) Open the document in Calc.
- 2) Choose **Edit → Links** from the menu bar.

The Edit Links dialog shows all the linked files. In the *Source file* list, select the files you want to change from linked to embedded.

- 3) Click the **Break Link** button.

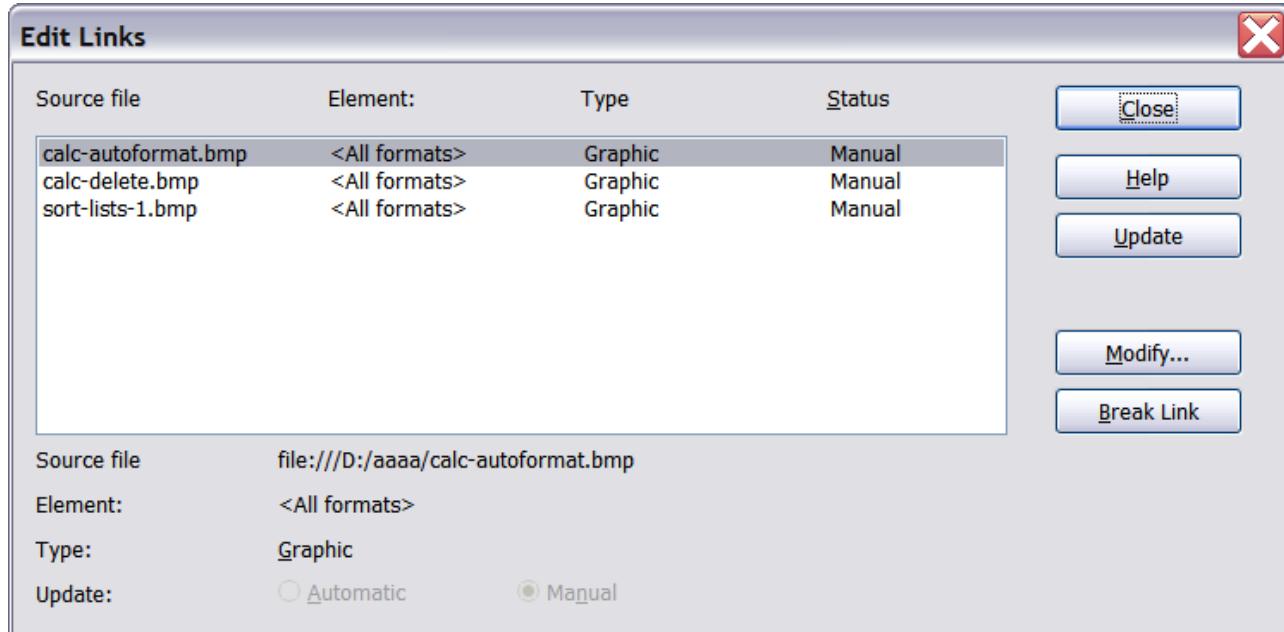


Figure 111: The *Edit Links* dialog

Note

Going the other way, from embedded to linked, is not so easy—you must delete and reinsert each image, one at a time, selecting the **Link** option when you do so.

Inserting an image from the clipboard

Using the clipboard, you can copy images into a Calc document from another Calc document, from another component of LibreOffice (Writer, Draw, and so on), and from other programs.

To do this:

- 1) Open both the source document and the Calc document into which you want to copy the image.
- 2) In the source document, select the image to be copied.
- 3) Press *Control+C* to copy the image to the clipboard.
- 4) Switch to the Calc window.
- 5) Click to place the cursor where the graphic is to be inserted.
- 6) Press *Control+V* to insert the image.

Caution

If the application from which the graphic was copied is closed before the graphic is pasted into Calc, the image stored on the clipboard could be lost from the clipboard.

Inserting an image from the Gallery

The Gallery provides a convenient way to group reusable objects such as graphics and sounds that you can insert into your documents.

The Gallery is available in all components of LibreOffice. It does not come with many graphics, but you can add your own pictures or find extensions containing more graphics. The Gallery is explained in more detail in Chapter 11, Graphics, the Gallery, and Fontwork, in the *Getting Started* guide. For more about extensions, see Chapter 14, Setting Up and Customizing Calc, in this book.

This section explains the basics of inserting a Gallery image into a Calc document.

- 1) To open the Gallery (Figure 112), click on the Gallery icon  (located in the right side of the Standard toolbar) or choose **Tools** → **Gallery** from the menu bar.
- 2) Navigate through the Gallery to find the desired picture.
- 3) To insert the picture, either right-click on the picture and choose **Insert** → **Copy** or click and drag the picture from the Gallery into the Calc document.

By default, the Gallery is docked above the Calc workspace. To expand the Gallery, position the pointer over the line that divides it from the top of the workspace. When the pointer changes to parallel lines with arrows, click and drag downward. The workspace resizes in response.

To expand the Gallery without affecting the workspace, undock it so it floats over the workspace. To do so, hold down the *Control* key and double-click on the upper part of the Gallery next to the View icons. Double-click in the same area while holding down the *Control* key to dock it again (restore it to its position over the workspace).

When the Gallery is docked, to hide it and view the full Calc workspace, click the **Hide/Show** button in the middle of the thin bar separating the Gallery from the workspace (circled in Figure 112).

To close the Gallery, choose **Tools** → **Gallery** to uncheck the Gallery entry, or click on the Gallery

icon again.

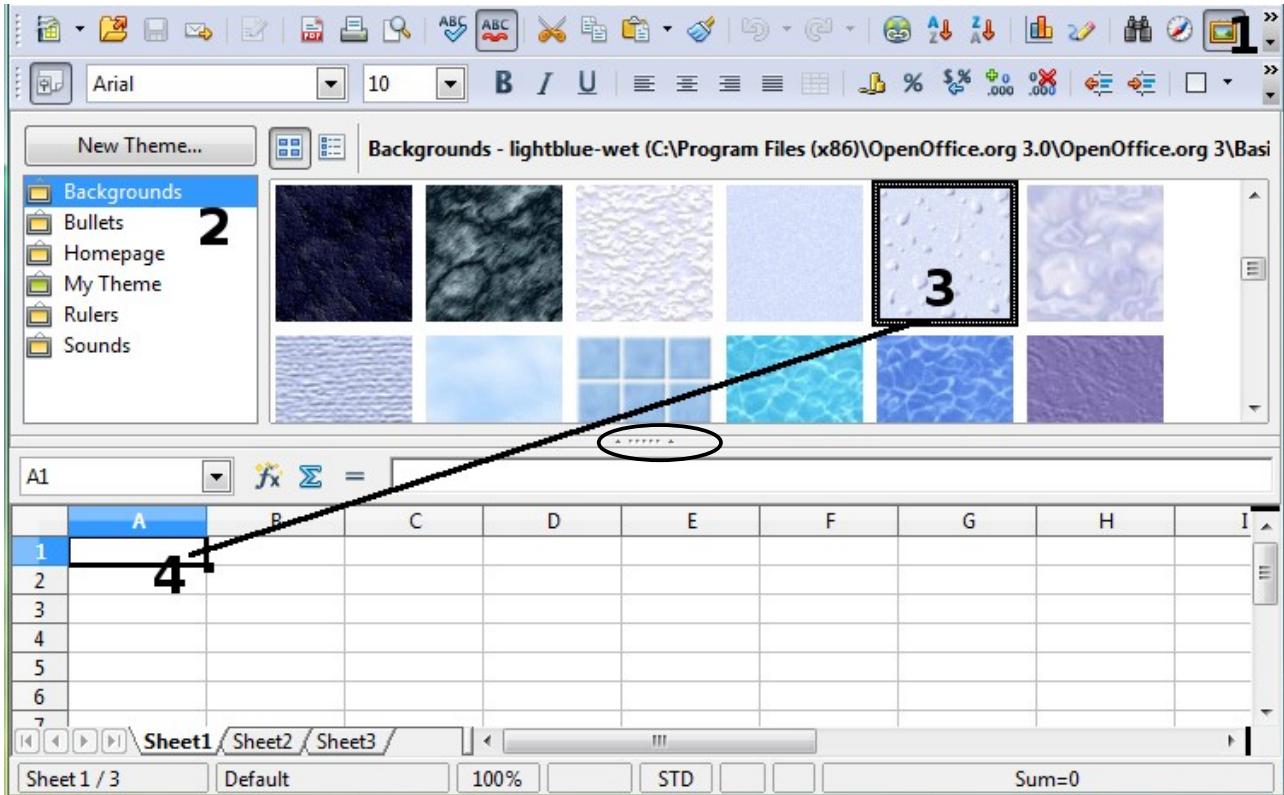


Figure 112: Gallery in Calc

Modifying images

When you insert a new image, you may need to modify it to suit the document. This section describes the use of the Picture toolbar, resizing, cropping, and a workaround for rotating a picture. Changes made in Calc do not affect the original picture, whether it is embedded or linked.

Calc provides many tools for working with images. These tools are sufficient for most people's everyday requirements. However, for professional results it is generally better to use an image manipulation program such as GIMP to modify images (for example, to crop, resize, rotate, and change color values) and then insert the result into Calc. GIMP is an open-source graphics program that can be downloaded from <http://www.gimp.org/downloads/>.

Using the Picture toolbar

When you insert an image or select one already present in the document, the Picture toolbar appears. You can set it to always be present (**View → Toolbars → Picture**). Picture control buttons from the Picture toolbar can also be added to the Standard Toolbar. See Chapter 14, Setting Up and Customizing Calc, for more information.

This toolbar can be either floating or docked. Figure 113 shows the Picture toolbar when it is floating. A brief explanation of the tools is given in Table 3. See the *Draw Guide* for a more detailed explanation.

Two other toolbars can be opened from this one: the Graphic Filter toolbar, which can be torn off and placed elsewhere on the window, and the Color toolbar, which opens as a separate floating toolbar.

From these three toolbars, you can apply small corrections to the graphic or obtain special effects.

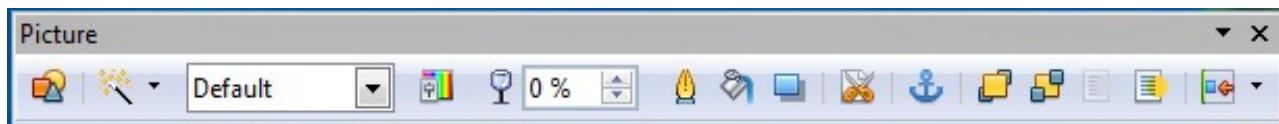


Figure 113: The Picture Toolbar

Table 3: Picture toolbar functions (from left to right)

Icon	Name	Behavior
	From File	Use of this icon is described in "Inserting an image file" on page 114.
	Filter	Displays the Graphic Filter toolbar. See page 120.
	Graphics Mode	Provides several color modes in the drop-down list. See page 120.
	Color	Opens the Color toolbar, described on page 121.
	Transparency	Sets the transparency of the selected image. See page 121.
	Line	Adjusts the border style of the selected image.
	Area	Fills an area with the selected color or pattern.
	Shadow	Adds a drop shadow to the edges of the picture.
	Crop	Opens the Crop dialog, where you can remove a selected part of the picture. See page 121.
	Anchor	Toggles between anchoring the image to the cell or to the page. See page 129.
	Bring to Front	Brings the selected image to the front of the stack. See page 128.
	Send to Back	Pushes the selected image to the rear of the stack. See page 128.
	To Foreground / Background	Allows image to float in the foreground or makes it part of the background (behind the cells). See page 128.
	Alignment	If two or more pictures are selected, adjusts the horizontal and vertical alignment of the pictures in relation to each other. See page 130.

Choosing a graphics mode

You can change color images to grayscale by selecting the image and then selecting **Grayscale** from the Graphics mode list.

Table 4: Graphics modes

Graphics mode	Behavior
Default	Keeps the picture the same as it was inserted.
Grayscale	Shows the picture in gradual shades of gray.
Black / White	Converts the picture into a monochromatic black and white image.
Watermark	Makes the picture into a watermark that blends into the background.

Using graphic filters

Click the Filter icon  to display the Graphic Filter toolbar, which provides options for applying basic photographic and effect filters to images from within Calc. To “tear off” this toolbar and place it anywhere on the screen, click on the three parallel lines and drag it away.

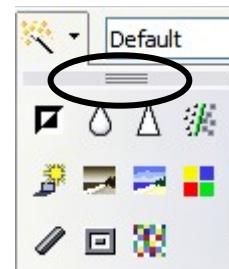


Table 5: Graphic filters and their effects

Icon	Name	Behavior
	Invert	Inverts the colors in the picture like a negative.
	Smooth	Applies a Gaussian Blur to the image which softens edges.
	Sharpen	Sharpens the image.
	Remove Noise	Applies crude noise reduction.
	Solarization	Reverses a portion of the tones, then produces pronounced outlines of the highlights.
	Aging	Applies a Sepia filter.
	Posterize	Opens a dialog to determine the number of poster colors. This effect is based on the reduction of the number of colors. It makes photos look like paintings.
	Pop Art	Applies a Pop Art style to the image.
	Charcoal Sketch	Applies a Charcoal Sketch look to the image.
	Relief	Displays a dialog for creating reliefs. The position of the imaginary light source that determines the type of shadow can be chosen.
	Mosaic	Joins small groups of pixels into rectangular areas of the same color. The larger the individual rectangles are, the fewer details the graphic image has.

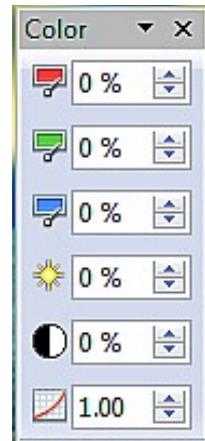
Caution



Applying LibreOffice picture filters to any image consecutively will progressively degrade the quality of the image. The picture filters used in Calc utilize what is known as a Destructive Editing algorithm, whereby each filter is applied to the image immediately, changing the original data of the image. Successive transformations result in less and less original data remaining, thus compromising the quality of the inserted picture. While this might be acceptable for use in simple documents, it is still recommended that dedicated photo or image editing software be used to perform anything but the simplest of manipulations.

Adjusting colors

Use the Color toolbar to adjust an image's red, green, and blue channels independently, as well as its brightness, contrast and gamma.



Setting transparency

Modify the percentage value in the *Transparency* box  on the Picture toolbar to make the image more transparent. This is particularly useful when creating a watermark or when wrapping an image in the background.

Customizing lines, areas, and shadows

The Line, Area, and Shadow icons open dialogs where you can customize these elements. Details are in the *Draw Guide*.

Cropping pictures

When you are only interested in a section of the image for the purpose of your document, you may wish to crop (cut off) parts of it. The user interface in Calc for cropping an image is not very friendly, so it may be a better choice to use a graphics package.



Click the Crop icon  to open a dialog where you can select which portion of the image you want to remove.

It is not possible to use the mouse to select the area to be cropped, as you can in Draw. Instead, in the Crop dialog, specify how far from the top, bottom, left and right borders of the image the crop should be, as illustrated in Figure 114. On the thumbnail in the figure, notice that the cropped selection is highlighted with an inner rectangle.

On the Crop dialog, you can control the following parameters:

Keep scale / Keep image size

When **Keep scale** is selected (default), cropping the image does not change the scale of the picture.

When **Keep image size** is selected, cropping enlarges (for positive cropping values), shrinks (for negative cropping values), or distorts of the image so that the image size remains constant.

Left, Right, Top, and Bottom

The image is cropped by the amount entered in these boxes. For example, a value of **3cm** in the *Left* box cuts 3 cm from the left side of the picture.

- When **Keep scale** is selected, the size of the image also changes, so in this example the width will be reduced by 3 cm.

- When **Keep image size** is selected, the remaining part of the image is enlarged (when you enter positive values for cropping) or shrunk (when you enter negative values for cropping) so that the width and height of the image is not changed.

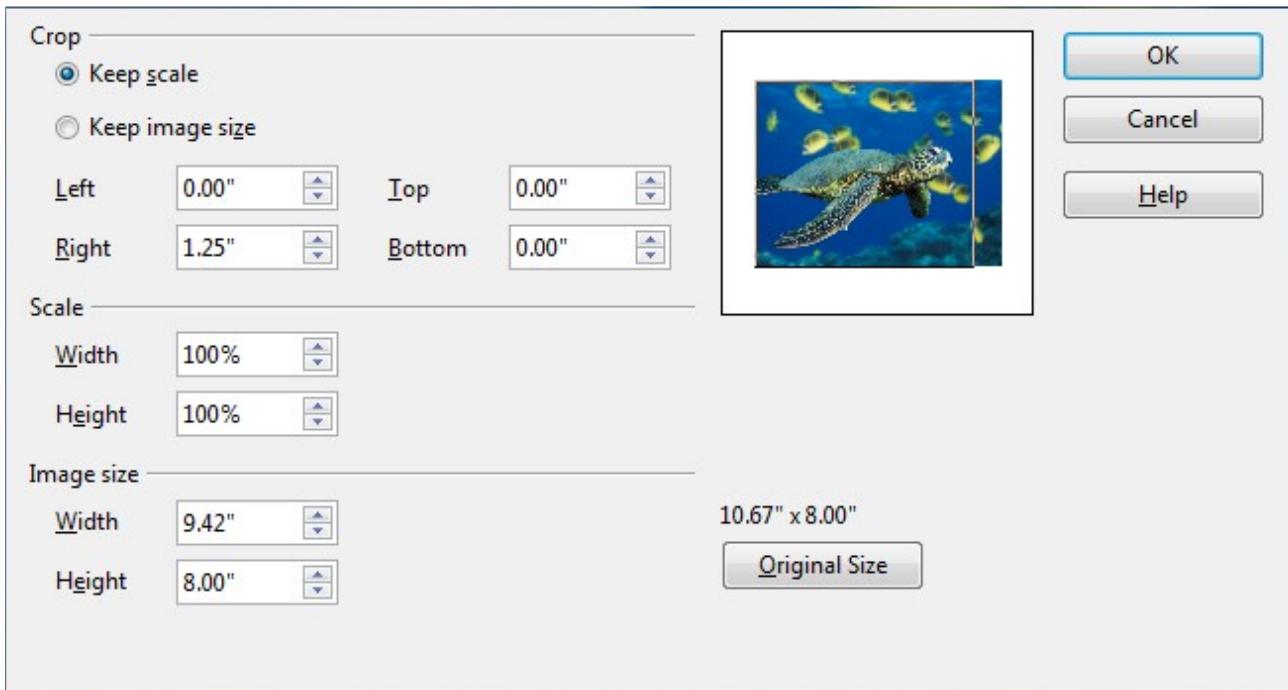


Figure 114: The Crop dialog

Width and Height

The *Width* and *Height* fields under either *Scale* or *Image size* change as you enter values in the Left, Right, Top, and Bottom fields. Use the thumbnail next to these fields to determine the correct amount by which to crop.

The cropped shape is always a rectangle; more complex cropped shapes are not possible in Calc. Instead, use a dedicated photo or image editing software for the job, then import the image into Calc.

Note

If you crop an image in Calc, the picture itself is not changed. If you export the document to HTML, the original image is exported, not the cropped image.

Resizing an image

To resize an image.

- Click the picture, if necessary, to show the green resizing handles.
- Position the pointer over one of the green resizing handles. The pointer changes shape giving a graphical representation of the direction of the resizing.
- Click and drag to resize the picture.
- Release the mouse button when satisfied with the new size.

The corner handles resize both the width and the height of the graphic object simultaneously, while the other four handles only resize one dimension at a time.

Tip

To retain the original proportions of the graphic, *Shift+click* one of the corner handles, then drag. Be sure to release the mouse button **before** releasing the *Shift* key.

Resizing a bit-mapped (raster) image such as a photograph adversely affects the resolution, causing some degree of blurring. It is better to use a graphics package to size your picture correctly before inserting it into your document, if possible.

For more accurate resizing, use the Position and Size dialog, described on page 123.

Rotating a picture

Calc does not provide a tool for rotating a picture, but you can use this workaround:

- 1) Open a new *Draw* or *Impress* document.
- 2) Insert the image you want to rotate.
- 3) Select the image, then in the Drawing toolbar (shown by default at the bottom of the window in Impress and Draw), select the **Rotate** icon 
- 4) Rotate the image as desired. Use the red handles at the corners of the picture and move the mouse in the direction you wish to rotate. By default the picture rotates around its center (indicated by a black crosshair), but you can change the pivot point by moving the black crosshair to the desired rotation center.

Tip

To restrict the rotation angle to multiples of 15 degrees keep the *Shift* key pressed while rotating the image.

- 5) Select the rotated picture by pressing *Ctrl+A*, then copy the image to the clipboard with *Ctrl+C*.
- 6) Finish by going back to the Calc document, place the cursor where the image is to be inserted, and press *Ctrl+V*.

Using the picture context menu

Many of the options accessible from the Picture toolbar can also be reached by right-clicking on an image to pop up a context menu. Some additional options are only available from the context menu; these are described in this section.

Text

Opens a dialog where you can set the options for text that goes over a picture. To write text over a graphic, click on the graphic to select it, and then press Enter. There should be a cursor inside the graphic. Any text entered is part of the graphic, so if the graphic is moved the text will move with it.

Position and Size

Opens the dialog shown below where you can change the size, location, rotation, slant and corner radius of the image.

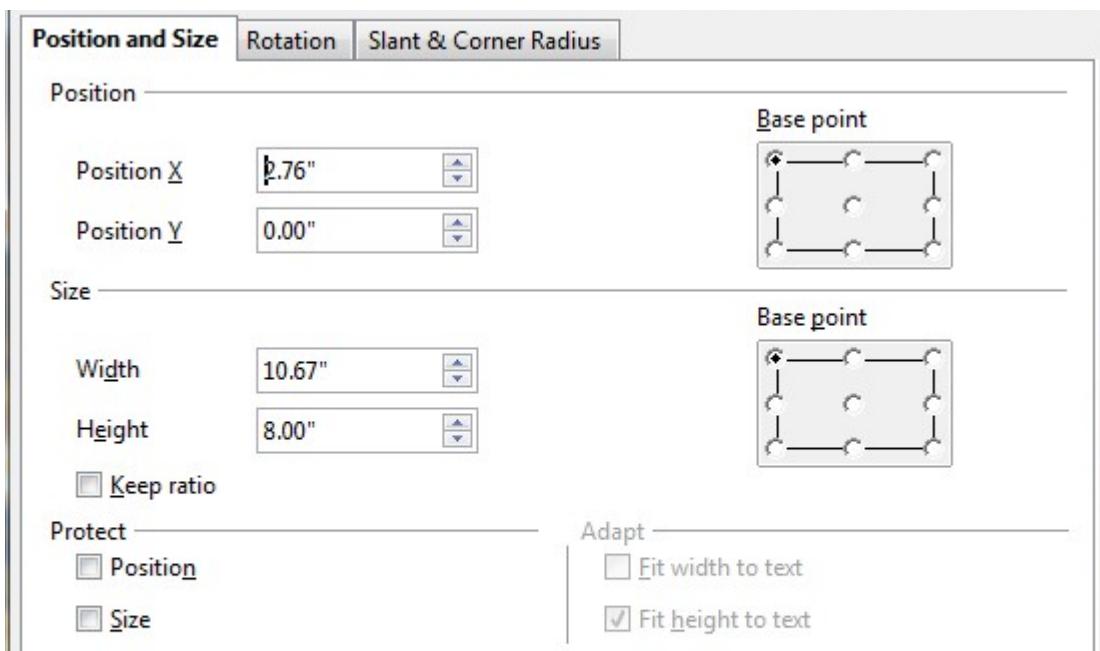


Figure 115: Position and Size dialog

Original Size

Resets the dimensions of the image to the values when it was originally inserted into the document.

Description

You can add metadata in the form of a title and description to the image. This information is used by accessibility tools (such as screen reader software) and as ALT (alternative) attributes if you export the document to HTML.

Name

You can add a custom name to be assigned to the image, to make it easier to find in the Navigator.

Tip

When collaborating with a team on a large, multi-page publication, it may be beneficial to give graphics, figures, and other objects meaningful names and descriptions to aid in clear communication.

Flip

Flips the image either horizontally or vertically.

Assign Macro

Adds programmable functionality to the image. Calc provides rich macro functionality. Macros are introduced in Chapter 12, Calc Macros.

Group

To group images:

- 1) Select one image, then hold down the *Shift* key and click in turn on each of the others that you want to include in the group. The invisible “bounding box” (with the 8 green handles) expands to include all the selected images.
- 2) With the images selected, choose **Format → Group → Group** from the menu bar.
Or hover the mouse pointer over one of the images. When the pointer changes shape from an arrow to a hand, right-click and choose **Group → Group** from the context menu.

Note

You cannot include drawing objects in a group with pictures.

After images are grouped, the context menu provides other choices (**Ungroup** and **Edit Group**) and the **Format → Group** menu includes **Ungroup** and **Enter Group**. For more information about grouping, see the *Draw Guide*.

Using Calc’s drawing tools

Calc, like the other components of LibreOffice, has a range of tools to create custom drawings. This chapter covers the default options in Calc. For a more detailed explanation of the drawing tools and their uses, see the *Draw Guide*.

In general, if you need to create complex drawings, it is recommended to use LibreOffice Draw or another drawing program.

To begin using the drawing tools, choose **View → Toolbars → Drawing**. The Drawing toolbar appears at the bottom of the screen. You can tear off this toolbar and move it to a convenient place on the window.

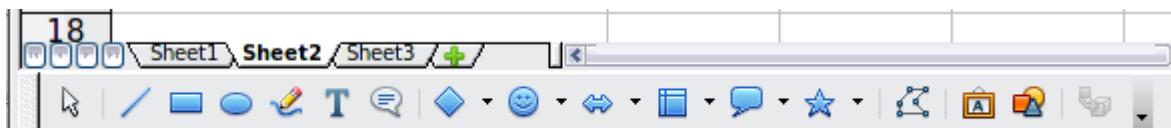


Figure 116: The Drawing toolbar showing default icons

Table 6: Drawing toolbar functions (from left to right)

Icon	Name	Behavior
	Select	Selects objects.
	Line	Draws a line.
	Rectangle	Draws a rectangle. To draw a square, hold down Shift while you drag.
	Ellipse	Draws an ellipse. To draw a circle, hold down Shift while you drag.
	Freeform Line	Draws a freeform line.
	Text	Draws a text box with no border.

Icon	Name	Behavior
	Callouts	Draws a line that ends in a rectangular callout.
	Basic Shapes	Opens the Basic Shapes toolbar.
	Symbol Shapes	Opens the Symbol Shapes toolbar.
	Block Arrows	Opens the Block Arrows toolbar of shapes.
	Flowcharts	Opens the Flowchart toolbar of shapes.
	Callouts	Opens the Callouts toolbar of shapes.
	Stars	Opens the Stars toolbar of shapes.
	Points	Allows editing of the points of a selected polygon.
	Fontwork Gallery	Opens the Fontwork Gallery.
	From File	Inserts a picture using the Insert Picture dialog.
	Extrusion On/Off	Opens the 3-D Setting toolbar and converts the selected shape (if any) to 3-D.

To display other icons, click the down-arrow at the right-hand end of the toolbar, select **Visible Buttons**, and then choose the tools you want to appear on the toolbar.

Icon	Name	Behavior
	Polygon	Draws a line composed of a series of straight line segments. Hold down the <i>Shift</i> key to position new points at 45 degree angles.
	Curve	Draws a smooth Bézier curve.
	Arc	Draws an arc.
	Ellipse Pie	Draws a filled shape that is defined by the arc of an oval and two radius lines in the current document. To draw a circle pie, hold down <i>Shift</i> while you drag.
	Circle Segment	Draws a filled shape that is defined by the arc of a circle and a diameter line in the current document. To draw an ellipse segment, hold down <i>Shift</i> while you drag.
	Text Animation	Inserts animated text.

If support for Asian languages has been enabled (in **Tools** → **Options** → **Language Settings** → **Languages**), two more tools can be added to the Drawing toolbar: Vertical Text and Vertical Callouts.

To use a drawing tool:

- 1) Click in the document where you want the drawing to be anchored. You can change the anchor later, if necessary.
- 2) Select the tool from the Drawing toolbar (Figure 116). The mouse pointer changes to a cross-hair pointer.
- 3) Move the cross-hair pointer to the place in the document where you want the graphic to appear and then click-and-drag to create the drawing object. Release the mouse button. (Some tools have other requirements; see the Help or the *Draw Guide* for details.)
The selected drawing function remains active, so you can draw another object of the same type.
- 4) To cancel the selected drawing function, press the *Esc* key or click on the **Select** icon (the arrow) on the Drawing toolbar.
- 5) You can now change the properties (fill color, line type and weight, anchoring, and others) of the drawing object using either the Drawing Object Properties toolbar (Figure 117) or the choices and dialog boxes reached by right-clicking on the drawing object.

Set or change properties for drawing objects

To set the properties for a drawing object before you draw it:

- 1) On the Drawing toolbar (Figure 116), click the **Select** tool.
- 2) On the Drawing Object Properties toolbar (Figure 117), click on the icon for each property and select the value you want for that property.
- 3) For more control, or to define new attributes, you can click on the **Area** or **Line** icons on the toolbar to display detailed dialogs.

These default properties are applied only to the current document and session. They are not retained when you close the document, and they do not apply to any other document. The defaults apply to all the drawing objects except text objects.

To change the properties for an existing drawing object, select the object and continue as described above.

Other tools and methods for modifying and positioning graphics are described in “Positioning graphics” below.



- | | | | |
|----------------------|-------------------------------|---|---------------------|
| 1 Line | 5 Line Color | 9 Change Anchor | 13 Alignment |
| 2 Arrow Style | 6 Area | 10 Bring to Front | |
| 3 Line Style | 7 Area Style / Filling | 11 Send to Back | |
| 4 Line Width | 8 Rotate | 12 To Foreground / To Background | |

Figure 117. Drawing Object Properties toolbar

Resizing a drawing object

Select the object, click on one of the eight handles around it and drag it to its new size. For a scaled resizing, select one of the corner handles and keep the *Shift* key pressed while dragging the handle.

For more control of the size of the object, use the Position and Size dialog (see “Position and Size” on page 123) to set the width and height independently. If the **Keep ratio** option is selected, then the two dimensions change so that the proportion is maintained, allowing for a scaled resizing.

Grouping drawing objects

To group drawing objects:

- 1) Select one object, then hold down the *Shift* key and select the others you want to include in the group. The bounding box expands to include all the selected objects.
- 2) With the objects selected, hover the mouse pointer over one of the objects and choose **Format → Group → Group** from the menu bar or right-click and choose **Group → Group** from the context menu.

Note

You cannot include an embedded or linked graphic in a group with drawing objects.

Positioning graphics

Graphics can be positioned in LibreOffice Calc to work together and build more complex features.

Arranging graphics

Graphics in a Calc document are maintained in a similar manner to a deck of cards. As you add more images to the document, each image occupies a new layer at the top of the stack. To arrange graphics, you tell Calc to change the order of layers in the stack.



Figure 118: Layering effect

Calc provides four basic options to re-arrange the order of images. These options can be accessed from both the Picture toolbar and the picture context menu:

Bring to Front

Places the image on top of any other graphics or text.

Bring Forward

Brings the image one level up in the stack (z-axis). Depending on the number of overlapping objects, you may need to apply this option several times to obtain the desired result.

Send Backward

The opposite of Bring Forward; sends the selected image one level down in the object stack.

Send to Back

Sends the selected graphic to the bottom of the stack, so that other graphics and text cover it.

To Background and To Foreground

An image or a drawing object can be sent to the background as well. This is not the same as Bring Forward and Send Backward, which set the order of a number of overlapping graphics. This feature pushes a graphic behind the cells, allowing cells to be edited without affecting the graphic.

A graphic in the background will have To Foreground as a menu item, instead of To Background.

Anchoring graphics

Anchors tell a graphic where to stay in relation to other items.

Anchor to page

Anchoring a graphic to the page allows it to be positioned in a specific place on the page. The graphic does not move when cells are added or deleted. This is equivalent to an absolute reference. The graphic will always stay by cell B10 if that is where it is placed.

Anchor to cell

Anchoring a graphic to a cell ensures that the graphic always stays with the content it is originally anchored to. If a graphic is anchored to cell B10, and a new row is inserted, the graphic will then be anchored to cell B11. This is equivalent to a relative reference.

For example, in Figure 115 the picture on the left is anchored *To Cell B2* (XXX shows where the picture is anchored). The picture on the right is anchored to the page.

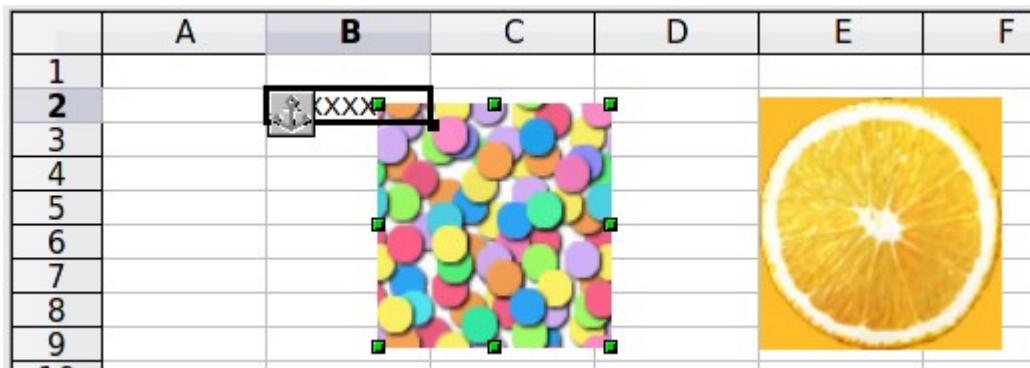


Figure 119: Anchoring 1

If two rows are inserted above the pictures, the picture anchored to a cell will shift down two rows and the anchor will change. The picture anchored to the page will not move. This is illustrated in Figure 111. Note that the anchor symbol and the XXX have moved down to cell B4.

	A	B	C	D	E	F
1						
2						
3						
4		XXXX				
5						
6						
7						
8						
9						
10						
11						
12						

Figure 120: Anchoring

Aligning graphics

You can align several graphics relative to each other. To do this:

- 1) Select all of the graphics to be aligned (*Shift+click* on each in turn). The graphics will be surrounded by an invisible bounding box with 8 green handles.
- 2) On the Picture toolbar, click on the Alignment icon and select one of the six options.
Or, position the mouse pointer over any of the graphics. When the pointer changes shape from an arrow to a hand, right-click and choose Alignment, then select from the six options.

The six options include three for aligning the graphics horizontally (left, center, right) and three for aligning the graphics vertically (top, center, bottom).

Creating an image map

An image map defines areas of an image (called *hotspots*) with hyperlinks to web addresses, other files on the computer, or parts of the same document. Hotspots are the graphic equivalent of text hyperlinks. Clicking on a hotspot causes Calc to open the linked page in the appropriate program (for example, the default browser for an HTML page; LibreOffice Calc for a .ODS file; a PDF viewer for a PDF file). You can create hotspots of various shapes, and include several hotspots in the same image.

To use the image map editor:

- 1) In your spreadsheet, select the picture where you want to define the hotspots.
- 2) Choose **Edit → ImageMap** from the menu bar. The ImageMap Editor (Figure 110) opens.
- 3) Use the tools and fields in the dialog (described below) to define the hotspots and links necessary.
- 4) Click the **Apply** icon to apply the settings.
- 5) When done, click the **Save** icon to save the imagemap to a file, then click the **X** in the upper right corner to close the dialog.

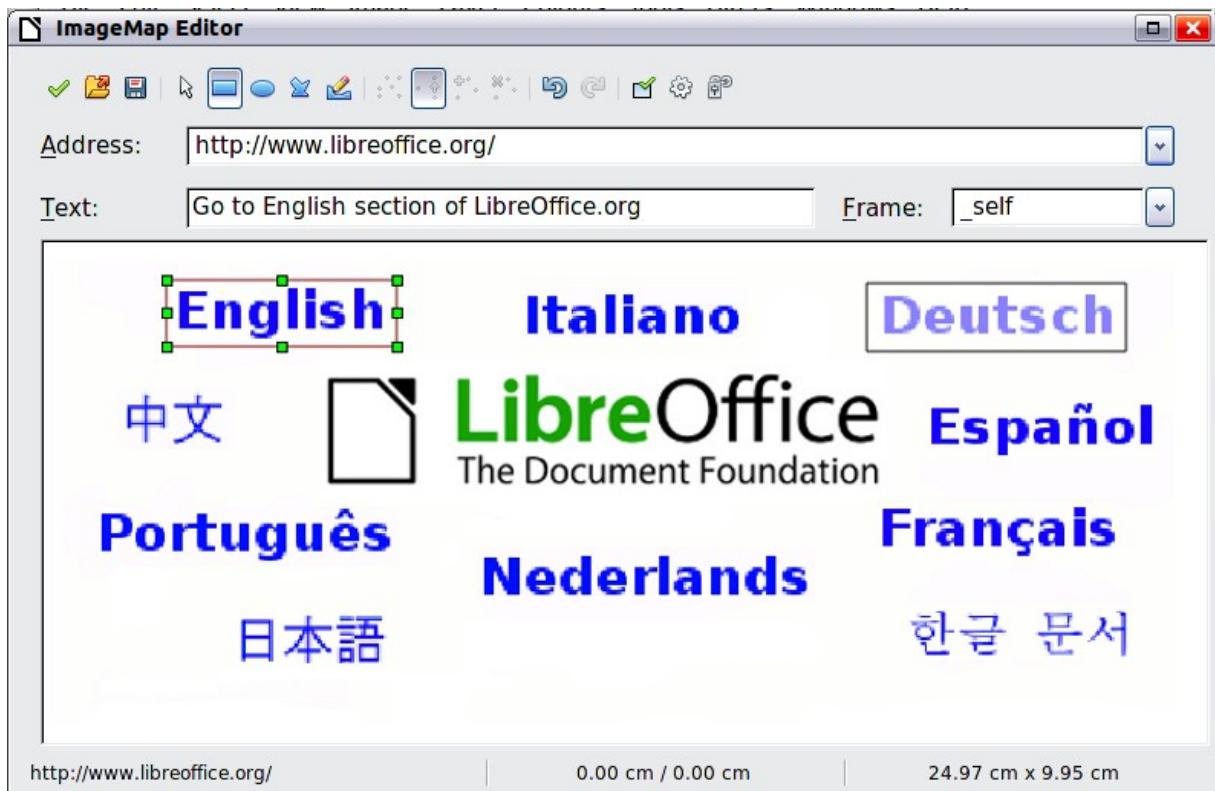


Figure 121: The dialog to create or edit an image map

The main part of the dialog shows the image on which the hotspots are defined. A hotspot is identified by a line indicating its shape.

The toolbar at the top of the dialog contains the following tools:

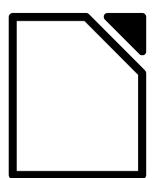
- **Apply** button: click this button to apply the changes.
- **Load, Save, and Select** icons.
- Tools for drawing a hotspot shape: these tools work in exactly the same way as the corresponding tools in the Drawing toolbar.
- **Edit, Move, Insert, Delete Points**: advanced editing tools to manipulate the shape of a polygon hotspot. Select the Edit Points tool to activate the other tools.
- **Active** icon: toggles the status of a selected hotspot between active and inactive.
- **Macro**: associates a macro with the hotspot instead of just associating an hyperlink.
- **Properties**: sets the hyperlink properties and adds the Name attribute to the hyperlink.

Below the toolbar, specify for the selected hotspot:

- **Address**: the address pointed by the hyperlink. You can also point to an anchor in a document; to do this, write the address in this format:
file:///<path>/document_name#anchor_name
- **Text**: type the text that you want to be displayed when the mouse pointer is moved over the hotspot.
- **Frame**: where the target of the hyperlink will open: pick among _blank (opens in a new browser window), _self (opens in the active browser window), _top or _parent.

Tip

The value _self for the target frame will work just fine in the vast majority of occasions. It is therefore not recommended to use the other choices unless absolutely necessary.



LibreOffice
The Document Foundation

Chapter 6 *Printing, Exporting, and* *E-mailing*

Quick printing

Click the **Print File Directly** icon  to send the entire document to the default printer defined for your computer.

Note

You can change the action of the **Print File Directly** icon to send the document to the printer defined for the document instead of the default printer for the computer. Choose **Tools → Options → Load/Save → General** and select the **Load printer settings with the document** option.

Controlling printing

For more control over printing, use the Print dialog (**File → Print** or **Ctrl+P**).

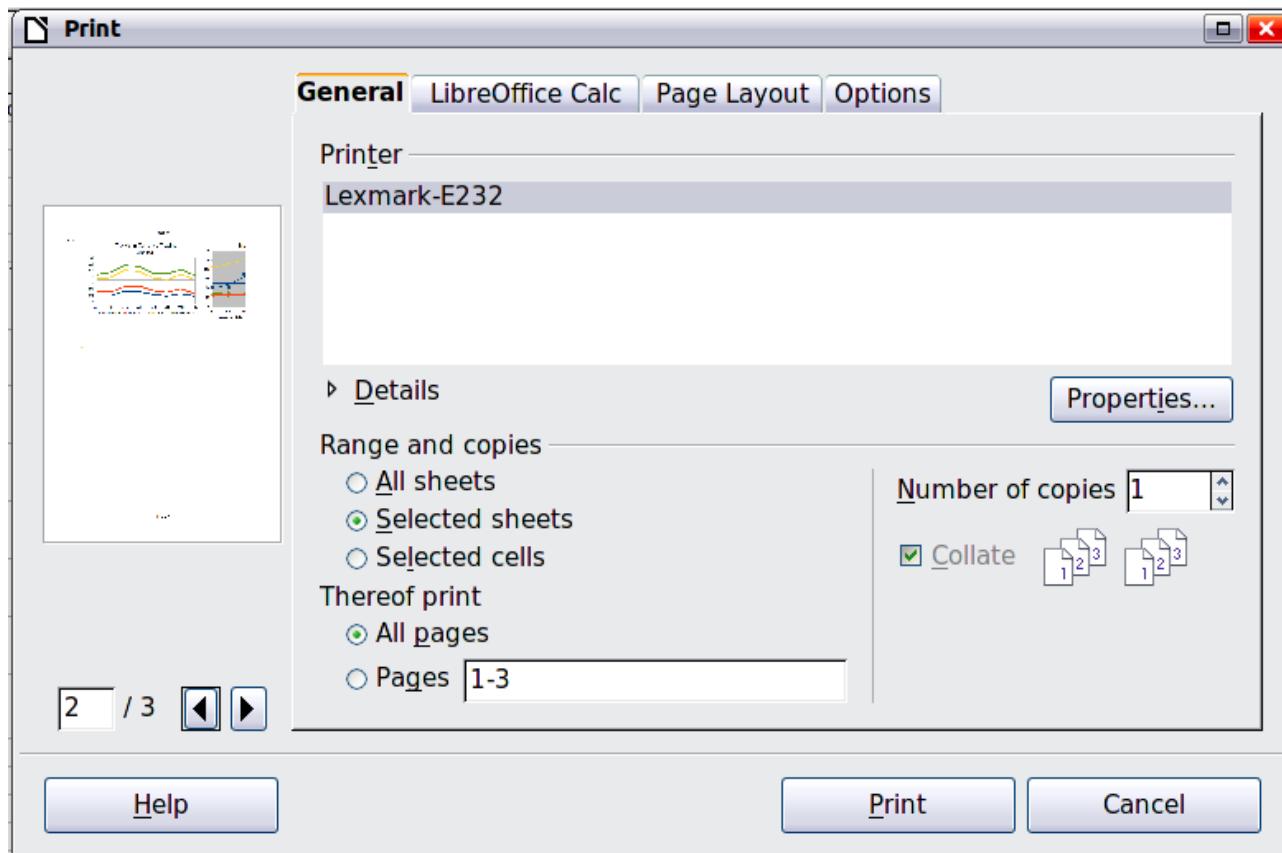


Figure 122. The Print dialog

The Print dialog has four tabs, from which you can choose a range of options, as described in the following sections.

Note

The options selected on the Print dialog apply to this printing of this document only. To specify default printing settings for LibreOffice, go to **Tools → Options → LibreOffice – Print** and **Tools → Options → LibreOffice Calc – Print**. See Chapter 14, Setting Up and Customizing Calc, for details.

Selecting general printing options

On the *General* tab of the Print dialog (Figure 122), you can choose:

- The **printer** (from the printers available)
- Which **sheets** and **pages** to print, the number of copies to print, and whether to collate multiple copies (*Range and copies* section)

Select the **Properties** button to display a dialog where you can choose portrait or landscape orientation, which paper tray to use, and the paper size to print on.

On the *Options* tab of the Print dialog (Figure 123), you can choose to print to a file (instead of to a printer), to create a single print job containing several copies of the document (instead of a separate print job for each copy), and whether to print in reverse page order.

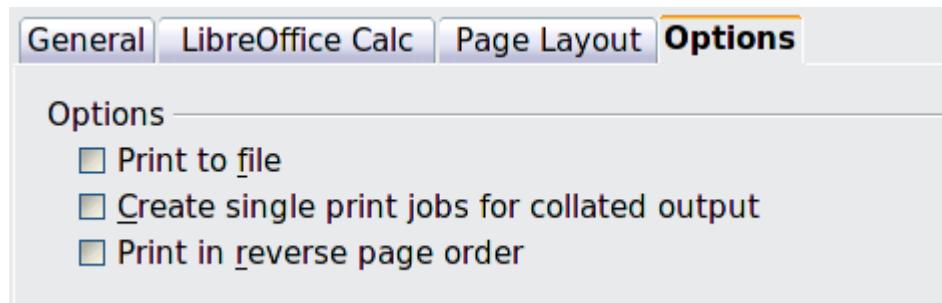


Figure 123: General print options

Printing multiple pages on a single sheet of paper

You can print multiple pages of a document on one sheet of paper. To do this:

- 1) In the Print dialog, select the *Page Layout* tab (Figure 124).

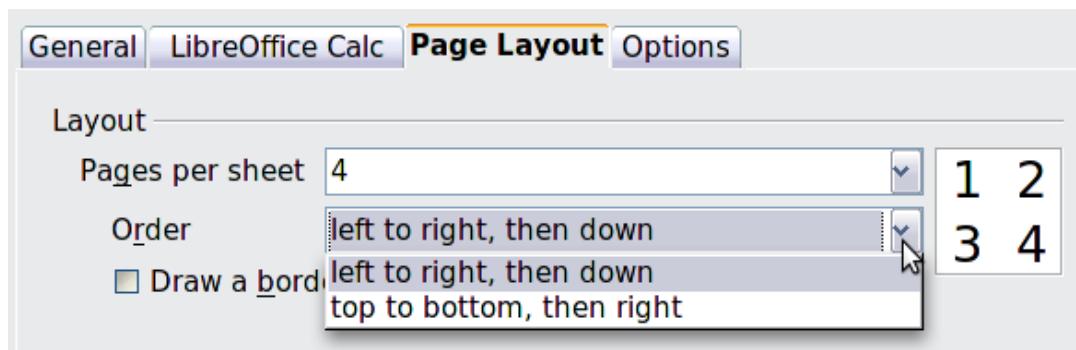
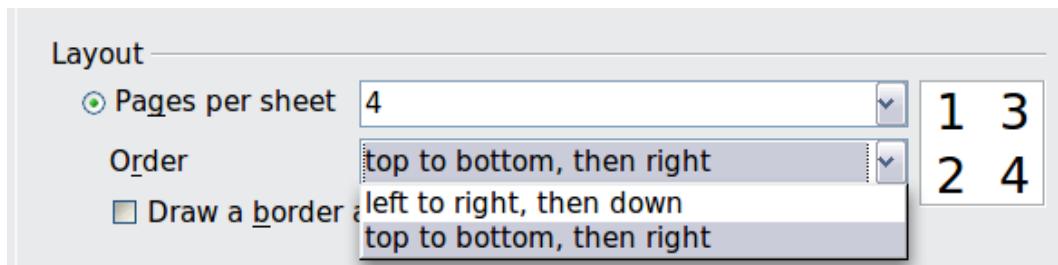


Figure 124: Printing multiple page per sheet of paper

- 2) In the *Layout* section, select from the drop-down list the number of pages to print per sheet. The preview panel on the left of the Print dialog shows how the printed document will look. When printing more than 2 pages per sheet, you can choose the order in which they are printing across and down the paper. The pictures above and below show the difference.



- 3) In the *Page sides* section, select whether to print all pages or only some pages.
- 4) Click the **Print** button.

Selecting sheets to print

In addition to printing a full document, you can choose to print individual sheets, ranges of sheets, or a selection of a document.

You can choose single sheets, multiple sheets, and selections of cells for printing.

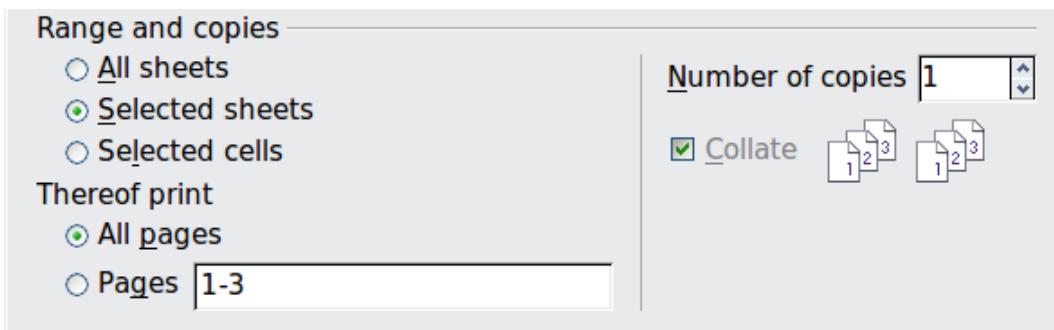


Figure 125: Choosing what to print in Calc

Printing an individual sheet:

- 1) In the spreadsheet, click on the sheet tab to select the sheet you want to print.
- 2) Choose **File** → **Print** from the menu bar.
- 3) In the *Ranges and copies* section of the Print dialog, choose the *Selected sheets* option.
- 4) Click the **Print** button.

Printing a range of sheets:

- 1) In the spreadsheet, select the sheets to print.
 - a) Select the first sheet.
 - b) Hold down the *Control* key.
 - c) Click on the additional sheet tabs.
 - d) Release the *Control* key when all required sheets are selected.
- 2) Choose **File** → **Print** from the menu bar.
- 3) In the *Ranges and copies* section of the Print dialog, choose the *Selected sheets* option.
- 4) Click the **Print** button.

Printing a selection of cells:

- 1) In the document, select the section of cells to print.
- 2) Choose **File** → **Print** from the menu.
- 3) In the *Ranges and copies* section of the Print dialog, select the *Selected cells* option.
- 4) Click the **Print** button.

Caution



After printing, be sure to deselect the extra sheets. If you keep them selected, the next time you enter data on one sheet, you enter data on all the selected sheets. This might not be what you want.

Using print ranges

Print ranges have several uses, including printing only a specific part of the data or printing selected rows or columns on every page.

Defining a print range

To define a new print range or modify an existing print range:

- 1) Highlight the range of cells that comprise the print range.
- 2) Choose **Format → Print Ranges → Define**.

The page break lines display on the screen.

Tip

You can check the print range by using **File → Page Preview**. LibreOffice will only display the cells in the print range.

Adding to the print range

After defining a print range, you can add more cells to it. This allows multiple, separate areas of the same sheet to be printed, while not printing the whole sheet. After you have defined a print range:

- 1) Highlight the range of cells to be added to the print range.
- 2) Choose **Format → Print Ranges → Add**. This adds the extra cells to the print range.

The page break lines no longer display on the screen.

Note

The additional print range will print as a separate page, even if both ranges are on the same sheet.

Removing a print range

It may become necessary to remove a defined print range, for example if the whole sheet needs to be printed later.

Choose **Format → Print Ranges → Remove**. This removes *all* defined print ranges on the sheet. After the print range is removed, the default page break lines will appear on the screen.

Editing a print range

At any time, you can directly edit the print range, for example to remove or resize part of the print range. Choose **Format → Print Ranges → Edit**. If you have already selected a print range, the Edit Print Ranges dialog looks something like Figure 126.

In this example, three rectangles are selected, each separated by a semicolon. The first is bounded by cell A3 (\$A\$3) in the top left and cell C9 (\$C\$9) in the bottom right corners. Clicking anywhere in the text entry box shows the currently selected print range on the screen, with each rectangle in a different color, as in Figure 127.

After making any changes, click the **Shrink** icon next to the text entry box to redisplay the rectangles with their new values.



To re-expand the Edit Print Ranges dialog, click the **Shrink** icon again.

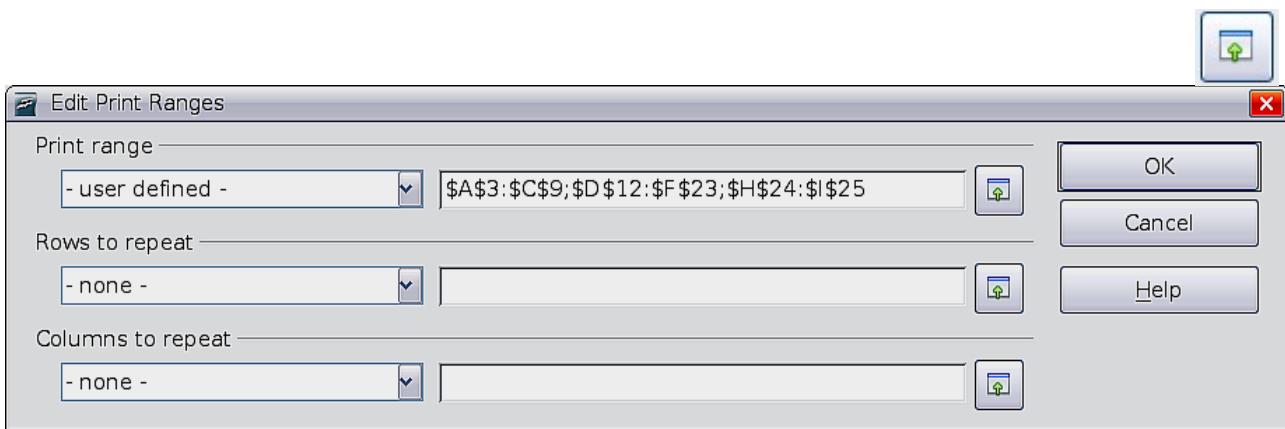


Figure 126: Edit a print range

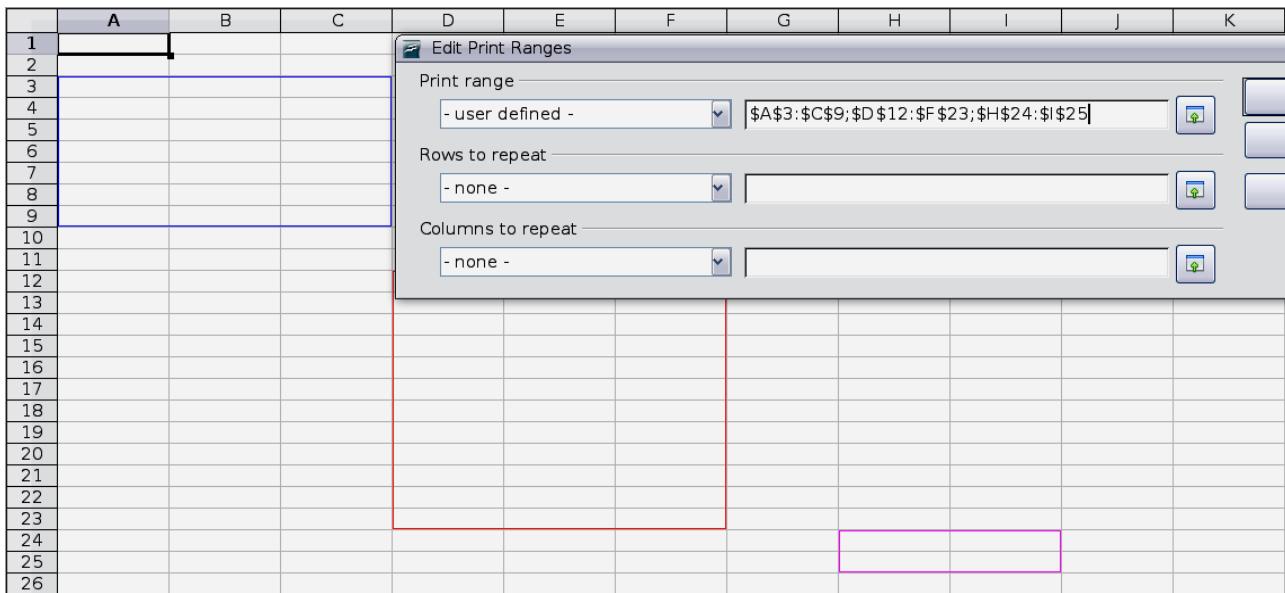


Figure 127: Print range marked by colored boxes

Printing rows or columns on every page

If a sheet is printed on multiple pages, you can set up certain rows or columns to repeat on each printed page.

For example, if the top two rows of the sheet as well as column A need to be printed on all pages, do the following:

- 1) Choose **Format → Print Ranges → Edit**. On the Edit Print Ranges dialog, type the rows in the text entry box under *Rows to repeat*. For example, to repeat rows 1 and 2, type **\$1:\$2**. This automatically changes *Rows to repeat* from **- none -** to **- user defined -**.
- 2) To repeat columns, type the columns in the text entry box under *Columns to repeat*. For example, to repeat column A, type **\$A**. This automatically changes *Columns to repeat* from **- none -** to **- user defined -**.
- 3) Click **OK**.

Note

You do not need to select the entire range of the rows to be repeated; simply select one cell in each row.

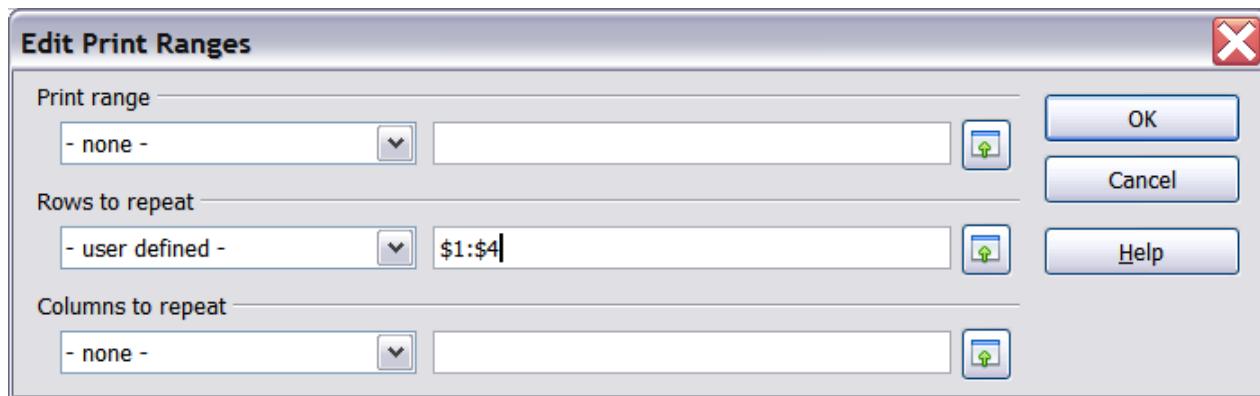


Figure 128: Specifying repeating rows

Defining a custom print range

In addition to highlighting a print range for each print job, you can define a range of cells to be used repeatedly. This may be useful if there are different areas of a large spreadsheet that need to be printed for different reports. Several different print ranges can be defined to meet this need.

- 1) To define a print range, use the same procedure as labeling an area of the sheet. Highlight the cells you want to define as a print range and select **Insert → Names → Define**. (The cells can be highlighted after opening the Define Names dialog as well.)
- 2) On the Define Names dialog (Figure 129), type a name for the range in the text box with the blinking cursor. **The name of the range cannot contain any spaces.**

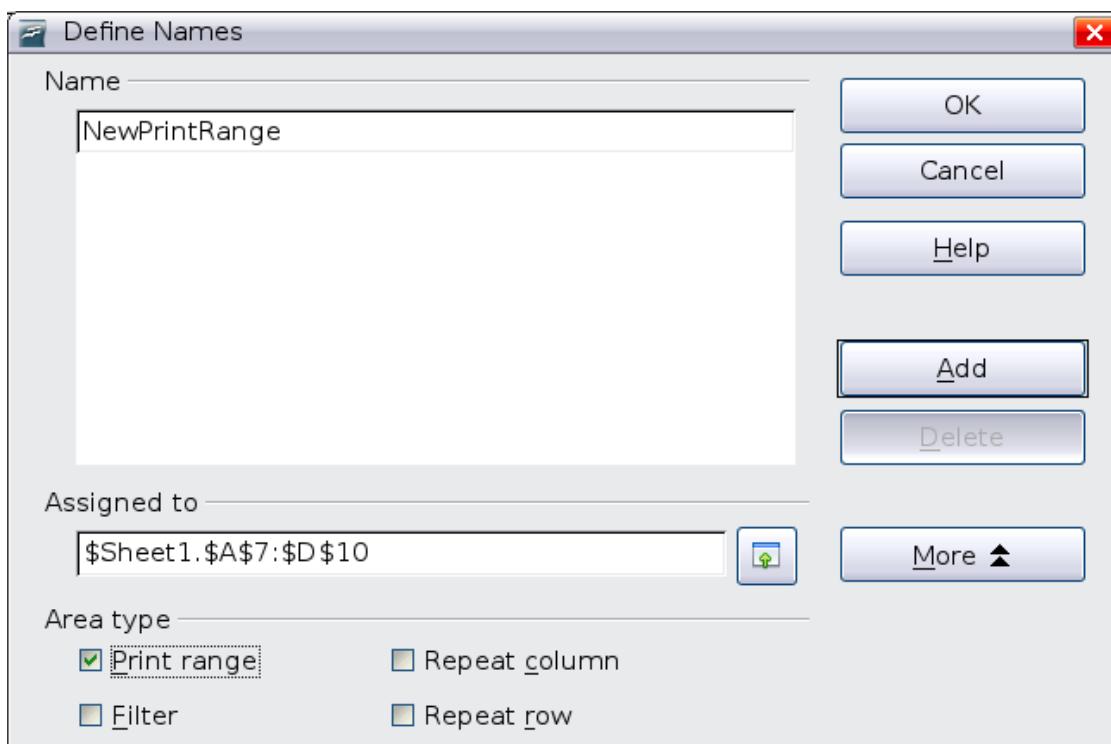


Figure 129: Define Names dialog

- 3) Click the **More** button in the dialog and then select the **Print range** option. Click the **Add** button.
- 4) To include more than one group of cells in the selection, type in the additional ranges. For example, to select the rectangle with A3 as the top left cell and F20 as the bottom right cell, enter **;\$A\$3:\$F\$20** or **;A3:F20** (both work and are equivalent) after the initial selection. Make sure that each group of cells is separated with a semicolon. Click **OK**.

To print this range:

- 1) Choose **Format** → **Print Ranges** → **Edit** (Figure 126). The previously defined area now appears in the drop-down box under Print range.
- 2) Select the defined print range and click **OK**.

This method can be useful to quickly change the print range without highlighting a large area of cells every time.

Note

If the cell range name refers to more than one group of cells, it will not appear in the drop-down list. You will need to type it in or highlight and select it.

Page breaks

While defining a print range can be a powerful tool, it may sometimes be necessary to manually adjust Calc's printout. To do this, you can use a *manual break*. A manual break helps to ensure that your data prints properly. You can insert a horizontal page break above, or a vertical page break to the left of, the active cell.

Inserting a page break

To insert a page break:

- 1) Navigate to the cell where the page break will begin.
- 2) Select **Insert** → **Manual Break**.
- 3) Select **Row Break** or **Column Break** depending on your need.

The break is now set.

Row break

Selecting *Row Break* creates a page break above the selected cell. For example, if the active cell is H15, then the break is created between rows 14 and 15.

Column break

Selecting *Column Break* creates a page break to the left of the selected cell. For example, if the active cell is H15, then the break is created between columns G and H.

Tip

To see page break lines more easily on screen, you can change their color. Choose **Tools** → **Options** → **LibreOffice** → **Appearance** and scroll down to the Spreadsheet section.

Deleting a page break

To remove a page break:

- 1) Navigate to a cell that is next to the break you want to remove.
- 2) Select **Edit** → **Delete Manual Break**.
- 3) Select **Row Break** or **Column Break** depending on your need.

The break is now removed.

Note

Multiple manual row and column breaks can exist on the same page. When you want to remove them, you have to remove each one individually. This may be confusing at times, because although there may be a column break set on the page, when you go to **Edit → Manual Break**, the *Column break* choice may not be available (grayed out).

In order to remove the break, you have to be in the cell next to the break. For example, if you set the column break while you are in H15, you can not remove it if you are in cell D15. However, you can remove it from any cell in column H.

Printing options setup in page styles

Several printing options are set in the page style for sheets. These include the page order, details, and scale to be printed. Because these options are set in the page style, different page styles can be set up to quickly change the print properties of the sheets in the spreadsheet. See Chapter 3, Using Styles and Templates in Calc, for more about page styles.

The Sheet tab of the Page Style dialog (Figure 130) provides the following options.

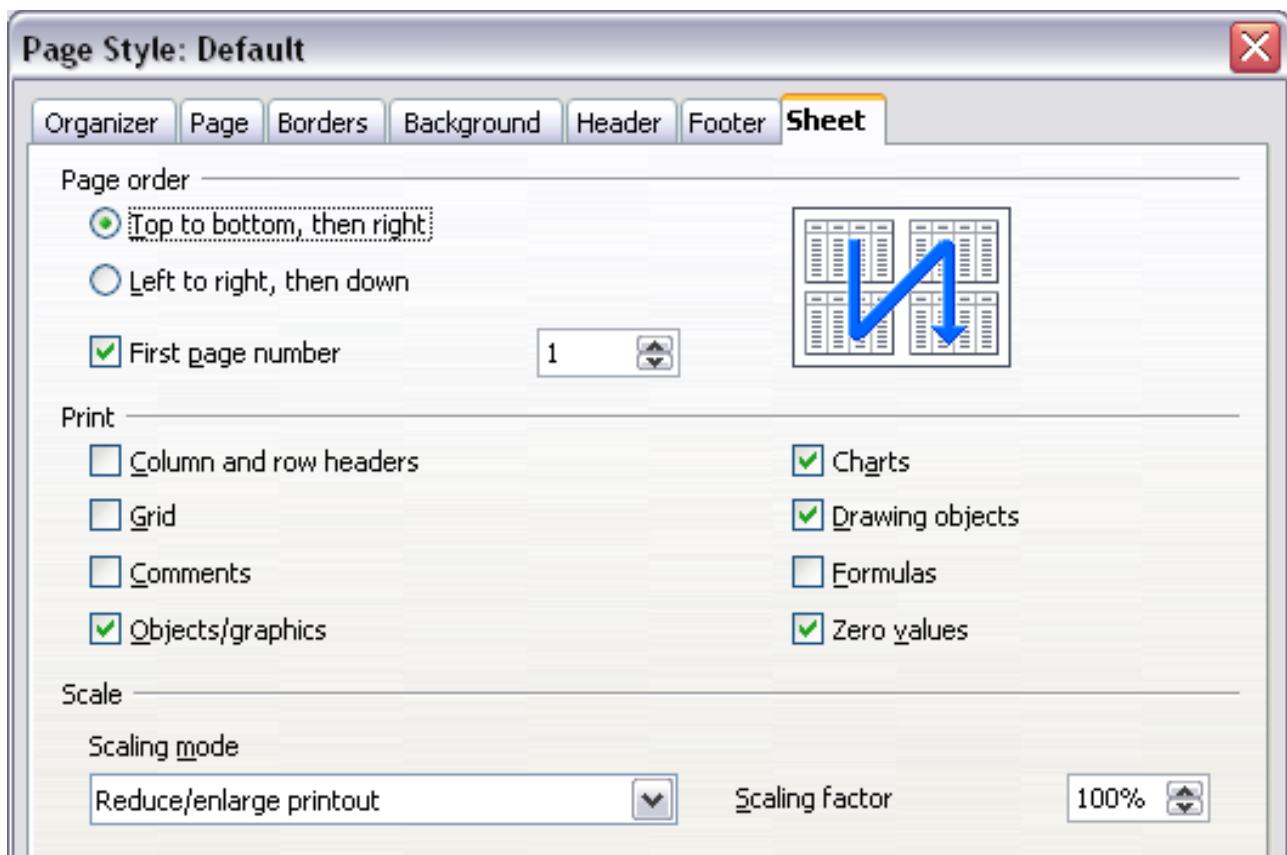


Figure 130. The Sheet tab of the Page Style dialog

Page Order

You can set the order in which pages print. This is especially useful in a large document; for example, controlling the print order can save time if you have to collate the document a certain way.

Where a sheet prints to more than one page of paper, it can be printed either by column, where the first column of pages prints, and then the second column and so on, or by row as shown in the graphic on the top right of the dialog in Figure 130.

Print

You can specify which details to print. These details include:

- Row and column headers
- Sheet grid—prints the borders of the cells as a grid
- Comments—prints the comments defined in your spreadsheet on a separate page, along with the corresponding cell reference
- Objects and graphics
- Charts
- Drawing objects
- Formulas—prints the formulas contained in the cells, instead of the results
- Zero Values—prints cells with a zero value

Scale

Use the scale features to control the number of pages the data will print on.

- Reduce/Enlarge printout—scales the data in the printout either larger or smaller. For example, if a sheet would normally print out as four pages (two high and two wide), a scaling of 50% would print as one page (both width and height are halved).
- Fit print range(s) on number of pages—defines exactly how many pages the printout will take up. This option will only reduce a printout, it will not enlarge it. To enlarge a printout, the reduce/enlarge option must be used.
- Fit print range(s) to width/height—defines how high and wide the printout will be, in pages.

Headers and footers

Headers and footers are predefined pieces of text that are printed at the top or bottom of a sheet outside of the sheet area. Headers are set the same way as footers.

Headers and footers are assigned to a page style. You can define more than one page style for a spreadsheet and assign different page styles to different sheets. For more about page styles, see Chapter 4.

Setting a header or a footer

To set a header or footer:

- 1) Navigate to the sheet that you want to set the header or footer for. Select **Format → Page**.
- 2) Select the Header (or Footer) tab.
- 3) Select the **Header on** option.

From here you can also set the margins, the spacing, and height for the header or footer. You can check the **AutoFit height** box to automatically adjust the height of the header or footer.

Margin

Changing the size of the left or right margin adjusts how far the header or footer is from that side of the page.

Spacing

Spacing affects how far above or below the sheet the header or footer will print. So, if spacing is set to 1.00", then there will be 1 inch between the header or footer and the sheet.

Height

Height affects how big the header or footer will be.

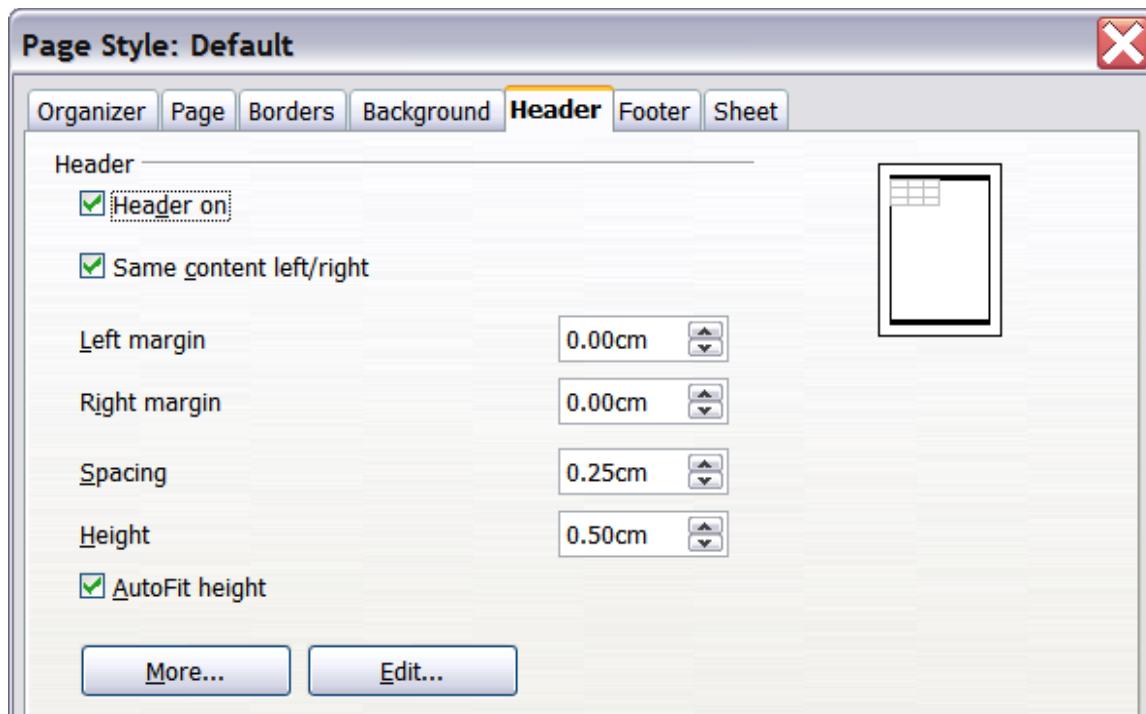


Figure 131: Header dialog

Header or footer appearance

To change the appearance of the header or footer, click the **More** button in the dialog. This opens the Border/Background dialog.

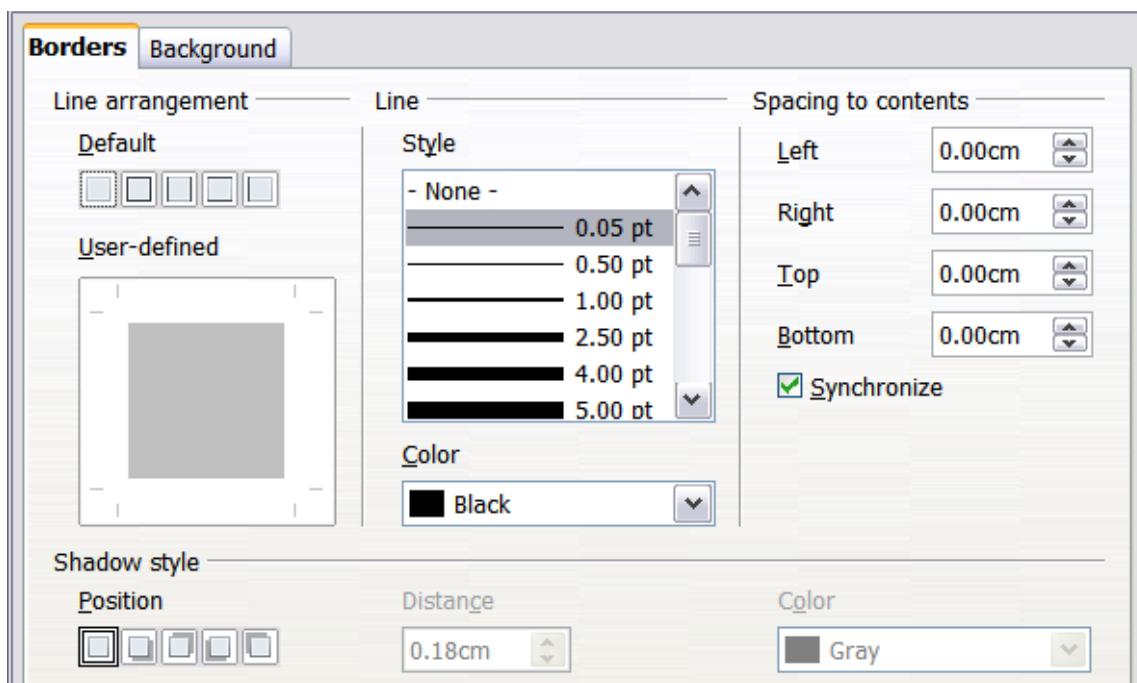


Figure 132: Header/Footer Border/Background dialog

From this dialog you can set the background and border style of the header or footer. See Chapter 4, Using Styles and Templates in Calc, for more information.

Setting the contents of the header or footer

The header or footer of a Calc spreadsheet has three columns for text. Each column can have different contents.

To set the contents of the header or footer, click the **Edit** button in the header or footer dialog shown in Figure 131 to display the dialog shown in Figure 133.

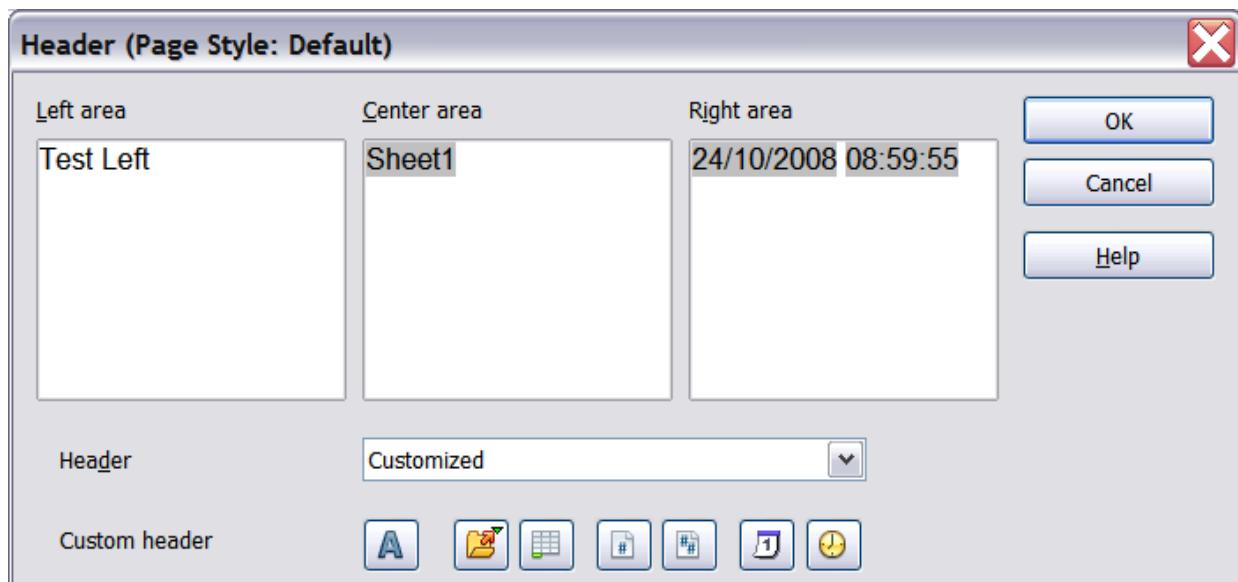


Figure 133: Edit contents of header or footer

Areas

Each area in the header or footer is independent and can have different information in it.

Header

You can select from several preset choices in the Header drop-down list, or specify a custom header using the buttons below the area boxes. (To format a footer, the choices are the same.)

Custom header

Click in the area (Left, Center, Right) that you want to customize, then use the buttons to add elements or change text attributes.

- Opens the Text Attributes dialog.
- Inserts the total number of pages.
- Inserts the File Name field.
- Inserts the Date field.
- Inserts the Sheet Name field.
- Inserts the Time field.
- Inserts the current page number.

Exporting to PDF

Calc can export documents to PDF (Portable Document Format). This industry-standard file format is ideal for sending the file to someone else to view using Adobe Reader or other PDF viewers.

Quick export to PDF

Click the **Export Directly as PDF** icon  to export the entire document using your default PDF settings. You are asked to enter the file name and location for the PDF file, but you do not get a chance to choose a page range, the image compression, or other options.

Controlling PDF content and quality

For more control over the content and quality of the resulting PDF, use **File → Export as PDF**. The PDF Options dialog opens. This dialog has five pages (General, Initial View, User Interface, Links, and Security). Select the appropriate settings, and then click **Export**. Then you are asked to enter the location and file name of the PDF to be created, and click **Save** to export the file.

General page of PDF Options dialog

On the *General* page, you can choose which pages to include in the PDF, the type of compression to use for images (which affects the quality of images in the PDF), and other options.

Range section

- **All:** Exports the entire document.
- **Pages:** To export a range of pages, use the format **3-6** (pages 3 to 6). To export single pages, use the format **7;9;11** (pages 7, 9, and 11). You can also export a combination of page ranges and single pages, by using a format like **3-6;8;10;12**.
- **Selection:** Exports whatever content is selected.

Images section

- **Lossless compression:** Images are stored without any loss of quality. Tends to make large files when used with photographs. Recommended for other kinds of images or graphics.
- **JPEG compression:** Allows for varying degrees of quality. A setting of 90% works well with photographs (small file size, little perceptible loss).
- **Reduce image resolution:** Lower-DPI (dots per inch) images have lower quality. For viewing on a computer screen a resolution of 72dpi (for Windows) or 96dpi (GNU/Linux) is sufficient, while for printing it is generally preferable to use at least 300 or 600 dpi, depending on the capability of the printer. Higher dpi settings greatly increase the size of the exported file.

Note	EPS (Encapsulated PostScript) images with embedded previews are exported only as previews. EPS images without embedded previews are exported as empty placeholders.
-------------	---

General section

- **PDF/A-1a:** PDF/A is an ISO standard for long-term preservation of documents, by embedding all the information necessary for faithful reproduction (such as fonts) while forbidding other elements (including forms, security, and encryption). PDF tags are written. If you select PDF/A-1a, the forbidden elements are greyed-out (not available).

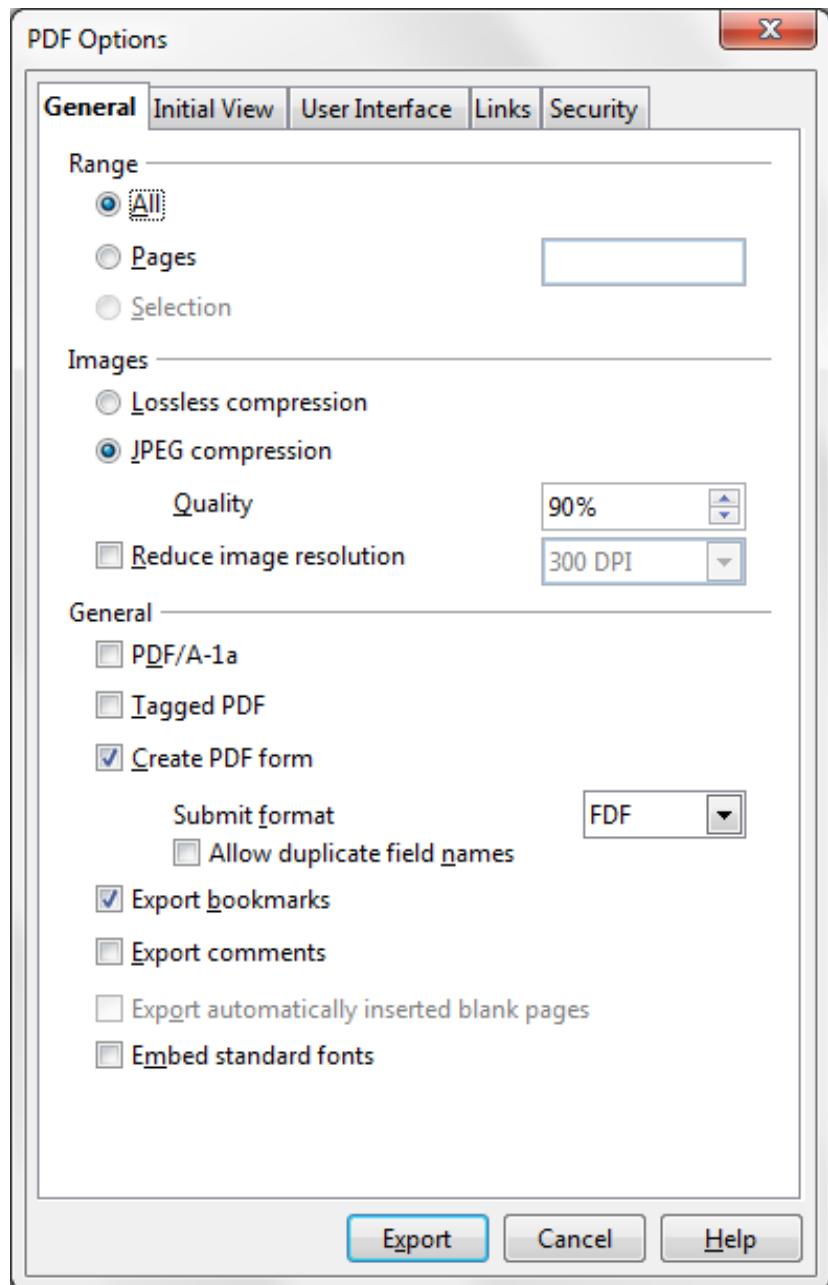


Figure 134: General page of PDF Options dialog

- **Tagged PDF:** Tagged PDF contains information about the structure of the document's contents. This can help to display the document on devices with different screens, and when using screen reader software. Some tags that are exported are table of contents, hyperlinks, and controls. This option can increase file sizes significantly.
- **Create PDF form - Submit format:** Choose the format for submitting forms from within the PDF file. This setting overrides the control's URL property that you set in the document. There is only one common setting valid for the whole PDF document: PDF (sends the whole document), FDF (sends the control contents), HTML, and XML. Most often you will choose the PDF format.
- **Export bookmarks:** Exports sheet names in Calc documents as "bookmarks" (a table of contents list displayed by some PDF readers, including Adobe Reader).
- **Export comments:** Exports comments in Calc documents as PDF notes. You may not want this!

- **Export automatically inserted blank pages:** Not available in Calc.
- **Embed standard fonts:** You can choose to embed the standard fonts (Times, Helvetica, Courier, Symbol, and ZapfDingbats) in all PDF documents created by LibreOffice, to enhance display accuracy in PDF viewers.

Initial View page of PDF Options dialog

On the *Initial View* page (Figure 134), you can choose how the PDF opens by default in a PDF viewer. The selections are self-explanatory.

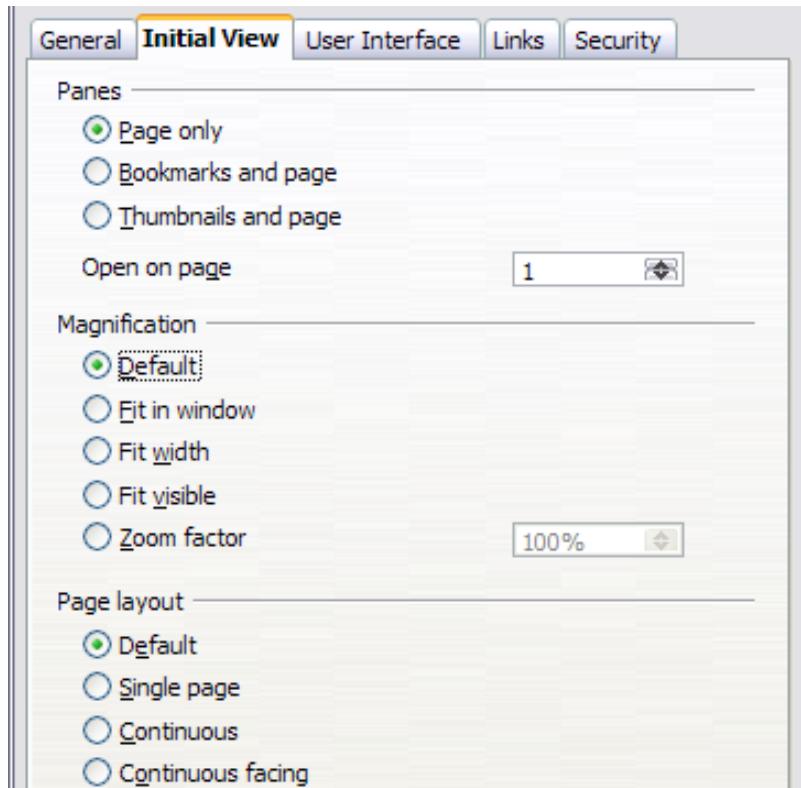


Figure 135: Initial View page of PDF Options dialog

User Interface page of PDF Options dialog

On the *User Interface* page (Figure 132), you can choose more settings to control how a PDF viewer displays the file. Some of these choices are particularly useful when you are creating a PDF to be used as a presentation or a kiosk-type display.

Window options section

- **Resize window to initial page:** Causes the PDF viewer window to resize to fit the first page of the PDF.
- **Center window on screen:** Causes the PDF viewer window to be centered on the computer screen.
- **Open in full screen mode:** Causes the PDF viewer to open full-screen instead of in a smaller window.
- **Display document title:** Causes the PDF viewer to display the document's title in the title bar.

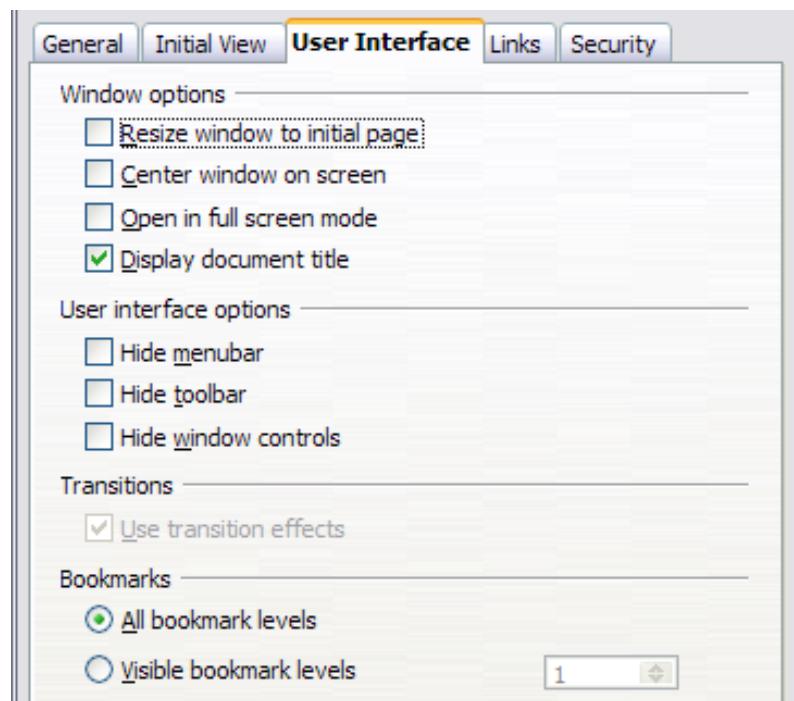


Figure 136: User Interface page of PDF Options dialog

User interface options section

- **Hide menubar:** Causes the PDF viewer to hide the menu bar.
- **Hide toolbar:** Causes the PDF viewer to hide the toolbar.
- **Hide window controls:** Causes the PDF viewer to hide other window controls.

Transitions

- Not available in Calc.

Bookmarks

Select how many heading levels are displayed as bookmarks, if *Export bookmarks* is selected on the General page.

Links page of PDF Options dialog

On this page you can choose how links are exported to PDF.

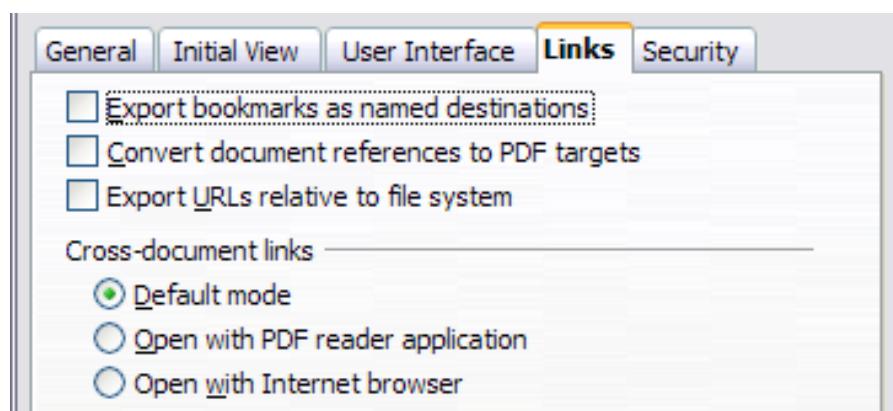


Figure 137: Links page of PDF Options dialog

Export bookmarks as named destinations

If you have defined Writer bookmarks, Impress or Draw slide names, or Calc sheet names, this option exports them as “named destinations” to which Web pages and PDF documents can link.

Convert document references to PDF targets

If you have defined links to other documents with OpenDocument extensions (such as .ODT, .ODS, and .ODP), this option converts the file names to .PDF in the exported PDF document.

Export URLs relative to file system

If you have defined relative links in a document, this option exports those links to the PDF.

Cross-document links

Defines the behavior of links clicked in PDF files.

Security page of PDF Options dialog

PDF export includes options to encrypt the PDF (so it cannot be opened without a password) and apply some digital rights management (DRM) features.

- With an *open password* set, the PDF can only be opened with the password. Once opened, there are no restrictions on what the user can do with the document (for example, print, copy, or change it).
- With a *permissions password* set, the PDF can be opened by anyone, but its permissions can be restricted. See Figure 125.
- With *both* the *open password* and *permission password* set, the PDF can only be opened with the correct password, and its permissions can be restricted.

Note

Permissions settings are effective only if the user's PDF viewer respects the settings.

Figure 128 shows the dialog displayed when you click the **Set open password** button on the Security page of the PDF Options dialog.

After you set a password for permissions, the other choices on the Security page (shown in Figure 125) become available. These selections are self-explanatory.

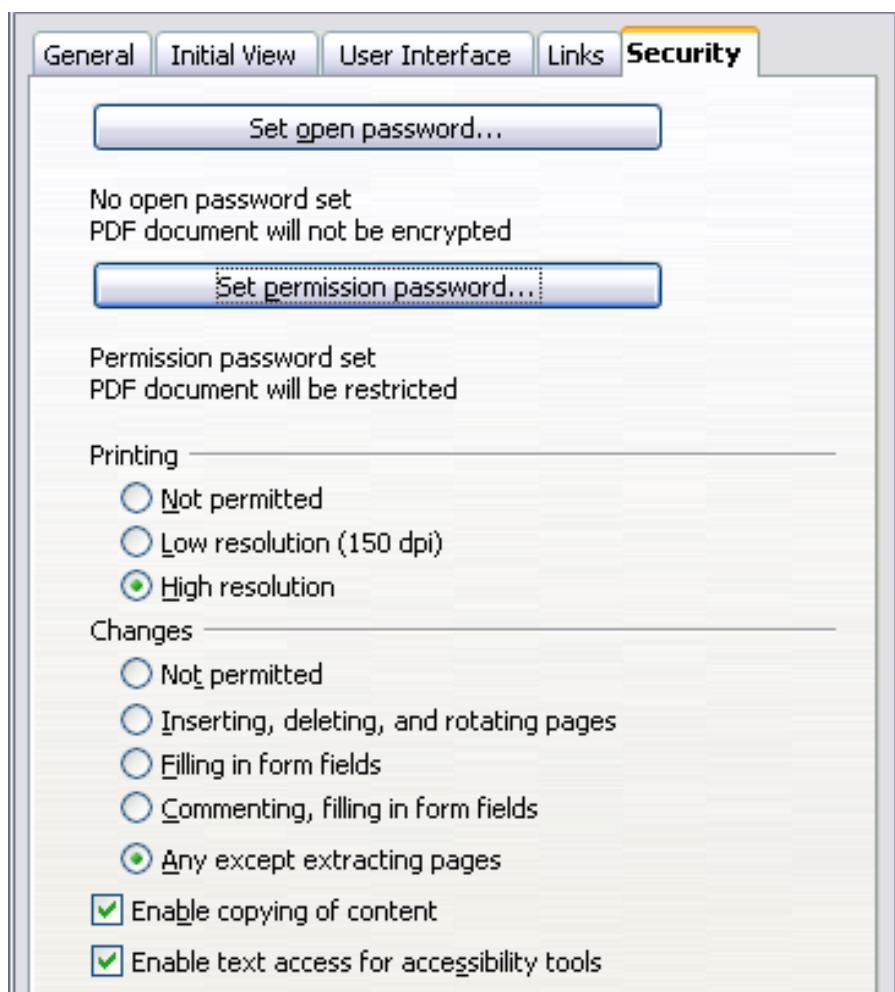


Figure 138: Security page of *PDF Options* dialog.



Figure 139: Setting a password to encrypt a PDF

Exporting to XHTML

Calc can export spreadsheets to XHTML. Choose **File → Export**. On the Export dialog, specify a file name for the exported document, then select the XHTML in the *File format* list and click the **Export** button.

Saving as Web pages (HTML)

Calc can save files as HTML documents. Use **File → Save As** and select **HTML Document**, or **File → Wizards → Web Page**.

If the file contains more than one sheet, the additional sheets will follow one another in the HTML file. Links to each sheet will be placed at the top of the document. Calc also allows the insertion of links directly into the spreadsheet using the Hyperlink dialog.

E-mailing spreadsheets

LibreOffice provides several quick and easy ways to send spreadsheets as an e-mail attachment in one of three formats: OpenDocument Spreadsheet (LibreOffice's default format), Microsoft Excel, or PDF.

Note	Documents can only be sent from the LibreOffice menu if a mail profile has been set up.
-------------	---

To send the current document in OpenDocument format:

- 1) Choose **File → Send → Document as E-mail**. LibreOffice opens your default e-mail program with the spreadsheet (*.ODS) document attached.
- 2) In your e-mail program, enter the recipient, subject, and any text you want to add, then send the e-mail.

File → Send → E-mail as OpenDocument Spreadsheet has the same effect.

If you choose **E-mail as Microsoft Excel**, LibreOffice first creates a file in Excel format and then opens your e-mail program with the *.XLS file attached.

Similarly, if you choose **E-mail as PDF**, LibreOffice first creates a PDF using your default PDF settings (as when using the **Export Directly as PDF** toolbar button) and then opens your email program with the *.PDF file attached.

E-mailing a spreadsheet to several recipients

To e-mail a document to several recipients, you can use the features in your e-mail program or you can use LibreOffice Writer's mail merge facilities to extract email addresses from an address book.

For details, see Chapter 10, Printing, Exporting, and E-mailing, in the *Getting Started* guide.

Digital signing of documents

To sign a document digitally, you need a personal key, also known as a *certificate*. A personal key is stored on your computer as a combination of a private key, which must be kept secret, and a public key, which you add to your documents when you sign them. You can get a certificate from a certification authority, which may be a private company or a governmental institution.

When you apply a digital signature to a document, a checksum is computed from the document's content plus your personal key. The checksum and your public key are stored together with the document.

When someone later opens the document on any computer with a recent version of LibreOffice, the program will compute the checksum again and compare it with the stored checksum. If both are the same, the program will signal that you see the original, unchanged document. In addition, the program can show you the public key information from the certificate. You can compare this key with the public key that is published on the web site of the certificate authority.

Whenever someone changes something in the document, this change breaks the digital signature.

On Windows operating systems, the Windows features of validating a signature are used. On Solaris and Linux systems, files that are supplied by Thunderbird, Mozilla or Firefox are used. For a more detailed description of how to get and manage a certificate, and signature validation, see "Using Digital Signatures" in the LibreOffice Help.

To sign a document:

- 1) Choose **File** → **Digital Signatures**.
- 2) If you have not saved the document since the last change, a message box appears. Click **Yes** to save the file.
- 3) After saving, you see the Digital Signatures dialog. Click **Add** to add a public key to the document.
- 4) In the Select Certificate dialog, select your certificate and click **OK**.
- 5) You see again the Digital Signatures dialog, where you can add more certificates if you want. Click **OK** to add the public key to the saved file.

A signed document shows an icon  in the status bar. You can double-click the icon to view the certificate.

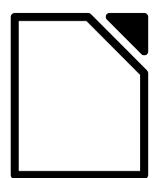
Removing personal data

You may wish to ensure that personal data, versions, notes, hidden information, or recorded changes are removed from files before you send them to other people or create PDFs from them.

In **Tools** → **Options** → **LibreOffice** → **Security** → **Options**, you can set Calc to remind (warn) you when files contain certain information and remove personal information automatically on saving.

To remove personal and some other data from a file, go to **File** → **Properties**. On the *General* tab, uncheck **Apply user data** and then click the **Reset** button. This removes any names in the created and modified fields, deletes the modification and printing dates, and resets the editing time to zero, the creation date to the current date and time, and the version number to 1.

To remove version information, either go to **File** → **Versions**, select the versions from the list and click **Delete**, or use **Save As** and save the file with a different name.



LibreOffice
The Document Foundation

Chapter 7 *Using Formulas and Functions*

Introduction

In previous chapters, we have been entering one of two basic types of data into each cell: numbers and text. However, we will not always know what the contents should be. Often the contents of one cell depends on the contents of other cells. To handle this situation, we use a third type of data: the *formula*. Formulas are equations using numbers and variables to get a result. In a spreadsheet, the variables are cell locations that hold the data needed for the equation to be completed.

A *function* is a predefined calculation entered in a cell to help you analyze or manipulate data in a spreadsheet. All you have to do is add the arguments, and the calculation is automatically made for you. Functions help you create the formulas needed to get the results that you are looking for.

Setting up a spreadsheet

If you are setting up more than a simple one-worksheet system in Calc, it is worth planning ahead a little. Avoid the following traps:

- Typing fixed values into formulas
- Not including notes and comments describing what the system does, including what input is required and where the formulas come from (if not created from scratch)
- Not incorporating a system of checking to verify that the formulas do what is intended

The trap of fixed values

Many users set up long and complex formulas with fixed values typed directly into the formula.

For example, conversion from one currency to another requires knowledge of the current conversion rate. If you input a formula in cell C1 of $=0.75*B1$ (for example to calculate the value in Euros of the USD dollar amount in cell B1), you will have to edit the formula when the exchange rate changes from 0.75 to some other value. It is much easier to set up an input cell with the exchange rate and reference that cell in any formula needing the exchange rate. *What-if* type calculations also are simplified: what if the exchange rate varies from 0.75 to 0.70 or 0.80? No formula editing is needed and it is clear what rate is used in the calculations. Breaking complex formulas down into more manageable parts, described below, also helps to minimise errors and aid troubleshooting.

Lack of documentation

Lack of documentation is a very common failing. Many users prepare a simple worksheet which then develops into something much more complicated over time. Without documentation, the original purpose and methodology is often unclear and difficult to decipher. In this case it is usually easier to start again from the beginning, wasting the work done previously. If you insert comments in cells, and use labels and headings, a spreadsheet can be later modified by you or others and much time and effort will be saved.

Error-checking formulas

Adding up columns of data or selections of cells from a worksheet often results in errors due to omitting cells, wrongly specifying a range, or double-counting cells. It is useful to institute checks in your spreadsheets. For example, set up a spreadsheet to calculate columns of figures, and use SUM to calculate the individual column totals. You can check the result by including (in a non-printing column) a set of row totals and adding these together. The two figures—row total and column total—must agree. If they do not, you have an error somewhere.

Error Checking Demonstration			
Sum columns A, B and C			
A	B	C	Row Sums
0	0.64	0.02	0.66
0.43	0.23	0.75	1.41
0.91	0.57	0.59	2.07
0.07	0.07	0.45	0.59
0.37	0.33	0.04	0.74
0.34	0.06	0.98	1.38
0.95	0.34	0.65	1.94
0.93	0.08	0.63	1.64
0.61	0.82	0.17	1.6
Column Sums =SUM(B22:B29)		4.26	
	TOTAL:	11.37	12.03
			ERROR!!!

Figure 140: Error checking of formulas

You can even set up a formula to calculate the difference between the two totals and report an error in case a non-zero result is returned (see Figure 140).

Creating formulas

You can enter formulas in two ways, either directly into the cell itself, or at the input line. Either way, you need to start a formula with one of the following symbols: `=`, `+` or `-`. Starting with anything else causes the formula to be treated as if it were text.

Operators in formulas

Each cell on the worksheet can be used as a data holder or a place for data calculations. Entering data is accomplished simply by typing in the cell and moving to the next cell or pressing *Enter*. With formulas, the equals sign indicates that the cell will be used for a calculation. A mathematical calculation like $15 + 46$ can be accomplished as shown in Figure 141.

While the calculation on the left was accomplished in only one cell, the real power is shown on the right where the data is placed in cells and the calculation is performed using references back to the cells. In this case, cells B3 and B4 were the data holders, with B5 the cell where the calculation was performed. Notice that the formula was shown as `=B3+B4`. The plus sign indicates that the contents of cells B3 and B4 are to be added together and then have the result in the cell holding the formula. All formulas build upon this concept. Other ways of entering formulas are shown in Table 7.

These cell references allow formulas to use data from anywhere in the worksheet being worked on or from any other worksheet in the workbook that is opened. If the data needed was in different worksheets, they would be referenced by referring to the name of the worksheet, for example `=SUM(Sheet2.B12+Sheet3.A11)`.

Note

To enter the = symbol for a purpose other than creating a formula as described in this chapter, type an apostrophe or single quotation mark before the =. For example, in the entry '= means different things to different people, Calc treats everything after the single quotation mark—including the = sign—as text.

Simple Calculation in 1 Cell			Calculation by Reference			
	A	B		A	B	C
1				1		
2				2		
3		=15+46		3		15
4				4		46
5				5		
6				6		

	A	B	C
1			
2			
3		61	
4			
5			
6			

	A	B	C
1			
2			
3			15
4			46
5			61
6			

	A	B	C
1			
2			
3			15
4			46
5		=b3+b4	
6			

Figure 141: A simple calculation

Table 7: Common ways to enter formulas

Formula	Description
=A1+10	Displays the contents of cell A1 plus 10.
=A1*16%	Displays 16% of the contents of A1.
=A1*A2	Displays the result of the multiplication of A1 and A2.
=ROUND(A1;1)	Displays the contents of cell A1 rounded to one decimal place.
=EFFECTIVE(5%;12)	Calculates the effective interest for 5% annual nominal interest with 12 payments a year.
=B8-SUM(B10:B14)	Calculates B8 minus the sum of the cells B10 to B14.
=SUM(B8;SUM(B10:B14))	Calculates the sum of cells B10 to B14 and adds the value to B8.

Formula	Description
=SUM(B1:B65536)	Sums all numbers in column B.
=AVERAGE(BloodSugar)	Displays the average of a named range defined under the name BloodSugar.
=IF(C31>140; "HIGH"; "OK")	Displays the results of a conditional analysis of data from two sources. If the contents of C31 is greater than 140, then HIGH is displayed, otherwise OK is displayed.

Note

Users of Lotus 1-2-3®, Quattro Pro® and other spreadsheet software may be familiar with formulas that begin with +, -, =, (, @, ., \$, or #. A mathematical formula would look like $+D2+C2$ or $+2^3$. Functions begin with the @ symbol such as $@SUM(D2..D7)$, $@COS(@DEGTORAD(30))$ and $@IRR(GUESS;CASHFLOWS)$. Ranges are identified such as $A1..D3$.

Functions can be identified in Table 7 with a word, for example ROUND, followed by parentheses enclosing references or numbers.

It is also possible to establish ranges for inclusion by naming them using **Insert → Names**, for example BloodSugar representing a range such as B3:B10. Logical functions can also be performed as represented by the IF statement which results in a conditional response based upon the data in the identified cell, for example

`=IF(A2>=0;"Positive";"Negative")`

A value of 3 in cell A2 would return the result *Positive*, -9 the result *Negative*.

Operator types

You can use the following operators in LibreOffice Calc: arithmetic, comparative, descriptive, text, and reference.

Arithmetic operators

The addition, subtraction, multiplication and division operators return numerical results. The Negation and Percent operators identify a characteristic of the number found in the cell, for example -37. The example for Exponentiation illustrates how to enter a number that is being multiplied by itself a certain number of times, for example $2^3 = 2*2*2$.

Table 8: Arithmetical operators

Operator	Name	Example
+	(Plus)	Addition
-	(Minus)	Subtraction
-	(Minus)	Negation
*	(asterisk)	Multiplication
/	(Slash)	Division
%	(Percent)	Percent
^	(Caret)	Exponentiation

Comparative operators

Comparative operators are found in formulas that use the IF function and return either a true or false answer; for example, `=IF(B6>G12; 127; 0)` which, loosely translated, means if the contents of cell B6 are greater than the contents of cell G12, then return the number 127, otherwise return the number 0.

A direct answer of TRUE or FALSE can be obtained by entering a formula such as `=B6>B12`. If the numbers found in the referenced cells are accurately represented, the answer TRUE is returned, otherwise FALSE is returned.

Table 9: Comparative operators

Operator	Name	Example
= (equal sign)	Equal	A1=B1
> (Greater than)	Greater than	A1>B1
< (Less than)	Less than	A1<B1
>= (Greater than or equal to)	Greater than or equal to	A1>=B1
<= (Less than or equal to)	Less than or equal to	A1<=B1
<> (Inequality)	Inequality	A1<>B1

If cell A1 contains the numerical value 4 and cell B1 the numerical value 5, the above examples would yield results of FALSE, FALSE, TRUE, FALSE, TRUE, and TRUE.

Text operators

It is common for users to place text in spreadsheets. To provide for variability in what and how this type of data is displayed, text can be joined together in pieces coming from different places on the spreadsheet. Figure 142 shows an example.

The figure consists of two screenshots of LibreOffice Calc. The top screenshot shows the formula bar with the formula `=B2 & " " & C2 & ", " & D2`. The bottom screenshot shows the result of this formula being applied to cell F2, resulting in the date `June 23, 2010`.

	A	B	C	D	E	F	G
1							
2		June		23	2010	=B2 & " " & C2 & ", " & D2	
3							
4							

	A	B	C	D	E	F	G
1							
2		June		23	2010	June 23, 2010	
3							
4							

Figure 142: Text concatenation

In this example, specific pieces of the text were found in three different cells. To join these segments together, the formula also adds required spaces and punctuation enclosed within quotation marks, resulting in a formula of `=B2 & " " & C2 & ", " & D2`. The result is the concatenation into a date formatted in a particular sequence.

Calc has a CONCATENATE function which performs the same operation.

Taking this example further, if the result cell is defined as a name, then text concatenation is performed using this defined name. This process is demonstrated in Figures 143, 144, and 145 where the cell with the date is named “WizardDay” and subsequently used in a formula in another cell.

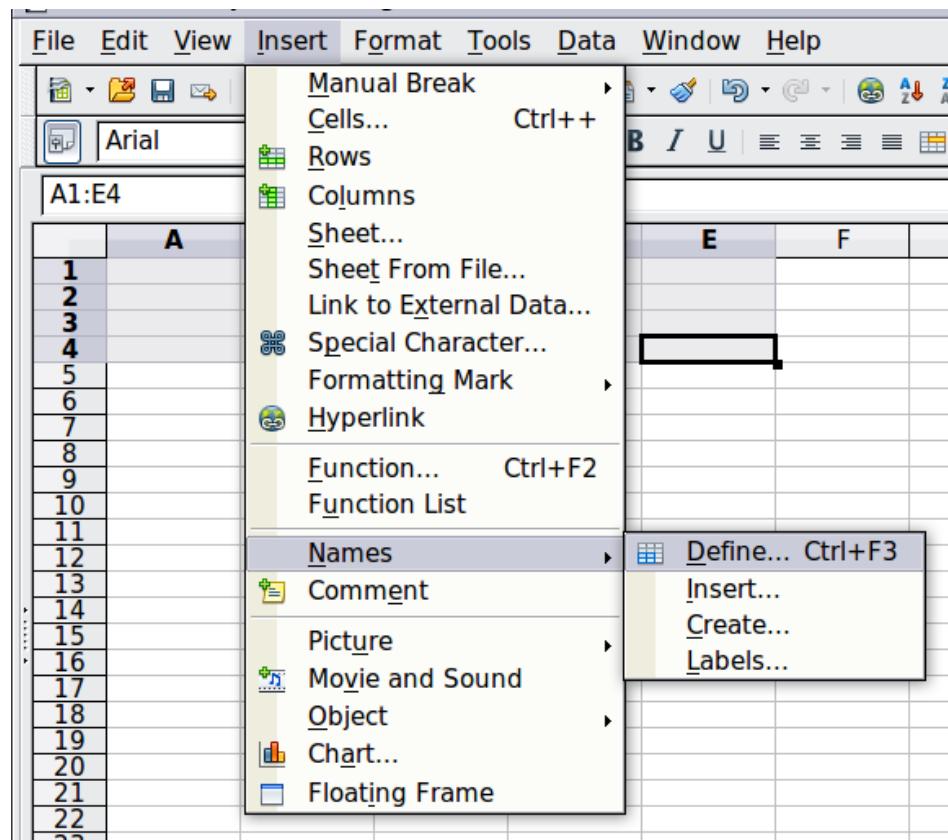


Figure 143: Defining a name for a range of cells

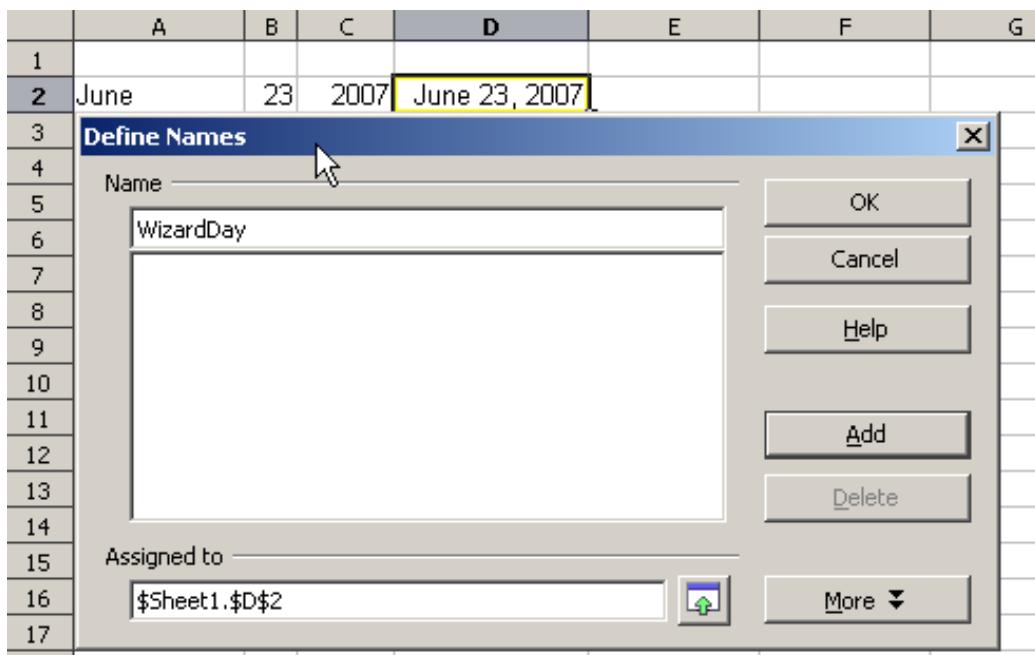


Figure 144: Naming a cell or range of cells for inclusion in a formula

	A	B	C	D
1				
2	June	23	2007	June 23, 2007
3				
4				

	A	B	C	D
1				
2	June	23	2007	June 23, 2007
3				
4	The Big Show will happen on			
5				
6	=A4 & WizardDay			

	A	B	C	D
1				
2	June	23	2007	June 23, 2007
3				
4	The Big Show will happen on			
5				
6	The Big Show will happen on June 23, 2007			

Figure 145: Defining Names on a worksheet

Reference operators

In its simplest form a reference refers to a single cell, but references can also refer to a rectangle or cuboid range or a reference in a list of references. To build such references you need reference operators.

An individual cell is identified by the column identifier (letter) located along the top of the columns and a row identifier (number) found along the left-hand side of the spreadsheet. On spreadsheets read from left to right, the upper left cell is A1.

Range operator

The range operator is written as colon. An expression using the range operator has the following syntax:

reference left : reference right

The range operator builds a reference to the smallest range including both the cells referenced with the left reference and the cells referenced with the right reference.

	A	B	C	D	E
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
:					

Figure 146: Reference Operator for a range

In the upper left corner of Figure 146 the reference A1:D12 is shown, corresponding to the cells included in the drag operation with the mouse to highlight the range.

Examples

A2:B4

Reference to a rectangle range with 6 cells, 2 column width \times 3 row height. When you click on the reference in the formula in the input line, a border indicates the rectangle.

(A2:B4):C9

Reference to a rectangle range with cell A2 top left and cell C9 bottom right. So the range contains 24 cells, 3 column width \times 8 row height. This method of addressing extends the initial range from A2:B4 to A2:C9.

Sheet1.A3:Sheet3.D4

Reference to a cuboid range with 24 cells, 4 column width \times 2 row height \times 3 sheets depth.

When you enter B4:A2 or A4:B2 directly, then Calc will turn it to A2:B4. So the left top cell of the range is left of the colon and the bottom right cell is right of the colon. But if you name the cell B4 for example with `_start` and A2 with `_end`, you can use `_start:_end` without any error.

Calc can not reference a whole column of unspecified length using A:A or a whole row using 1:1 yet, as you might be familiar with in other spreadsheet programs.

Reference concatenation operator

The concatenation operator is written as a tilde. An expression using the concatenation operator has the following syntax:

`reference left ~ reference right`

The result of such an expression is a reference list, which is an ordered list of references. Some functions can take a reference list as an argument, SUM, MAX or INDEX for example.

The reference concatenation is sometimes called 'union'. But it is not the union of the two sets 'reference left' and 'reference right' as normally understood in set theory. COUNT(A1:C3~B2:D2) returns 12 (=9+3), but it has only 10 cells when considered as the union of the two sets of cells.

Notice that SUM(A1:C3;B2:D2) is different from SUM(A1:C3~B2:D2) although they give the same result. The first is a function call with 2 parameters, each of them is reference to a range. The second is a function call with 1 parameter, which is a reference list.

Intersection operator

The intersection operator is written as an exclamation mark. An expression using the intersection operator has the following syntax:

```
reference left ! reference right
```

If the references refer to single ranges, the result is a reference to a single range, containing all cells, which are both in the left reference and in the right reference.

If the references are reference lists, then each list item from the left is intersected with each one from the right and these results are concatenated to a reference list. The order is to first intersect the first item from the left with all items from the right, then intersect the second item from the left with all items from the right, and so on.

Examples

A2:B4 ! B3:D6

This results in a reference to the range B3:B4, because these cells are inside A2:B4 and inside B3:D4.

(A2:B4~B1:C2) ! (B2:C6~C1:D3)

First the intersections A2:B4!B2:C6, A2:B4!C1:D3, B1:C2!B2:C6 and B1:C2!C1:D3 are calculated. This results in B2:B4, empty, B2:C2, and C1:C2. Then these results are concatenated, dropping empty parts. So the final result is the reference list B2:B4 ~ B2:C2 ~ C1:C2.

You can use the intersection operator to refer a cell in a cross tabulation in an understandable way. If you have columns labeled 'Temperature' and 'Precipitation' and the rows labeled 'January', 'February', 'March', and so on, then the following expression

```
'February' ! !Temperature'
```

will reference to the cell containing the temperature in February.

The intersection operator (!) should have a higher precedence than the concatenation operator (~), but do not rely on precedence.

Tip

Always put in parentheses the part that is to be calculated first.

Relative and absolute references

References are the way that we refer to the location of a particular cell in Calc and can be either relative (to the current cell) or absolute (a fixed amount).

Relative referencing

An example of a relative reference will illustrate the difference between a relative reference and absolute reference using the spreadsheet from Figure 147.

- 1) Type the numbers 4 and 11 into cells C3 and C4 respectively of that spreadsheet.
- 2) Copy the formula in cell B5 to cell C5. You can do this by using a simple copy and paste or click and drag B5 to C5 as shown below. The formula in B5 calculates the sum of values in the two cells B3 and B4.
- 3) Click in cell C5. The formula bar shows =C3+C4 rather than =B3+B4 and the value in C5 is 15, the sum of 4 and 11 which are the values in C3 and C4.

In cell B5 the references to cells B3 and B4 are relative references. This means that Calc interprets the formula in B5, applies it to the cells in the B column, and puts the result in the cell holding the

formula. When you copied the formula to another cell, the same procedure was used to calculate the value to put in that cell. This time the formula in cell C5 referred to cells C3 and C4.

	A	B	C	D
1				
2				
3		15	4	
4		46	11	
5		61		
6				

	A	B	C	D
1				
2				
3		15	4	
4		46	11	
5		61	15	
6				

Figure 147: Relative references

You can think of a relative address as a pair of offsets to the current cell. Cell B1 is 1 column to the left of Cell C5 and 4 rows above. The address could be written as R[-1]C[-4]. In fact earlier spreadsheets allowed this notation method to be used in formulas.

Whenever you copy this formula from cell B5 to another cell the result will always be the sum of the two numbers taken from the two cells one and two rows above the cell containing the formula.

Relative addressing is the default method of referring to addresses in Calc.

Absolute referencing

You may want to multiply a column of numbers by a fixed amount. A column of figures might show amounts in US Dollars. To convert these amounts to Euros it is necessary to multiply each dollar amount by the exchange rate. \$US10.00 would be multiplied by 0.75 to convert to Euros, in this case Eur7.50. The following example shows how to input an exchange rate and use that rate to convert amounts in a column from USD to Euros.

- 1) Input the exchange rate Eur:USD (0.75) in cell D1. Enter amounts (in USD) into cells D2, D3 and D4, for example 10, 20, and 30.
- 2) In cell E2 type the formula =D2*D1. The result is 7.5, correctly shown.
- 3) Copy the formula in cell E2 to cell E3. The result is 200, clearly wrong! Calc has copied the formula using relative addressing - the formula in E3 is =D3*D2 and not what we want which is =D3*D1.
- 4) In cell E2 edit the formula to be =D2*\$D\$1. Copy it to cells E3 and E4. The results are now 15 and 22.5 which are correct.

	D	E	F
1	€0.75		
2	\$10	7.50	
3	\$20		
4	\$30		

Steps 2: Setting the exchange rate of Eur at 7.5, then copying it to E3

	D	E	F
1	€0.75		
2	\$10	7.50	
3	\$20	200.00	
4	\$30		

	D	E	F
1	€0.75		
2	\$10	=D2*\$D\$1	
3	\$20	200.00	
4	\$30		

Copying formula from E2 to E3 & changing the formula to read absolute reference

	D	E	F
1	€0.75		
2	\$10	7.50	
3	\$20	200.00	
4	\$30		

	D	E	F
1	€0.75		
2	\$10	7.50	
3	\$20	15.00	
4	\$30		

Applying the correct formula from E2 to E3

Figure 148: Absolute References

The \$ signs before the D and the 1 convert the reference to cell D1 from relative to absolute or fixed. If the formula is copied to another cell the second part will always show \$D\$1. The interpretation of this formula is “take the value in the cell one column to the left in the same row and multiply it by the value in cell D1”.

Cell references can be shown in four ways.

Reference	Explanation
D1	Relative, from cell E3 it is the cell one column to the left and two rows above
\$D\$1	Absolute, from cell E3 it is the cell D1
\$D1	Partially absolute, from cell E3 it is the cell in column D and two rows above
D\$1	Partially absolute, from cell E3 it is the cell one column to the left and in row 1

Tip

To change references in formulas highlight the cell and press Shift-F4 to cycle through the four different types of references. This is of limited value in more complicated formulas, it is usually quicker to edit the formula by hand.

Knowledge of the use of relative and absolute references is essential if you want to copy and paste formulas and to link spreadsheets.

Order of calculation

Order of calculation refers to the sequence in which numerical operations are performed. Division and multiplication are performed before addition or subtraction. There is a common tendency to expect calculations to be made from left to right as the equation would be read in English. Calc evaluates the entire formula, then based upon programming precedence breaks the formula down executing multiplication and division operations before other operations. Therefore, when creating formulas you should test your formula to make sure that the correct result is being obtained. Following is an example of the order of calculation in operation.

Table 10 – Order of Calculation

Left To Right Calculation	Ordered Calculation
$1+3*2+3 = 11$	$=1+3*2+3$ result 10
$1+3=4$, then $4 \times 2 = 8$, then $8 + 3 = 11$	$3*2=6$, then $1 + 6 + 3 = 10$
Another possible intention could be: $1+3*2+3 = 20$	The program resolves the multiplication of 3×2 before dealing with the numbers being added.

If you intend for the result to be either of the two possible solutions on the left, the way to achieve these results would be to order the formula as:

$$((1+3) * 2)+3 = 11$$

$$(1+3) * (2+3) = 20$$

Note

Use parentheses to group operations in the order you intend; for example, $=B4+G12*C4/M12$ might become $=(B4+G12)*C4)/M12$.

Calculations linking sheets

Another powerful feature of Calc is the ability to link data through several worksheets. The naming of worksheets can be helpful to identify where specific data may be found. A name such as Payroll or Boise Sales is much more meaningful than Sheet1. The function named SHEET() returns the sheet number in the collection of spreadsheets. There are several worksheets in each book and they are numbered from the left: Sheet1, Sheet2, and so forth. If you drag the worksheets around to different locations among the tabs, the function returns the number referring to the current position of this worksheet.

An example of calculations obtaining data from other work can be seen in a business setting where a business combines revenues and costs of each of its branch operations into a single combined worksheet.

	A	K	L	M	N	Sheet containing data for Branch 1.
2	Flowing Abundantly, Ltd.					
3	Combined Sales YTD					
4						
5						
6		Oct	Nov	Dec	YTD	
7	Revenue:					
8	Greenery Sales	36,288	52,874	81,335	1,283,107	
9	Fertilizer Sales	16,822	3,825	3,600	697,634	
10	Earth Sales	2,019	459	432	84,479	
11	Sub-Total	55,129	57,158	85,367	2,065,220	
12						
13	Cost of Sales:					
14	Wholesaler Purchases	18,744	19,434	29,025	702,175	
15	Sales Tax	6,064	6,287	9,390	227,174	
16	Sub-Total	24,808	25,721	38,415	929,349	
17						
18	Total Revenue:	30,321	31,437	46,952	1,135,871	
19						
20	Expenses:					

Branch1 Branch2 Branch3 Combined

	A	K	L	M	N	Sheet containing data for Branch 2.
2	Flowing Abundantly, Ltd.					
3	Combined Sales YTD					
4						
5						
6		Oct	Nov	Dec	YTD	
7	Revenue:					
8	Greenery Sales	38,251	14,899	49,588	1,027,538	
9	Fertilizer Sales	6,120	2,384	7,934	164,406	
10	Earth Sales	734	286	952	19,729	
11	Sub-Total	45,106	17,569	58,474	1,211,673	
12						
13	Cost of Sales:					
14	Wholesaler Purchases	15,336	5,973	19,881	411,969	
15	Sales Tax	4,962	1,933	6,432	133,284	
16	Sub-Total	20,298	7,906	26,313	545,253	
17						
18	Total Revenue:	24,808	9,663	32,161	666,420	
19						
20	Expenses:					

Branch1 Branch2 Branch3 Combined

	A	K	L	M	N	Sheet containing data for Branch 3.
3	Combined Sales YTD					
4						
5		Oct	Nov	Dec	YTD	
6	Revenue:					
7	Greenery Sales	65,801	58,257	102,179	1,498,444	
8	Fertilizer Sales	54,833	17,620	8,782	843,175	
9	Earth Sales	59,025	16,824	7,622	397,342	
10	Sub-Total	179,659	92,701	118,583	2,738,961	
11						
12	Cost of Sales:					
13	Wholesaler Purchases	61084.06	31518.34	40318.22	931246.74	
14	Sales Tax	19762.49	10197.11	13044.13	301285.71	
15	Sub-Total	80846.55	41715.45	53362.35	1232532.45	
16						
17	Total Revenue:	98,812	50,986	65,221	1,506,429	
18						
19	Expenses:					

K7 f(x) Σ = =Branch1.K7+Branch2.K7+Branch3.K7

	A	K	L	M	N
2	Flowering Abundantly, Ltd.				
3	Combined Sales YTD				
4					
5		Oct	Nov	Dec	YTD
6	Revenue:				
7	Greenery Sales	167,890	169,388	285,693	4,279,995
8	Fertilizer Sales	126,488	39,065	21,164	2,383,984
9	Earth Sales	120,069	34,107	15,676	879,163
10	Sub-Total	414,447	242,560	322,533	7,543,142
11					
12	Cost of Sales:				
13	Wholesaler Purchases	140,912	82,470	109,661	2,564,668
14	Sales Tax	45,589	26,682	35,479	829,746
15	Sub-Total	186,501	109,152	145,140	3,394,414
16					
17	Total Revenue:	227,946	133,408	177,393	4,148,728
18					
19	Expenses:				

Figure 149: Combining data from several sheets into a single sheet

The spreadsheets have been set up with identical structures. The easiest way to do this is to set up the first Branch spreadsheet, input data, format cells, and prepare the formulas for the various sums of rows and columns.

- 1) On the worksheet tab, right-click and select **Rename Sheet**. Type Branch1. Right-click on the tab again and select **Move/Copy Sheet**.
 - 2) In the Move/Copy Sheet dialog, select the *Copy* option and select Sheet 2 in the area *Insert before*. Click **OK**, right-click on the tab of the sheet Branch1_2 and rename it to Branch2. Repeat to produce the Branch3 and Combined worksheets.

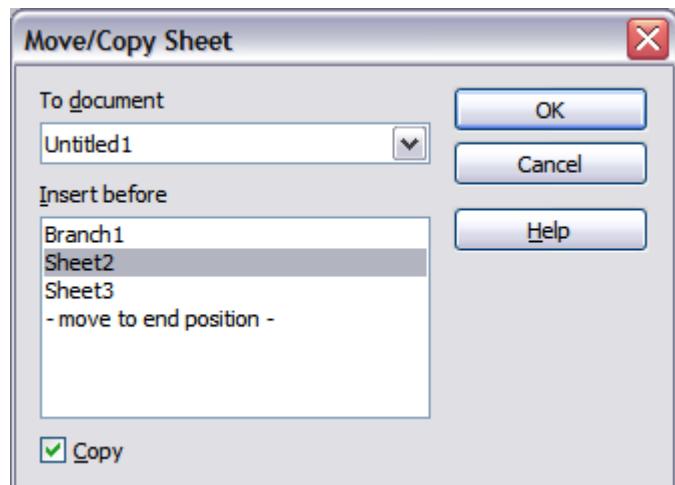


Figure 150: Copying a worksheet

- 3) Enter the data for Branch 2 and Branch 3 into the respective sheets. Each sheet stands alone and reports the results for the individual branches.
- 4) In the Combined worksheet, click on cell K7. Type =, click on the tab Branch1, click on cell K7, press +, repeat for sheets Branch2 and Branch3 and press Enter. You now have a formula in cell K1 which adds the revenue from Greenery Sales for the 3 Branches.

	A	K	L	M	N
1					
2	Flowing Abundantly Ltd				
3	Combined YTD				
4					
5		Oct	Nov	Dec	YTD
6	Revenue:				
7	Greenery Sales	140,340	126,030	233,102	4,279,995
8	Fertilizer Sales	77,775	23,829	20,316	2,383,984
9	Earth Sales	61,778	17,569	9,006	879,163
10	Sub-Total	279,893	167,428	262,424	7,543,142
11					
12	Cost of Sales:				
13	Wholesaler Purchases	98,572.06	70,386.34	98,368.22	2,564,668.00
14	Sales Tax	31,890.49	22,771.11	31,824.13	829,746.00
15	Sub-Total	130,462.55	93,157.45	130,192.35	3,394,414.00
16					
17	Total Revenue:	227,946	133,408	177,393	4,148,728
18					
19	Expenses:				
20					

Figure 151: Combined worksheet showing linking between branch sheets

- 5) Copy the formula, highlight the range K7..N17, click **Edit → Paste Special**, uncheck the Paste all and Formats boxes in the Selection area of the dialog box and click OK. You will see the following message:

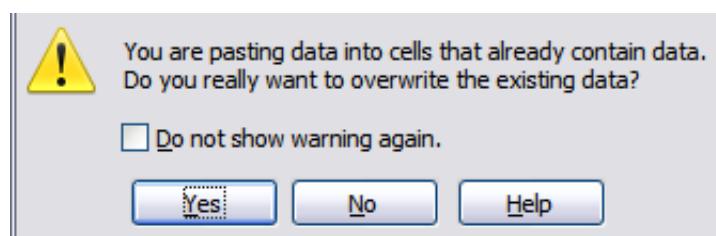


Figure 152: Linking sheets: pasting a formula to a cell range

- 6) Click **Yes**. You have now copied the formulas into each cell while maintaining the format you set up in the original worksheet. Of course, in this example you would have to tidy the worksheet up by removing the zeros in the non-formatted rows.

	A	K	L	M	N
1					
2	Flowing Abundantly Ltd				
3	Combined YTD				
4					
5		Oct	Nov	Dec	YTD
6	Revenue:				
7	Greener Sales	140,340	126,030	233,102	3,809,089
8	Fertilizer Sales	77,775	23,829	20,316	1,705,215
9	Earth Sales	61,778	17,569	9,006	501,550
10	Sub-Total	279,893	167,428	262,424	6,015,854
11		0	0	0	0
12	Cost of Sales:				
13	Wholesaler Purchases	98,572.06	70,386.34	98,368.22	2,045,390.74
14	Sales Tax	31,890.49	22,771.11	31,824.13	661,743.71
15	Sub-Total	130,462.55	93,157.45	130,192.35	2,707,134.45
16		0	0	0	0
17	Total Revenue:	153,941	92,086	144,334	3,308,720
18					
19	Expenses:				

Figure 153: Linking Sheets: Copy Paste Special from K7...N17

Note

LibreOffice default is to paste all the attributes of the original cell(s) - formats, notes, objects, text strings and numbers.

The Function Wizard can also be used to accomplish the linking. Use of this Wizard is described in detail in the section on Functions.

Understanding functions

Calc includes over 350 functions to help you analyze and reference data. Many of these functions are for use with numbers, but many others are used with dates and times, or even text. A function may be as simple as adding two numbers together, or finding the average of a list of numbers. Alternatively, it may be as complex as calculating the standard deviation of a sample, or a hyperbolic tangent of a number.

Typically, the name of a function is an abbreviated description of what the function does. For instance, the FV function gives the future value of an investment, while BIN2HEX converts a binary number to a hexadecimal number. By tradition, functions are entered entirely in upper case letters, although Calc will read them correctly if they are in lower or mixed case, too.

A few basic functions are somewhat similar to operators. Examples:

- + This operator adds two numbers together for a result. SUM() on the other hand adds groups of contiguous ranges of numbers together.
- * This operator multiplies two numbers together for a result. PRODUCT() does the same for multiplying that SUM() does for adding.

Each function has a number of *arguments* used in the calculations. These arguments may or may not have their own name. Your task is to enter the arguments needed to run the function. In some cases, the arguments have predefined choices, and you may need to refer to the online help or Appendix B (Description of Functions) in this book to understand them. More often, however, an argument is a value that you enter manually, or one already entered in a cell or range of cells on the spreadsheet. In Calc, you can enter values from other cells by typing in their name or range, or—unlike the case in some spreadsheets—by selecting cells with the mouse. If the values in the cells change, then the result of the function is automatically updated.

For compatibility, functions and their arguments in Calc have almost identical names to their counterparts in Microsoft Excel. However, both Excel and Calc have functions that the other lacks. Occasionally, functions with the same names in Calc and Excel have different arguments, or slightly different names for the same argument—neither of which can be imported to the other. However, the majority of functions can be used in both Calc and Excel without any change.

Understanding the structure of functions

All functions have a similar structure. If you use the right tool for entering a function, you can escape learning this structure, but it is still worth knowing for troubleshooting.

To give a typical example, the structure of a function to find cells that match entered search criteria is:

= DCOUNT (Database ; Database field ; Search_criteria)

Since a function cannot exist on its own, it must always be part of a formula. Consequently, even if the function represents the entire formula, there must be an = sign at the start of the formula. Regardless of where in the formula a function is, the function will start with its name, such as DCOUNT in the example above. After the name of the function comes its arguments. All arguments are required, unless specifically listed as optional.

Arguments are added within the parentheses and are separated by semicolons, with no space between the arguments and the semicolons.

Note

LibreOffice uses the semicolon as an argument list separator, unlike Excel which uses a comma. This is a common mistake made by users accustomed to entering Excel formulas.

Many arguments are a number. A Calc function can take up to thirty numbers as an argument. That may not sound like much at first. However, when you realize that the number can be not only a number or a single cell, but also an array or range of cells that contain several or even hundreds of cells, then the apparent limitation vanishes.

Depending on the nature of the function, arguments may be entered as follows:

- | | |
|-------------|---|
| "text data" | The quotes indicate text or string data is being entered. |
| 9 | The number nine is being entered as a number. |
| "9" | The number nine is being entered as text |
| A1 | The address for whatever is in Cell A1 is being entered |

Nested functions

Functions can also be used as arguments within other functions. These are called nested functions.

```
=SUM(2;PRODUCT(5;7))
```

To get an idea of what nested functions can do, imagine that you are designing a self-directed learning module. During the module, students do three quizzes, and enter the results in cells A1, A2, and A3. In A4, you can create a nested formula that begins by averaging the results of the quizzes with the formula **=AVERAGE(A1:A3)**. The formula then uses the **IF** function to give the student feedback that depends upon the average grade on the quizzes. The entire formula would read:

```
=IF(AVERAGE(A1:A3) >85; "Congratulations! You are ready to advance to  
the next module"; "Failed. Please review the material again. If  
necessary, contact your instructor for help")
```

Depending on the average, the student would receive the message for either congratulations or failure.

Notice that the nested formula for the average does not require its own equal sign. The one at the start of the equation is enough for both formulas.

If you are new to spreadsheets, the best way to think of functions is as a scripting language. We've used simple examples to explain the concept more clearly, but, through nesting of functions, a Calc formula can quickly become complex.

Note

Calc keeps the syntax of a formula displayed in a tool tip next to the cell as a handy memory aid as you type.

A more reliable method is to use the *Function List* (Figure 154).

Available from the **Insert** menu, the Function List automatically docks as a pane on the right side of the Calc editing window. If you wish, you can *Control+double-click* on a blank space at the top of the pane to undock this pane and make it a floating window.

The Function List includes a brief description of each function and its arguments; highlight the function and look at the bottom of the pane to see the description. If necessary, hover the cursor over the division between the list and the description; when the cursor becomes a two-headed arrow, drag it upwards to increase the space for the description. Double-click on a function's name to add it to the current cell, together with placeholders for each of the function's arguments.

Clicking on the bar where the 5 dots and arrows are shown (shown by the ellipse in Figure 154) will hide the list on the right hand side of the screen. Clicking this area again will show the list, making it easy to keep the list available for easy reference.

Using the Function List is almost as fast as manual entry, and has the advantage of not requiring that you memorize a formula that you want to use. In theory, it should also be less error-prone. In practice, though, some users may fumble when replacing the placeholders with values. Another feature is the ability to display the last formulas used.

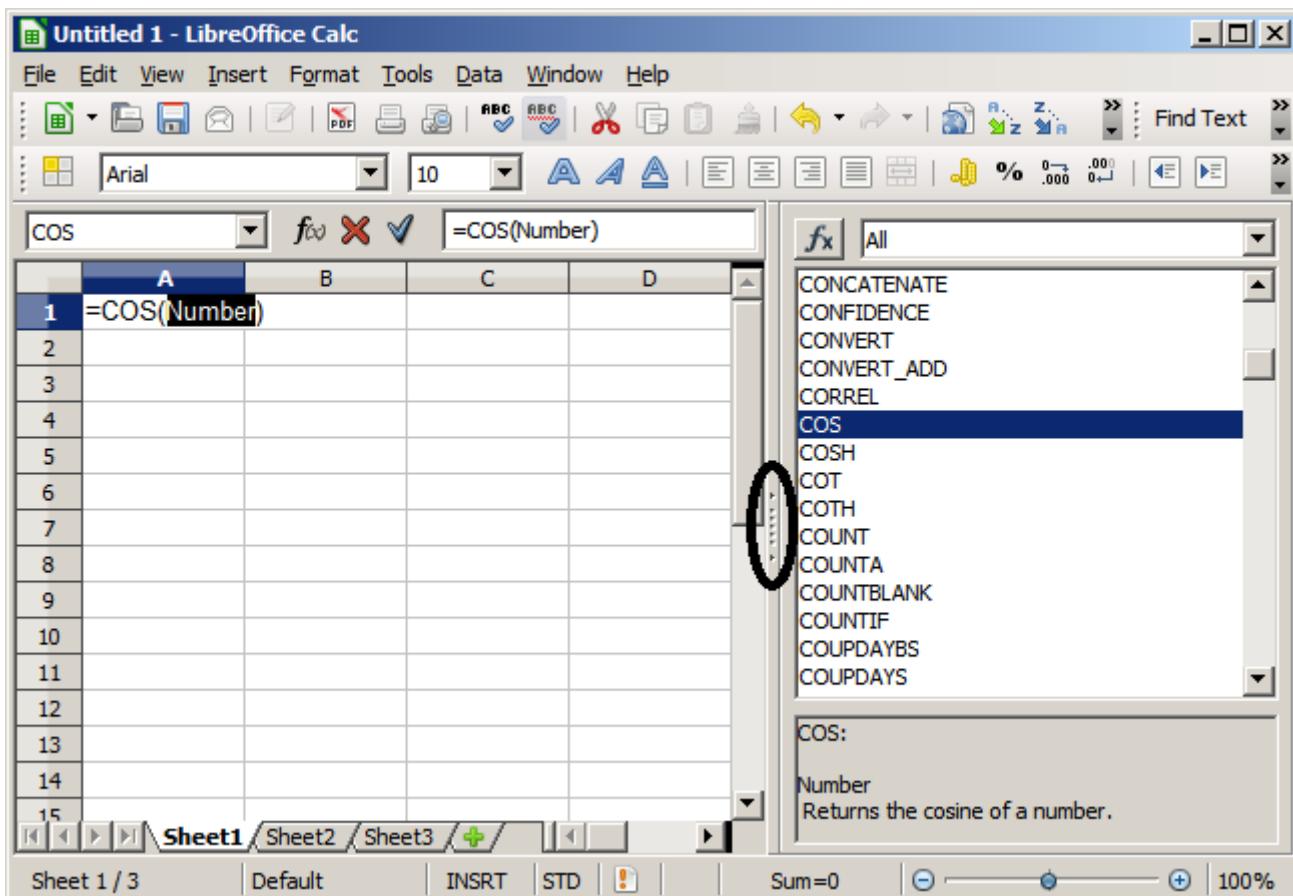


Figure 154: Function List docked to right side of Calc window

Function Wizard

The most commonly used input method is the *Function Wizard* (Figure 153). To open the Function Wizard, choose **Insert** → **Function**, or click the **fx** button on the Function tool bar, or press **Ctrl+F2**. Once open, the Function Wizard provides the same help features as the Function List, but adds fields in which you can see the result of a completed function, as well as the result of any larger formula of which it is part.

Select a category of functions to shorten the list, then scroll down through the named functions and select the required one. When you select a function its description appears on the right-hand side of the dialog. Double-click on the required function.

The Wizard now displays an area to the right where you can enter data manually in text boxes or click the Shrink button  to shrink the wizard so you can select cells from the worksheet.



Figure 155: Function Wizard after shrinking

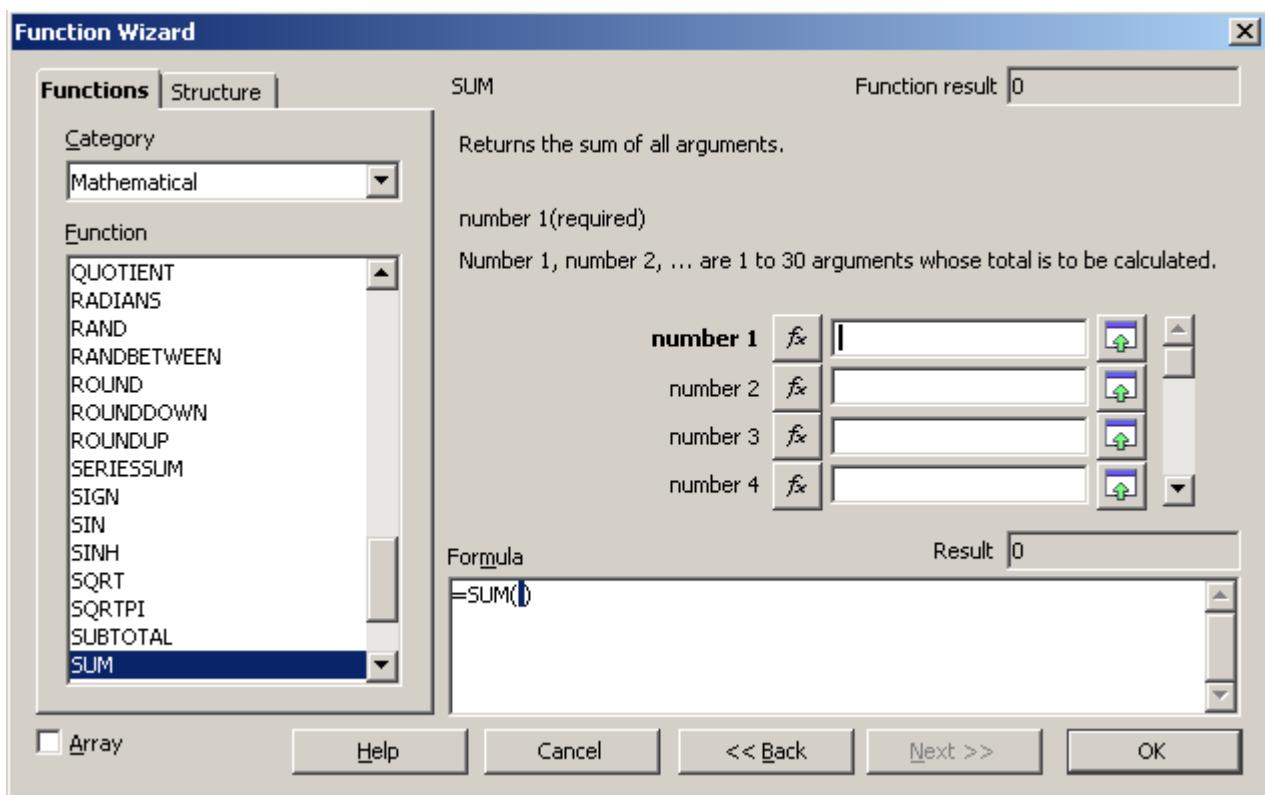


Figure 156: Functions page of Function Wizard.

To select cells, either click directly upon the cell or hold down the left mouse button and drag to select the required area.

When the area has been selected, click the **Shrink** button again to return to the wizard.

If multiple arguments are needed select the next text box below the first and repeat the selection process for the next cell or range of cells. Repeat this process as often as required. The Wizard will accept up to 30 ranges or arguments in the SUM function.

Click **OK** to accept the function and add it to the cell and get the result.

You can also select the *Structure* tab (Figure 152) to see a tree view of the parts of the formula. The main advantage over the Function List is that each argument is entered in its own field, making it easier to manage. The price of this reliability is slower input, but this is often a small price to pay, since precision is generally more important than speed when creating a spreadsheet.

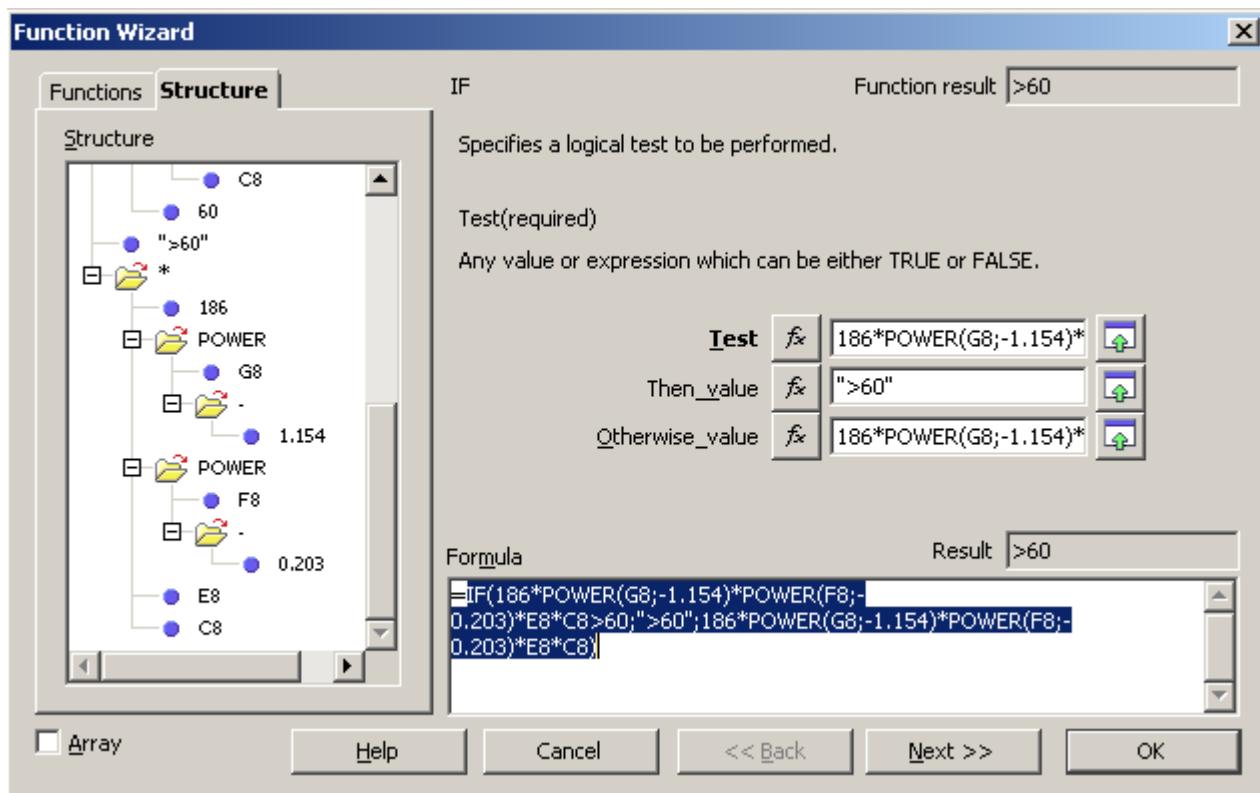
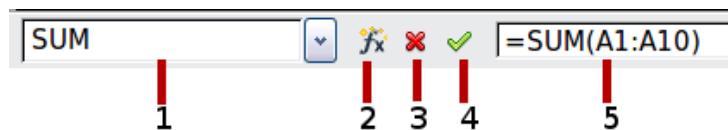


Figure 157: Structure page of Function Wizard

After you enter a function on the Input line, press the *Enter* key or click the **Accept** button on the Function toolbar to add the function to the cell and get its result.



- | | | |
|----------------------------------|---|--|
| 1
2
3 | Name Box showing list of common functions
Function Wizard
Cancel | 4
Accept
5
Input Line |
|----------------------------------|---|--|

Figure 158: The Function toolbar

If you see the formula in the cell instead of the result, then *Formulas* are selected for display in **Tools → Options → LibreOffice Calc → View → Display**. Deselect *Formulas*, and the result will display. However, you can still see the formula in the Input line.

Strategies for creating formulas and functions

Formulas that do more than a simple calculation or summation of rows or columns of values usually take a number of arguments. For example, the classic equation of motion $s = s_0 + vt - \frac{1}{2}at^2$ calculates the position of a body knowing its original position, its final velocity, its acceleration, and the time taken to move from the initial state to the final state.

For ease of presentation, it is good practice to set up a spreadsheet in a manner similar to that shown in Figure 151. In this example, the individual variables are input into cells on the sheet and no editing of the formula (in cell B9) is required.

	A	B	C
1	Uniformly accelerated linear motion		
2			
3	Original position, s_0	50 metres	
4	Final velocity, v	120 metres/second	
5	Constant acceleration, a	2 metres/sec ²	
6	Time taken, t	12 seconds	
7			
8	Distance between initial and final positions		
9	S=	1346 metres	
10			
11	Source:		
12	Equations of motion		
13	$S=S_0 + v*t - (1/2)*a*t^2$		
14			

Figure 159: Setting up a formula with arguments

You can take several broad approaches when creating a formula. In deciding which approach to take, consider how many other people will need to use the worksheets, the life of the worksheets, and the variations that could be encountered in use of the formula.

If people other than yourself will use the spreadsheet, make sure that it is easy to see what input is required and where. Explanation of the purpose of the spreadsheet, basis of calculation, input required and output(s) generated are often placed on the first worksheet.

A spreadsheet that you build today, with many complicated formulas, may not be quite so obvious in its function and operation in 6 or 12 months time. Use comments and notes liberally to document your work.

You might be aware that you cannot use negative values or zero values for a particular argument, but if someone else inputs such a value will your formula be robust or simply return a standard (and often not too helpful) Err: message? It is a good idea to trap errors using some form of logic statements or with conditional formatting.

Place a unique formula in each cell

The most basic strategy is to view whatever formulas are needed as simple and with a limited useful life. The strategy is then to place a unique formula in each appropriate cell. This can be recommended only for very simple or “throw away” (single use) spreadsheets.

Break formulas into parts and combine the parts

The second strategy is similar to the first, but instead you break down longer formulas into smaller parts and then combine the parts into the whole. Many examples of this type exist in complex scientific and engineering calculations where interim results are used in a number of places in the worksheet. The result of calculating the flow velocity of water in a pipe may be used in estimating losses due to friction, whether the pipe is flowing full or partially empty, and in optimizing the diameter for the given flow regime.

In all cases you should adopt the basic principles of formula creation described previously.

Use the Basic editor to create functions

A third strategy is to use the Basic editor and create your own functions and macros. This approach would be used where the result would greatly simplify the use of the spreadsheet by the end user and keep the formulas simple with a better chance of avoiding errors. This approach also can make the maintenance easier by having corrections or updates kept in one central location. The use of macros is described in Chapter 12 of this book and is a specialized topic in itself. The danger of overusing macros and custom functions is that the principles upon which the spreadsheet is based become much more difficult to see by a user other than the original author (and sometimes even by the author!).

Finding and fixing errors

It is common to find situations where errors are displayed. Even with all the tools available in Calc to help you to enter formulas, making mistakes is easy. Many people find inputting numbers difficult and many may make a mistake about the kind of entry that a function's argument needs. In addition to correcting errors, you may want to find the cells used in a formula to change their values or to check the answer.

Calc provides three tools for investigating formulas and the cells that they reference: error messages, color coding, and the Detective.

Error messages

The most basic tool is error messages. Error messages display in a formula's cell or in the Function Wizard instead of the result.

An error message for a formula is usually a three-digit number from 501 to 527, or sometimes an unhelpful piece of text such as NAME?, REF, or VALUE. The error number appears in the cell, and a brief explanation of the error on the right side of the status bar.

Most error messages indicate a problem with how the formula was input, although several indicate that you have run up against a limitation of either Calc or its current settings.

Error messages are not user-friendly, and may intimidate new users. However, they are valuable clues to correcting mistakes. You can find detailed explanations of them in the help, by searching for Error codes in LibreOffice Calc. A few of the most common are shown in the following table.

NAME? (525)	No valid reference exists for the argument.
REF (525)	The column, row, or sheet for the referenced cell is missing.
VALUE (519)	The value for one of the arguments is not the type that the argument requires. The value may be entered incorrectly; for example, double-quotation marks may be missing around the value. At other times, a cell or range used may have the wrong format, such as text instead of numbers.
509	An operator such as an equals sign is missing from the formula.
510	An argument is missing from the formula.
502	The column, row, or sheet for the referenced cell is missing.

Examples of common errors

Err:503 Division by zero

This error is the result of dividing a number by either the number zero (0) or a blank cell. There is an easy way to avoid this type of problem. When you have a zero or blank cell displayed, use a conditional function. Figure 150 depicts division of column B by column C yielding 2 errors arising from a zero and a blank cell showing in column C.

	A	B	C	D
1				
2	Date	Patients	Nursing Staff	Patients Per Nurse
3	01/05/2007	24	5	4.8
4	02/05/2007	16	5	3.2
5	03/05/2007	21	3	7
6	04/05/2007	17	0	Err:503
7	05/05/2007	18	4	4.5
8	06/05/2007	17		Err:503
9	07/05/2007	19	5	3.8
10	08/05/2007	22	4	5.5
11	09/05/2007	21	4	5.25
12	10/05/2007	18	3	6
13	11/05/2007	19	4	4.75

Figure 160: Examples of Err:503, Division by zero

It is very common to find an error such as this arising from a situation where data was not reported or reported incorrectly. When such an occurrence is possible, an IF function can be used to display the data correctly. The formula `=IF(C3>0, B3/C3, "No Report")` can be entered. The formula is then copied over the remainder of Column D. The meaning of this formula roughly would be: "If C3 is greater than 0, then compute B3 divided by C3, otherwise enter 'No Report'".

It is also possible for the last parameter to use double quotes for a blank to be entered, or a different formula with a standardized number being substituted for the lower number. An example of this might be to use the nursing staff in the unit.

SUM		f(x)	X	✓	=IF(C3>0, B3/C3, "No Report")	
	A	B	C	D	E	F
1						
2	Date	Patients	Nursing Staff	Patients Per Nurse		
3	01/05/2007	24	5	=IF(C3>0, B3/C3, "No Report")		
4	02/05/2007	16	5	3.2		
5	03/05/2007	21	3	7		
6	04/05/2007	17	0	Err:503		
7	05/05/2007	18	4	4.5		
8	06/05/2007	17		Err:503		
9	07/05/2007	19	5	3.8		
10	08/05/2007	22	4	5.5		
11	09/05/2007	21	4	5.25		

Figure 161: Division by zero solution

#VALUE Non-existent value and #REF! Incorrect references

The non-existent value error is also very common. The most common appearance of this error arises when a user copies a formula over a selected area. When copying, it is typical for the program to increment the represented cells. If you were copying downward from cell B3 the program would automatically substitute the cell B4 into the next lower cell and so on until the end of the copying process. If that next cell contains text or a value that is inappropriate for the formula, then this error may result. The difficulty usually occurs when one or more of the parameters in the formula need to be fixed.

Note

To avoid the #VALUE and #REF! errors, give the cell B3 a name such as TotalExpenses. In that way, the program will carry that name to each succeeding formula being copied and remove the need to use the \$ to anchor the reference to the TotalExpenses cell.

Color coding for input

Another useful tool when reviewing a formula is the color coding for input. When you select a formula that has already been entered, the cells or ranges used for each argument in the formula are outlined in color.

Calc uses eight colors for outlining referenced cells, starting with blue for the first cell, and continuing with red, magenta, green, dark blue, brown, purple and yellow before cycling through the sequence again.

The Detective

In a long or complicated spreadsheet, color coding becomes less useful. In these cases, consider using the the submenu under **Tools → Detective**. The Detective is a tool for checking which cells are used as arguments by a formula (precedents) and which other formulas it is nested in (dependents), and tracking errors. It can also be used for tracing errors, marking invalid data (that is, information in cells that is not in the proper format for a function's argument), or even for removing precedents and dependents.

To use the Detective, select a cell with a formula, then start the Detective. On the spreadsheet, you will see lines ending in circles to indicate precedents, and lines ending in arrows for dependents. The lines show the flow of information.

Use the Detective to assist in following the precedents referred to in a formula in a cell. By tracing these precedents, you frequently can find the source of the errors. Place the cursor in the cell in question and then choose **Tools → Detective → Trace Precedents** from the menu bar or press **Shift+F7**. Figure 149 shows a simple example of tracing precedents.

C3 f(x) Σ = =SUM(C4:C16)

	A	B	C	D	E
1	Name	Population			Total private dwellings, 2001
2		2001	1996	% change	
3	Canada †	30,007,094	28,822,031	4.00	12,548,588
4	Newfoundland and Labrador	512,930	551,792	-7.00	227,570
5	Prince Edward Island	135,294	134,557	0.50	55,992
6	Nova Scotia	908,007	909,282	-0.10	403,819
7	New Brunswick	729,498	738,133	-1.20	313,609
8	Quebec †	7,237,479	7,138,795	1.40	3,230,196
9	Ontario †	11,410,046	10,753,573	6.10	4,556,240
10	Manitoba †	1,119,583	1,113,898	0.50	477,085
11	Saskatchewan †	978,933	990,237	-1.10	431,628
12	Alberta †	2,974,807	2,696,826	10.30	1,171,841
13	British Columbia †	3,907,738	3,724,500	4.90	1,643,969
14	Yukon Territory	28,674	30,766	-6.80	13,793
15	Northwest Territories	37,360	39,672	-5.80	14,669
16	Nunavut	26,745	24,730 A	8.10	8,177
17	Source: Census of Canada -- Population and Dwelling Counts, for Canada, Provinces and Territories, 2001 and 1996 Censuses - 100% Data				
18					

Cursor placed in cell

Figure 162: Tracing precedents using the Detective

File Edit View Insert Format Tools Data Window Help

Arial

C3 f(x) Σ

Tools menu open, Detective submenu selected:

- Trace Precedents Shift+F7
- Remove Precedents
- Trace Dependents Shift+F5
- Remove Dependents
- Remove All Traces
- Trace Error
- Mark Invalid Data
- Refresh Traces
- AutoRefresh
- Fill Mode

Table data (same as Figure 162):

	A	B	C	D	E
1	Name	Population			Total private dwellings, 2001
2		2001	1996	% change	
3	Canada †	30,007,094	28,822,031	4.00	12,548,588
4	Newfoundland and Labrador	512,930	551,792	-7.00	227,570
5	Prince Edward Island	135,294	134,557	0.50	55,992
6	Nova Scotia	908,007	909,282	-0.10	403,819
7	New Brunswick	729,498	738,133	-1.20	313,609
8	Quebec †	7,237,479	7,138,795	1.40	3,230,196
9	Ontario †	11,410,046	10,753,573	6.10	4,556,240
10	Manitoba †	1,119,583	1,113,898	0.50	477,085
11	Saskatchewan †	978,933	990,237	-1.10	431,628
12	Alberta †	2,974,807	2,696,826	10.30	1,171,841
13	British Columbia †	3,907,738	3,724,500	4.90	1,643,969
14	Yukon Territory	28,674	30,766	-6.80	13,793
15	Northwest Territories	37,360	39,672	-5.80	14,669
16	Nunavut	26,745	24,730 A	8.10	8,177
17	Source: Census of Canada -- Population and Dwelling Counts, for Canada, Provinces and Territories, 2001 and 1996 Censuses - 100% Data				
18					

a) Initiate trace by clicking Trace Precedents

	A	B	C	D	E
1	Name	Population			Total private dwellings, 2001
2		2001	1996	% change	
3	Canada †	30,007,094	28,822,031	4.00	12,548,588
4	Newfoundland and Labrador	512,930	551,792	-7.00	227,570
5	Prince Edward Island	135,294	134,557	0.50	55,992
6	Nova Scotia	908,007	909,282	-0.10	403,819
7	New Brunswick	729,498	738,133	-1.20	313,609
8	Quebec †	7,237,479	7,138,795	1.40	3,230,196
9	Ontario †	11,410,046	10,753,573	6.10	4,556,240
10	Manitoba †	1,119,583	1,113,898	0.50	477,085
11	Saskatchewan †	978,933	990,237	-1.10	431,628
12	Alberta †	2,974,807	2,696,826	10.30	1,171,841
13	British Columbia †	3,907,738	3,724,500	4.90	1,643,969
14	Yukon Territory	28,674	30,766	-6.80	13,793
15	Northwest Territories	37,360	39,672	-5.80	14,669
16	Nunavut	26,745	24,730 A	8.10	8,177
17	Source: Census of Canada -- Population and Dwelling Counts, for Canada, Provinces and Territories, 2001 and 1996 Censuses - 100% Data				
18					

b) Source area highlighted in Blue, with arrow pointing to the calculation cell

(continued): Tracing precedents using the Detective

We are concerned that the number shown in Cell C3 is incorrectly stated. The cause can be seen in the highlighted cells. In this case cell C16 contains both numeric data as well as letters. Removing the letters resolves the problem in the calculation.

In other cases we must trace the error. Use the Trace Error function, found under **Tools → Detective → Trace Error**, to find the cells that cause the error.

Examples of functions

For novices, functions are one of the most intimidating features of LibreOffice's Calc. New users quickly learn that functions are an important feature of spreadsheets, but there are almost four hundred, and many require input that assumes specialized knowledge. Fortunately, Calc includes dozens of functions that anyone can use.

Basic arithmetic and statistic functions

The most basic functions create formulas for basic arithmetic or for evaluating numbers in a range of cells.

Basic arithmetic

The simple arithmetic functions are addition, subtraction, multiplication, and division.

Except for subtraction, each of these operations has its own function:

- SUM for addition
- PRODUCT for multiplication
- QUOTIENT for division

Traditionally, subtraction does not have a function.

SUM, PRODUCT, and QUOTIENT are useful for entering ranges of cells in the same way as any other function, with arguments in brackets after the function name.

However, for basic equations, many users prefer the time-honored computer symbols for these operations, using the plus sign (+) for addition, the hyphen (–) for subtraction, the asterisk (*) for multiplication and the forward slash (/) for division. These symbols are quick to enter without requiring your hands to stray from the keyboard.

A similar choice is also available if you want to raise a number by the power of another. Instead of entering =POWER(A1;2), you can enter =A1^2.

Moreover, they have the advantage that you enter formulas with them in an order that more closely approximates human readable format than the spreadsheet-readable format used by the equivalent function. For instance, instead of entering =SUM (A1:A2), or possibly =SUM (A1;A2), you enter =A1+A2. This almost-human readable format is especially useful for compound operations, where writing =A1*(A2+A3) is briefer and easier to read than =PRODUCT(A1;SUM(A2:A3)).

The main disadvantage of using arithmetical operators is that you cannot directly use a range of cells. In other words, to enter the equivalent of =SUM (A1:A3), you would need to type =A1+A2+A3.

Otherwise, whether you use a function or an operator is largely up to you—except, of course, when you are subtracting. However, if you use spreadsheets regularly in a group setting such as a class or an office, you might want to standardize on an entry format so that everyone who handles a spreadsheet becomes accustomed to a standard input.

Simple statistics

Another common use for spreadsheet functions is to pull useful information out of a list, such as a series of test scores in a class, or a summary of earnings per quarter for a company.

You can, of course, scan a list of figures if you want basic information such as the highest or lowest entry or the average. The only trouble is, the longer the list, the more time you waste and the more likely you are to miss what you're looking for. Instead, it is usually quicker and more efficient to enter a function. Such reasons explain the existence of a function like COUNT, which does no more than give the total number of entries in the designated cell range.

Similarly, to find the highest or lowest entry, you can use MIN or MAX. For each of these formulas, all arguments are either a range of cells, or a series of cells entered individually.

Each also has a related function, MINA or MAXA, which performs the same function, but treats a cell formatted for text as having a value of 0 (The same treatment of text occurs in any variation of another function that adds an "A" to the end). Either function gives the same result, and could be useful if you used a text notation to indicate, for example, if any student were absent when a test was written, and you wanted to check whether you needed to schedule a makeup exam.

For more flexibility in similar operations, you could use LARGE or SMALL, both of which add a specialized argument of rank. If the rank is 1 used with LARGE, you get the same result as you would with MAX. However, if the rank is 2, then the result is the second largest result. Similarly, a rank of 2 used with SMALL gives you the second smallest number. Both LARGE and SMALL are handy as a permanent control, since, by changing the rank argument, you can quickly scan multiple results.

You would need to be an expert to want to find the Poisson Distribution of a sample, or to find the skew or negative binomial of a distribution (and, if you are, you will find functions in Calc for such things). However, for the rest of us, there are simpler statistical functions that you can quickly learn to use.

In particular, if you need an average, you have a number to choose from. You can find the arithmetical means—that is, the result when you add all entries in a list then divided by the number

of entries by enter a range of numbers when using AVERAGE, or AVERAGE A to include text entries and to give them a value of zero.

In addition, you can get other information about the data set:

- MEDIAN: The entry that is exactly half way between the highest and lowest number in a list.
- MODE: The most common entry in a list of numbers.
- QUARTILE: The entry at a set position in the array of numbers. Besides the cell range, you enter the type of Quartile: 0 for the lowest entry, 1 for the value of 25%, 2 for the value of 50%, 3 for 75%, and 4 for the highest entry. Note that the result for types 1 through 3 may not represent an actual item entered.
- RANK: The position of a given entry in the entire list, measured either from top to bottom or bottom to top. You need to enter the cell address for the entry, the range of entries, and the type of rank (0 for the rank from the highest, or 1 for the rank from the bottom).

Some of these functions overlap; for example, MIN and MAX are both covered by QUARTILE. In other cases, a custom sort or filter might give much the same result. Which you use depends on your temperament and your needs. Some might prefer to use MIN and MAX because they are easy to remember, while others might prefer QUARTILE because it is more versatile.

Using these functions

In some cases, you may be able to get similar results to some of these functions by setting up a filter or a custom sort. However, in general, functions are more easily adjusted than filters or sorts, and provide a wide range of possibilities.

At times, you may just want to enter one or more formulas temporarily in a convenient blank cell, and delete it once you have finished. However, if you find yourself using the same functions constantly, you should consider creating a template and including space for all the functions you use, with the cell to their left used as a label for them. Once you have created the template, you can easily update each formula as entries change, either automatically and on-the-fly or pressing the F9 key to update all selected cells.

No matter how you use these functions, you will probably find them simple to use and adaptable for many purposes. By the time you have mastered this handful, you will be ready to try more complex functions.

Rounding off numbers

For statistical and mathematical purposes, Calc includes a variety of ways to round off numbers. If you're a programmer, you may also be familiar with some of these methods. However, you don't need to be a specialist to find some of these methods useful. You may want to round off for billing purposes, or because decimal places don't translate well into the physical world—for instance, if the parts you need come in packages of 100, then the fact you only need 66 is irrelevant to you; you need to round up for ordering. By learning the options for rounding up or down, you can make your spreadsheets more immediately useful.

When you use a rounding function, you have two choices about how to set up your formulas. If you choose, you can nest a calculation within one of the rounding functions. For instance, the formula =ROUND((SUM(A1;A2)) adds the figures in cells A1 and A2, then rounds them off to the nearest whole number. However, even though you don't need to work with exact figures every day, you may still want to refer to them occasionally. If that is the case, then you are probably better off separating the two functions, placing =SUM(A1;A2) in cell A3, and =ROUND (A3) in A4, and clearly labelling each function.

Rounding methods

The most basic function for rounding numbers in Calc is ROUND. This function will round off a number according to the usual rules of symmetric arithmetic rounding: a decimal place of .4 or less gets rounded down, while one of .5 or more gets rounded up. However, at times, you may not want to follow these rules. For instance, if you are one of those contractors who bills a full hour for any fraction of an hour you work, you would want to always round up so you didn't lose any money. Conversely, you might choose to round down to give a slight discount to a long-established customer. In these cases, you might prefer to use ROUNDUP or ROUNDDOWN, which, as their names suggest, round a number to the nearest integer above or below it.

All three of these functions require the single argument of number—the cell or number to be rounded. Used with only this argument, all three functions round to the nearest whole number, so that 46.5 would round to 47 with ROUND or ROUNDUP and 46 with ROUNDDOWN. However, if you use the optional count argument, you can specify the number of decimal places to include. For instance, if number was set to 1, then 48.65 would round to 48.7 with ROUND or ROUNDUP and to 48.6 with ROUNDDOWN.

As an alternative to ROUNDDOWN when working with decimals, you can use TRUNC (short for truncate). It takes exactly the same arguments as ROUNDDOWN, so which function you use is a matter of choice. If you aren't working with decimals, you might choose to use INT (short for integer), which takes only the number argument.

Another option is the ODD and EVEN pair of functions. ODD rounds up to the nearest odd number if what is entered in the number argument is a positive number, and rounds down if it is a negative number, while EVEN does the same for an even number.

Options are the CEILING and FLOOR functions. As you can guess from the names, CEILING rounds up and FLOOR rounds down. For both functions, the number that they round to is determined by the closest multiple of the number that you enter as the significance argument. For instance, if your business insurance is billed by the work week, the fact that you were only open three days one week would be irrelevant to your costs; you would still be charged for an entire week, and therefore might want to use CEILING in your monthly expenses.

Conversely, if you are building customized computers and completed 4.5 in a day, your client would only be interested in the number ready to ship, so you might use FLOOR in a report of your progress. If cell E1 contains the value 46.7, =CEILING(E1;7) will return the value 49.

Besides number and significance, both CEILING and FLOOR include an optional argument called mode, which takes a value of 0 or 1. If mode is set to 0, and both the number and the significance are negative numbers, then the result of either function is rounded up; if it is set to 1, and both the number and the significance are negative numbers, then the results are rounded down. In other words, if the number is -11 and the significance is -5, then the result is -10 when the mode is set to 0, but -15 when set to 1.

However, if you are exchanging spreadsheets between Calc and MS Excel, remember that the mode argument is not supported by Excel. If you want the answers to be consistent between the two spreadsheets, set the mode in Calc to -1.

A function somewhat similar to CEILING and FLOOR is MROUND. Like CEILING AND FLOOR, MROUND requires two arguments, although, somewhat confusingly, the second one is called multiple rather than significance, even though the two are identical. The difference between MROUND and CEILING and FLOOR is that MROUND rounds up or down using symmetric arithmetic rounding. For example, if the number is 77 and the multiple is 5, then MROUND gives a result of 75. However, if the multiple is changed to 7, then MROUND's result becomes 77.

Once you become familiar with Calc's long, undifferentiated list of functions, you can start to decide which is most useful for your purposes.

However, one last point is worth mentioning: If you are working with more than two decimal places, don't be surprised if you don't see the same number of decimal places on the spreadsheet as you

do on the function wizard. If you don't, the reason is that **Tools → Options → LibreOffice Calc → Calculate → Decimal Places** defaults to 2. Change the number of decimal places, and, if necessary, uncheck the **Precision as shown** box on the same page, and the spreadsheet will display as expected.

Using regular expressions in functions

A number of functions in Calc allow the use of regular expressions: SUMIF, COUNTIF, MATCH, SEARCH, LOOKUP, HLOOKUP, VLOOKUP, DCOUNT, DCOUNTA, DSUM, DPRODUCT, DMAX, DMIN, DAVERAGE, DSTDEV, DSTDEVP, DVAR, DVARP, DGET.

Whether or not regular expressions are used is selected on the **Tools → Options → LibreOffice Calc → Calculate** dialog.

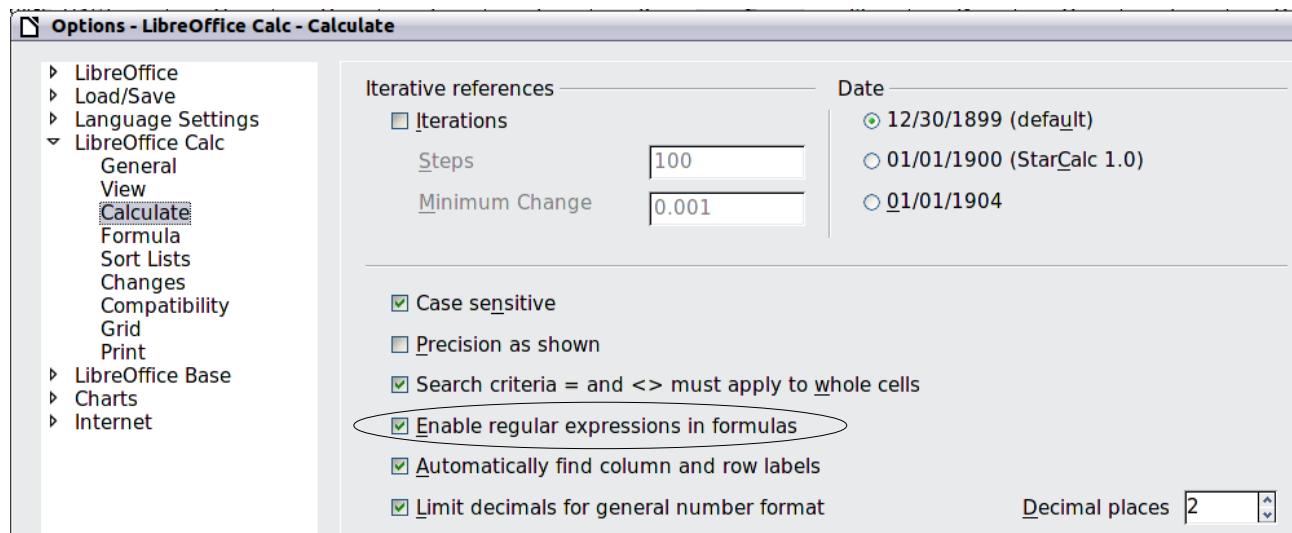


Figure 163: Enabling regular expressions in formulas

For example `=COUNTIF(A1:A6;"r.d")` with **Enable regular expressions in formulas** selected will count cells in A1:A6 which contain *red* and *ROD*.

Additionally if **Search criteria = and <> must apply to whole cells** is *not* selected, then *Fred*, *bride*, and *Ridge* will also be counted. If that setting *is* selected, then it can be overcome by wrapping the expression thus: `=COUNTIF(A1:A6;".*r.d.*")`.

	A	B	C	D
1	Fred			
2	red			
3	ROD			
4	bride			
5	blue			
6	Ridge			
7		5		

Figure 164: Using the COUNTIF function

Regular expression searches *within functions* are always case insensitive, irrespective of the setting of the **Case sensitive** checkbox on the dialog in Figure 148—so *red* and *ROD* will always

be matched in the above example. This case-insensitivity also applies to the regular expression structures ([:lower:]) and ([:upper:]), which match characters irrespective of case.

Regular expressions will not work in simple comparisons. For example: A1="r.d" will always return FALSE if A1 contains *red*, even if regular expressions are enabled. It will only return TRUE if A1 contains *r.d* (*r* then a dot then *d*). If you wish to test using regular expressions, try the COUNTIF function: COUNTIF(A1; "r.d") will return 1 or 0, interpreted as TRUE or FALSE in formulas like =IF(COUNTIF(A1; "r.d"); "hooray"; "boo").

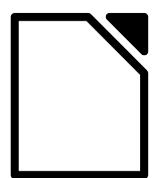
Activating the **Enable regular expressions in formulas** option means all the above functions will require any regular expression special characters (such as parentheses) used in strings within formulas, to be preceded by a backslash, despite not being part of a regular expression. These backslashes will need to be removed if the setting is later deactivated.

Advanced functions

As is common with other spreadsheet programs, LibreOffice Calc can be enhanced by user-defined functions or add-ins. Setting up user-defined functions can be done either by using the Basic IDE or by writing separate add-ins or extensions.

The basics of writing and running macros is covered in Chapter 12, Calc Macros. Macros can be linked to menus or toolbars for ease of operation or stored in template modules to make the functions available in other documents.

Calc Add-ins are specialized office extensions which can extend the functionality of LibreOffice with new built-in Calc functions. Writing Add-ins requires knowledge of the C++ language, the LibreOffice SDK, and is for experienced programmers. A number of extensions for Calc have been written and these can be found on the extensions site at <http://extensions.libreoffice.org/>. Refer to Chapter 14, Setting up and Customizing Calc, for more details.



LibreOffice
The Document Foundation

Chapter 8 *Using the DataPilot*

Introduction

Many requests for software support are the result of using complicated formulas and solutions to solve simple day to day problems. More efficient and effective solutions use the DataPilot, a tool for combining, comparing, and analyzing large amounts of data easily. Using the DataPilot, you can view different summaries of the source data, display the details of areas of interest, and create reports, whether you are a beginner, an intermediate or advanced user.

This chapter is divided into two sections:

- “Examples with step by step descriptions” uses three typical cases to demonstrate the advantages and applications of the DataPilot. Follow the examples to learn how easy it is to use the DataPilot.
- “DataPilot functions in detail” starting on page 207 describes the DataPilot in detail. You can use this part to look up how a function is used.

Examples with step by step descriptions

This section demonstrates some of the possibilities of the DataPilot in typical use cases. By following the step by step description, you can recreate the examples and learn about the power of the DataPilot.

Example 1: Sales volume overview

A typical introductory example in courses and books for beginners with spreadsheets is a simple sales volume overview.

The screenshot shows a LibreOffice Calc spreadsheet with the following data:

	A	B	C	E	F
1					
2			Experience Travel		
3					
4		Jan	Feb	Mar	Apr
5	Golf	1000	1100	1200	1300
6	Tennis	2000	2200	2400	2600
7	Sailing	3000	3300	3600	3900
8	Total	=SUM(B5:B7)			
9					

Figure 165: Typical example for beginners

This example demonstrates the user interface and how to insert text and numbers into cells. Useful aids like *AutoFill* and *drag and drop* have been demonstrated in other chapters. The most important part is the connection between cells through formulas, for example addition with the plus operator or the *SUM* function.

This small exercise might be useful for a first contact with the program, but it shows only a very small fraction of the tasks in an office. To create such a sales overview, you also need the original base data. That is, before you can use a spreadsheet to create a sales overview, you need to add the (possibly many) single purchases from different lists and then enter the sums into the relevant cells **C5** to **F7**.

Practical problems and questions

- To display additional values for May, June, July, and so on, you need to add extra columns; that is, you have to change the structure of the calculation sheet. This is not only somewhat inefficient from a workflow point of view, but it also raises some practical questions: How do references react if you add more columns or rows to the sum formulas?
- The layout, where the timeline is displayed horizontally, is less convenient if you want to add more months. A vertical layout might be a more efficient use of space. How can the table be transposed? Do you have to enter everything again?
- What if management asks unexpected questions or adds an additional subdivision for the different sales regions or a constraint of the sales for a given employee? In these cases you again have to manually add all the sums and create different tables in many variations.
- Is it really acceptable and realistic to create such an overview by adding the different values manually? This is really a lot of work and extremely error-prone!

Solution

The most important part of your task in the example is the addition of the Total sales per month cells, which had to be done manually. To do this automatically with the program, just get the data into Calc. You can enter the single numbers by hand or you can import a file from your bookkeeping software. In any case we assume a continuous table that keeps track of all sales in a somewhat primitive form.

	A	B	C	D	E
1	date	sales	category	region	employee
2	13/04/08	\$498.00	sailing	north	Kurt
3	7/02/08	\$1,383.00	sailing	south	Kurt
4	28/05/08	\$4,655.00	tennis	east	Hans
5	20/04/08	\$3,993.00	sailing	east	Fritz
6	28/02/08	\$3,377.00	golfing	south	Ute
7	27/01/08	\$2,095.00	sailing	north	Brigitte
8	16/02/08	\$4,731.00	sailing	east	Ute
9	15/04/08	\$4,330.00	tennis	south	Kurt
10	20/04/08	\$3,664.00	golfing	south	Kurt
11	7/06/08	\$769.00	tennis	west	Brigitte
12	29/02/08	\$293.00	sailing	east	Kurt
13	6/04/08	\$3,705.00	tennis	north	Kurt
14	19/06/08	\$1,747.00	golfing	west	Hans
15	14/05/08	\$449.00	tennis	west	Ute
16	30/05/08	\$1,795.00	golfing	south	Kurt
17	28/02/08	\$610.00	sailing	west	Ute
18	8/06/08	\$1,625.00	tennis	east	Fritz
19	12/05/08	\$3,887.00	sailing	south	Brigitte
20	30/01/08	\$2,458.00	tennis	west	Hans
21	9/05/08	\$4,369.00	golfing	south	Ute
22	15/03/08	\$1,785.00	golfing	east	Hans
23	27/03/08	\$669.00	sailing	south	Hans
24	28/01/08	\$155.00	sailing	west	Brigitte
25	5/02/08	\$2,657.00	golfing	south	Hans

Figure 166: Basic data in Calc

You can create the sales volume overview by following these instructions:

- 1) Select the cell **A1** (or any other single cell within the list).

- 2) Select **Data** → **DataPilot** → **Start**. On the Select Source dialog, choose **Current selection** and click **OK**.
- 3) The DataPilot dialog (Figure 167) has four white layout areas and several fields that look like buttons. These small fields are the titles of the different columns of your list.
 - Move (drag and drop with the mouse) the **date** field into the *Column Fields* area.
 - Move the **sales** field into the *Data Fields* area.
 - Move the **category** field into the *Row Fields* area.
- 4) Click **More**, to see more options in the lower part of the dialog.
- 5) In the *Results to* drop-down list, select – **new sheet** –.
- 6) Click **OK**.

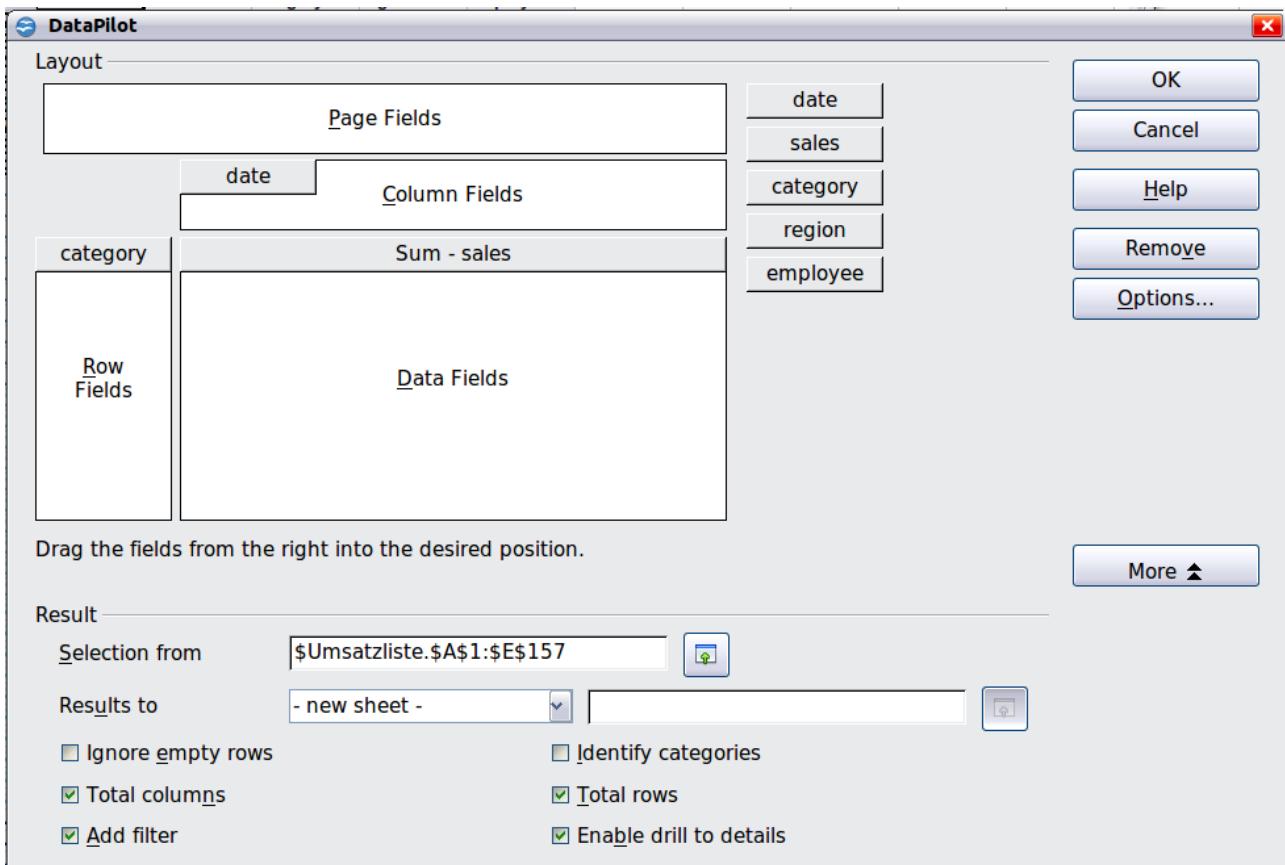


Figure 167: DataPilot dialog

- 7) The result appears on a new sheet. It has the desired structure, but the columns are not yet grouped into months.

	A	B	C	D	E	F	G	H
1	Filter							
2								
3	Sum - sales	date						
4	category	02/01/08	03/01/08	06/01/08	07/01/08	08/01/08	10/01/08	14/01/08
5	golfing	\$1,508.00			\$3,739.00	\$4,195.00	\$2,023.00	
6	sailing	\$2,340.00						
7	tennis	\$410.00	\$4,872.00	\$6,444.00				\$2,804.00
8	Total Result	\$4,258.00	\$4,872.00	\$6,444.00	\$3,739.00	\$4,195.00	\$2,023.00	\$2,804.00
9								

Figure 168: DataPilot result without grouping

- 8) To group the columns, select cell **B4** or any other cell that contains a date. Then select **Data → Group and Outline → Group**. On the Grouping dialog (Figure 169), make sure *Intervals* and *Months* are selected in the *Group by* section, and click **OK**. The result is now grouped for months (Figure 170).

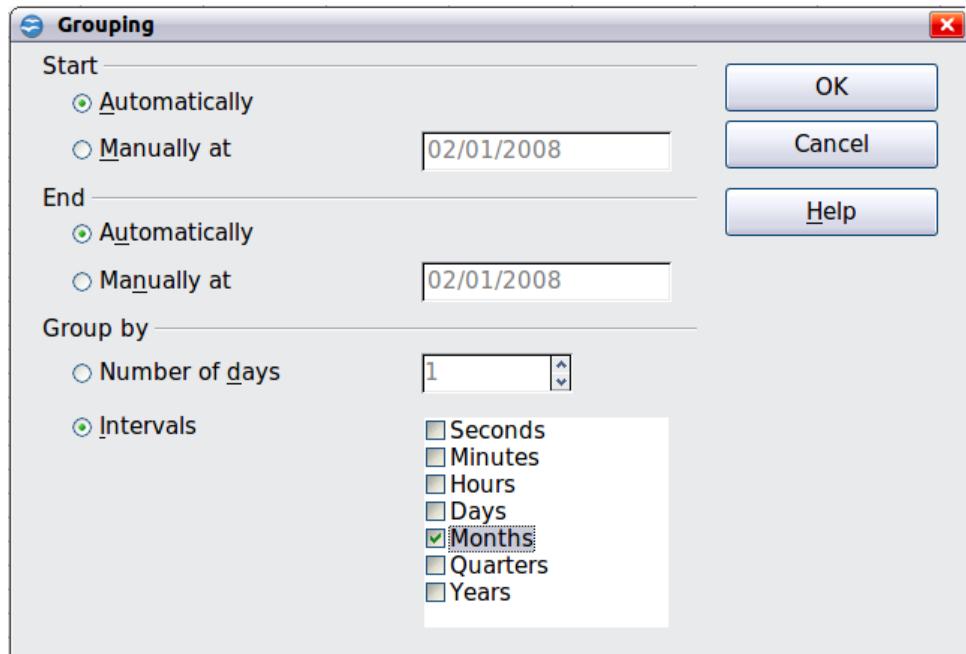


Figure 169: Grouping on months

	A	B	C	D	E	F	G	H
1	Filter							
2								
3	Sum - sales	date						
4	category	Jan	Feb	Mar	Apr	May	Jun	Total Result
5	golfing	\$26,180.00	\$30,444.00	\$31,714.00	\$24,747.00	\$24,686.00	\$18,443.00	\$156,214.00
6	sailing	\$13,979.00	\$15,625.00	\$17,409.00	\$19,769.00	\$21,799.00	\$21,271.00	\$109,852.00
7	tennis	\$39,206.00	\$23,710.00	\$12,097.00	\$31,918.00	\$11,439.00	\$24,329.00	\$142,699.00
8	Total Result	\$79,365.00	\$69,779.00	\$61,220.00	\$76,434.00	\$57,924.00	\$64,043.00	\$408,765.00
9								

Figure 170: DataPilot result grouped for months

In this result you will recognize the beginners' example. It is very easy to produce, without any further knowledge about the spreadsheet. You do not have to enter any formulas.

Advantages

- 1) No manual entering or adding of any values is necessary. There is less work and fewer errors.
- 2) The layout is very flexible: months horizontal and categories vertical or vice versa, in two mouse clicks.
- 3) Additional differentiating factors are immediately available.
- 4) Many types of evaluation are possible; for example, number or average instead of sum, accumulated values, comparisons, and so on.

We will now demonstrate some of these advantages.

Starting with the result of Figure 170, use the mouse to drag the **Date** field under the **Category** field, as shown in Figure 171.

	A	B	C	D
1	Filter			
2				
3	Sum - sales	date		
4	category	Jan	Feb	Mar
5	golfing	\$26,180.00	\$30,444.00	\$31,714.00
6	sailing	\$13,979.00	\$15,625.00	\$17,409.00
7	tennis	\$39,206.00	\$23,710.00	\$12,097.00
8	Total Result	\$79,365.00	\$69,779.00	\$61,220.00
9				

Figure 171: Drag Date field under Category field

Now the summary is as shown in Figure 172.

	A	B	C	
1	Filter			
2				
3	category	date		
4	golfing	Jan	\$26,180.00	
5		Feb	\$30,444.00	
6		Mar	\$31,714.00	
7		Apr	\$24,747.00	
8		May	\$24,686.00	
9		Jun	\$18,443.00	
10	sailing	Jan	\$13,979.00	
11		Feb	\$15,625.00	
12		Mar	\$17,409.00	
13		Apr	\$19,769.00	
14		May	\$21,799.00	
15		Jun	\$21,271.00	
16	tennis	Jan	\$39,206.00	
17		Feb	\$23,710.00	
18		Mar	\$12,097.00	
19		Apr	\$31,918.00	
20		May	\$11,439.00	
21		Jun	\$24,329.00	
22	Total Result		\$408,765.00	
23				

Figure 172: Changed layout

To transpose the table completely, just drag the **Category** field above the area of the displayed values, to cell **C3** (see Figure 173). The result of this action is shown in Figure 174.

	A	B	C	
1	Filter			
2				
3	category	date		
4	golfing	Jan	\$26,180.00	
5		Feb	\$30,444.00	
6		Mar	\$31,714.00	
7		Apr	\$24,747.00	
8		May	\$24,686.00	

Figure 173: Drag Category field to right of Data field

	A	B	C	D	E	
1	Filter					
2						
3	Sum - sales	category ▾				
4	date ▾	golfing	sailing	tennis	Total Result	
5	Jan	\$26,180.00	\$13,979.00	\$39,206.00	\$79,365.00	
6	Feb	\$30,444.00	\$15,625.00	\$23,710.00	\$69,779.00	
7	Mar	\$31,714.00	\$17,409.00	\$12,097.00	\$61,220.00	
8	Apr	\$24,747.00	\$19,769.00	\$31,918.00	\$76,434.00	
9	May	\$24,686.00	\$21,799.00	\$11,439.00	\$57,924.00	
10	Jun	\$18,443.00	\$21,271.00	\$24,329.00	\$64,043.00	
11	Total Result	\$156,214.00	\$109,852.00	\$142,699.00	\$408,765.00	
12						

Figure 174: Transposed layout of Figure 172

In contrast to the beginners' example in Figure 165, it is now very simple to view or add different aspects of the underlying data. For example, to see the values for different regions, do the following:

- 1) Select the cell **A3** (or any other single cell that is part of the DataPilot result).
- 2) Select **Data → DataPilot → Start** to start the DataPilot again.

Drag the **Region** field into the *Row Fields* area. Depending on the order you choose for the row fields, the result is either regions with date subdivisions or vice versa.

- 3) Click **OK**. The result is shown in Figure 175.

In another variation you may want to add the employees.

- 1) Select the cell **A3** (or any other single cell that is part of the DataPilot result).
- 2) Select **Data → DataPilot → Start**, to start the DataPilot again.
 - You do not need the **Region** field in this case. Drag it out of the layout area.
 - Drag the **Employee** field into the *Page Fields* area.
- 3) Click **OK**. The result is shown in Figure 176.

Fields that you use as page fields are placed in the result above the summary with the name *Filter*. You then have a drop-down list that you can use to show only the sums of a given employee.

	A	B	C	D	E	F
1	Filter					
2						
3	Sum - sales		category ▾			
4	date ▾	region ▾	golfing	sailing	tennis	Total Result
5	Jan	east	\$3,531.00	\$1,956.00	\$18,566.00	\$24,053.00
6		north	\$4,842.00	\$2,095.00	\$7,791.00	\$14,728.00
7		south	\$11,580.00	\$2,340.00	\$3,821.00	\$17,741.00
8		west	\$6,227.00	\$7,588.00	\$9,028.00	\$22,843.00
9	Feb	east	\$5,392.00	\$6,124.00		\$11,516.00
10		north	\$3,443.00		\$938.00	\$4,381.00
11		south	\$15,990.00	\$4,458.00	\$12,490.00	\$32,938.00
12		west	\$5,619.00	\$5,043.00	\$10,282.00	\$20,944.00
13	Mar	east	\$11,962.00	\$5,275.00	\$2,219.00	\$19,456.00
14		north	\$5,193.00		\$4,903.00	\$10,096.00
15		south	\$4,881.00	\$5,546.00		\$10,427.00
16		west	\$9,678.00	\$6,588.00	\$4,975.00	\$21,241.00
17	Apr	east	\$5,343.00	\$4,902.00	\$2,417.00	\$12,662.00
18		north		\$10,551.00	\$12,658.00	\$23,209.00
19		south	\$7,750.00	\$4,316.00	\$9,203.00	\$21,269.00
20		west	\$11,654.00		\$7,640.00	\$19,294.00
21	May	east	\$10,557.00	\$2,092.00	\$7,137.00	\$19,786.00
22		north	\$2,214.00	\$520.00		\$2,734.00
23		south	\$11,228.00	\$18,307.00	\$675.00	\$30,210.00
24		west	\$687.00	\$880.00	\$3,627.00	\$5,194.00
25	Jun	east	\$5,186.00	\$2,135.00	\$5,627.00	\$12,948.00
26		north	\$3,049.00	\$9,302.00	\$8,243.00	\$20,594.00
27		south	\$4,828.00	\$9,834.00	\$8,069.00	\$22,731.00
28		west	\$5,380.00		\$2,390.00	\$7,770.00
29	Total Result		\$156,214.00	\$109,852.00	\$142,699.00	\$408,765.00
30						

Figure 175: Additional subdivision into regions, added later

	A	B	C	D	E
1	Filter				
2	employee	- all -			
3		- all -			
4	Sum - sales				
5	date ▾	Brigitte	sailing	tennis	Total Result
6	Jan	Fritz	\$13,979.00	\$39,206.00	\$79,365.00
7	Feb	Hans	\$15,625.00	\$23,710.00	\$69,779.00
8	Mar	Kurt	\$17,409.00	\$12,097.00	\$61,220.00
9	Apr	Ute	\$19,769.00	\$31,918.00	\$76,434.00
10	May		\$21,799.00	\$11,439.00	\$57,924.00
11	Jun		\$21,271.00	\$24,329.00	\$64,043.00
12	Total Result		\$109,852.00	\$142,699.00	\$408,765.00
13					
14					
15					
16					
17					

Figure 176: Selection of subtotals for several employees.

Up to now we have not seen the most powerful features of the DataPilot. The following examples will show you more.

Example 2: Timekeeping

This example is often used by consultants and in several variations in user support. The task is to provide a means for one or more users to keep track of working hours.

Note

In the real world timekeeping requires tracking working time on individual projects. Specialized database software is often used but for simple applications in a small company a Calc spreadsheet and the Data Pilot might be all that is needed to track work done.

A typical way of doing this is to create a spreadsheet per month and a sum sheet with all the results of one year. For each employee, there is one file (see Figures 177 and 178 for examples of two pages from the file for one employee).

	A	B	C	D	E	F
1						
2						
3						
4	date	arrives	leaves	break	hours	
5	01/01/08	08:00	17:30	00:30	9.00	
6	01/02/08	07:45	14:45	00:30	6.50	
7	01/03/08	09:00	18:00	00:30	8.50	
8	01/04/08	07:15	17:45	01:00	9.50	
9	01/05/08					
10	01/06/08					
11	01/07/08	08:15	19:30	01:00	10.25	
12	01/08/08	08:15	20:00	00:30	11.25	
13	01/09/08	07:45	16:45	00:30	8.50	
14	01/10/08	08:15	13:45	00:00	5.50	
15	01/11/08	08:00	15:15	00:30	6.75	
16	01/12/08					
17	01/13/08					
18	01/14/08	08:00	13:45	00:00	5.75	
19	01/15/08	07:30	13:00	00:00	5.50	
20	01/16/08	08:45	18:45	00:30	9.50	
21	01/17/08	08:45	20:30	01:00	10.75	
22	01/18/08	07:30	13:45	00:30	5.75	
23	01/19/08					
24	01/20/08					
25	01/21/08	08:15	18:45	01:00	9.50	
26	01/22/08	08:15	16:45	00:30	8.00	
27	01/23/08	08:45	15:00	00:30	5.75	
28	01/24/08	08:30	19:30	01:00	10.00	

Figure 177: One month of timekeeping for one employee

1		
2		Timekeeping for Erika Mustermann
3		
4		2008
5		
6	January	183.25
7	February	165.50
8	March	172.25
9	April	162.00
10	May	168.50
11	June	0.00
12	July	0.00
13	August	
14	September	
15	October	
16	November	
17	December	
18	Total	851.50
19		
20		
21		

Figure 178: Yearly sums for one employee

Practical problems and questions

- It is very difficult and time-consuming to create the timekeeping table: 12 sheets that have to be copied from a raw template and adjusted for each month, and a sheet with all the yearly sums with references to all the other sheets. Users often search for a macro to make the creation easier.
- The file shown contains only the data of one employee. How can you get all the data for all the employees, so that you can have a summary of all the work hours from all employees of a department or the whole company?
- How can you compare employees and/or departments?
- The file shown contains data for one year. How can you compare it with the data of the previous years?

Solution

To use the DataPilot for this task, collect all the data into one single table. This can be done either manually or by importing a file from an (electronic) timekeeping machine.

In very simple cases, each employee takes care of their own working hours. If you need calculations that cover several employees, departments, or the whole company, just copy everything into one huge table (Figure 179).

	A	B	C	D	E	
1	date	name	arrives	leaves	hours	
2	01/01/2010	Brigitte	10:15	16:15	6.00	
3	01/01/2010	Fritz	11:00	18:45	7.00	
4	01/01/2010	Hans	8:15	19:00	10.00	
5	01/01/2010	Kurt	11:15	14:00	2.75	
6	01/01/2010	Ute	11:00	13:45	2.75	
7	02/01/2010	Brigitte	12:00	18:45	6.00	
8	02/01/2010	Fritz	7:45	13:45	6.00	
9	02/01/2010	Hans	8:30	17:30	8.25	
10	02/01/2010	Kurt	10:45	18:30	7.00	
11	02/01/2010	Ute	9:15	16:00	6.00	
12	03/01/2010	Brigitte	9:00	18:30	8.75	
13	03/01/2010	Fritz	9:00	14:30	5.50	
14	03/01/2010	Hans	7:30	18:00	9.75	
15	03/01/2010	Kurt	7:30	17:45	9.50	
16	03/01/2010	Ute	8:30	18:30	9.25	
17	06/01/2010	Brigitte	9:30	17:30	7.25	
18	06/01/2010	Fritz	11:00	14:30	3.50	

Figure 179: Database in Calc

Using the DataPilot requires only 12 mouse clicks and gives you a nice overview within seconds:

- 1) Select the cell **A1** (or any other single cell within the list).
- 2) Choose **Data → DataPilot → Start** and click **OK**.
- 3) On the DataPilot dialog (Figure 180):
 - Drag **date** into the *Row Fields* area.
 - Drag **hours** into the *Data Fields* area. Notice that it becomes **Sum – hours**.
 - Drag **name** into the *Column Fields* area.

The screenshot shows the DataPilot dialog with the following layout:

- Page Fields:** An empty box.
- Column Fields:** Contains the field **name**.
- Row Fields:** Contains the field **date**.
- Data Fields:** An empty box.
- Available Fields:** A vertical list on the right side containing the fields: **date**, **name**, **arrives**, **leaves**, and **hours**.

Below the dialog, the text "Drag the fields from the right into the desired position." is displayed.

Figure 180: Part of DataPilot dialog

- 4) Click **More** to show more options in the lower part of the dialog.
- 5) Choose – **new sheet** – for *Results to*.
- 6) Click **OK**.

The result appears on a new sheet (Figure 181).

	A	B	C	D	E	F	G
1	Filter						
2							
3	Sum - hours	name					
4	date	Brigitte	Fritz	Hans	Kurt	Ute	Total Result
5	01/01/10	6.00	7.00	10.00	2.75	2.75	28.50
6	02/01/10	6.00	6.00	8.25	7.00	6.00	33.25
7	03/01/10	8.75	5.50	9.75	9.50	9.25	42.75
8	06/01/10	7.25	3.50	6.00	5.00	4.50	26.25
9	07/01/10	4.75	9.00	6.00	5.75	5.75	31.25
10	08/01/10	7.25	4.75	7.75	4.75	7.25	31.75
11	09/01/10	6.75	2.50	5.50	6.00	5.00	25.75
12	10/01/10	7.00	8.75	3.75	10.50	3.50	33.50
13	13/01/10	6.00	7.00	7.50	2.75	5.50	28.75
14	14/01/10	5.50	6.75	7.25	4.25	8.00	31.75
15	15/01/10	4.75	7.75	4.00	9.25	7.00	32.75
16	16/01/10	10.25	4.50	8.00	5.75	5.50	34.00
17	17/01/10	4.75	7.00	8.75	5.50	6.50	32.50
18	20/01/10	8.75	5.75	10.75	6.25	8.75	40.25
19	21/01/10	10.00	6.00	9.25	6.75	3.25	35.25
20	22/01/10	8.50	8.00	9.75	1.50	7.00	34.75
21	23/01/10	5.50	6.00	5.50	8.25	3.50	28.75
22	24/01/10	7.25	3.00	5.50	7.50	4.00	27.25

Figure 181: The evaluation, done within seconds with DataPilot

The result is much more powerful than is possible with the classic formula-based calculation. For example, you can summarize the daily results to a monthly result very easily:

- 1) To group together the rows, select the cell **A5** (or any other cell that contains a date).
- 2) Choose **Data → Group and Outline → Group**. On the Grouping dialog, leave **Start** and **End** as **Automatically**; in the **Group by** section, choose **Intervals** and **Months**. Click **OK**.
The result is now grouped into months.

	A	B	C	D	E	F	G
1	Filter						
2							
3	Sum - hours	name					
4	date	Brigitte	Fritz	Hans	Kurt	Ute	Total Result
5	Jan	150.75	137.00	166.50	141.75	137.00	733.00
6	Feb	131.50	139.25	112.25	119.75	116.75	619.50
7	Mar	140.25	154.50	135.75	134.75	141.00	706.25
8	Apr	140.50	128.50	131.75	131.25	144.00	676.00
9	May	126.00	134.75	116.00	121.25	140.00	638.00
10	Jun	127.75	128.00	118.25	120.25	121.25	615.50
11	Total Result	816.75	822.00	780.50	769.00	800.00	3988.25
12							

Figure 182: Monthly sums

If you need a result with a percentage, start the DataPilot from this page.

- 1) Select the cell **A3** (or any other single cell that contains a result of the DataPilot).
- 2) Choose **Data → DataPilot → Start**.

- 3) Double-click on **Sum – hours** to open the Data Field dialog (Figure 183).
- 4) Click on **More**, to see more options.
- 5) Switch **Displayed value → Type** to **% of column**.
- 6) Click **OK** to return to the DataPilot dialog, then click **OK** again.

The result shows percentages as a decimal number. If you prefer to have a percent format, select the cells and click on the **%** icon in the menu bar (Figure 184).

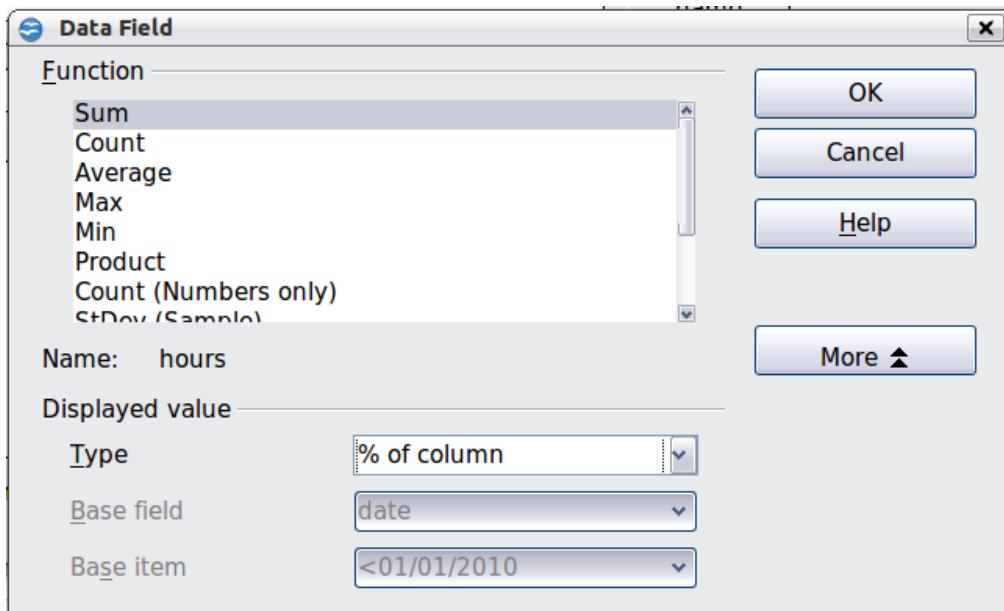


Figure 183: Properties of the data field

	A	B	C	D	E	F	G
1	Filter						
2							
3	Sum - hours	name ▾					
4	date ▾	Brigitte	Fritz	Hans	Kurt	Ute	Total Result
5	Jan	18.46%	16.67%	21.33%	18.43%	17.13%	18.38%
6	Feb	16.10%	16.94%	14.38%	15.57%	14.59%	15.53%
7	Mar	17.17%	18.80%	17.39%	17.52%	17.63%	17.71%
8	Apr	17.20%	15.63%	16.88%	17.07%	18.00%	16.95%
9	May	15.43%	16.39%	14.86%	15.77%	17.50%	16.00%
10	Jun	15.64%	15.57%	15.15%	15.64%	15.16%	15.43%
11	Total Result	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
12							

Figure 184: Result with percentages

To get a comparison between employees, start the DataPilot again from the output sheet:

- 1) Select the cell **A3** (or any other cell that contains a result of the DataPilot).
- 2) Choose **Data → DataPilot → Start**.
- 3) Double-click on **Sum – hours** to open the Data Field dialog.
- 4) Click **More**, to see more options.
 - Switch the *Type* of the displayed value to **Difference from**.
 - Switch the *Base field* to **name**.
 - Switch the *Base item* to **Brigitte**.
- 5) Click **OK** to return to the DataPilot dialog, then click **OK** again.

	A	B	C	D	E	F	G
1	Filter						
2							
3	Sum - hours	name					
4	date	Brigitte	Fritz	Hans	Kurt	Ute	Total Result
5	Jan			-13.75	15.75	-9.00	-13.75
6	Feb			7.75	-19.25	-11.75	-14.75
7	Mar			14.25	-4.50	-5.50	0.75
8	Apr			-12.00	-8.75	-9.25	3.50
9	May			8.75	-10.00	-4.75	14.00
10	Jun			0.25	-9.50	-7.50	-6.50
11	Total Result			5.25	-36.25	-47.75	-16.75
12							

Figure 185: Absolute comparison with Brigitte

As a final example we switch to an accumulated view; that is, continuing sums of all values:

- 1) Select the cell A3 (or any other cell that contains a result of the DataPilot).
- 1) Choose **Data → DataPilot → Start**.
- 2) Double-click on **Sum – hours** to open the Data Field dialog.
- 3) Click **More**, to see more options.
 - Switch the type of the displayed value to **Running total in**.
 - Switch the *Base field* to **Date**.
- 4) Click **OK** to return to the DataPilot dialog, then click **OK** again.

	A	B	C	D	E	F	G
1	Filter						
2							
3	Sum - hours	name					
4	date	Brigitte	Fritz	Hans	Kurt	Ute	Total Result
5	Jan	150.75	137.00	166.50	141.75	137.00	733.00
6	Feb	282.25	276.25	278.75	261.50	253.75	1352.50
7	Mar	422.50	430.75	414.50	396.25	394.75	2058.75
8	Apr	563.00	559.25	546.25	527.50	538.75	2734.75
9	May	689.00	694.00	662.25	648.75	678.75	3372.75
10	Jun	816.75	822.00	780.50	769.00	800.00	3988.25
11	Total Result						
12							

Figure 186: The DataPilot now shows accumulated values

Differences and advantages

These examples show an important aspect of the DataPilot. Normally you have to collect your data according to the way you want the result to be represented. This means you have to use a specific structure and you are stuck with it.

The DataPilot works more like a real database. The source data are collected in a simple spreadsheet that contains all data. Only when you want to look at it do you select which part of the data you want to use.

Example 3: Frequency distribution

For showing the frequency of incidents, Calc uses the function FREQUENCY. This formula has to be used in a so-called matrix formula. This is an advanced feature. Alternatively you can use the DataPilot, which requires almost no knowledge of spreadsheets.

In our example we want to investigate the number of emails that go to the Germanophone support mailing list. We want to know how the activity on the list is distributed during the day.

The starting point for this example is the mailbox file of the Thunderbird mail client. The command (in Linux)

```
grep 'Delivery-Date:' Inbox > users.txt
```

creates a text file that contains, for the timespan of more than 2 years, one line for each message, with date and time. (See Figure 187.)

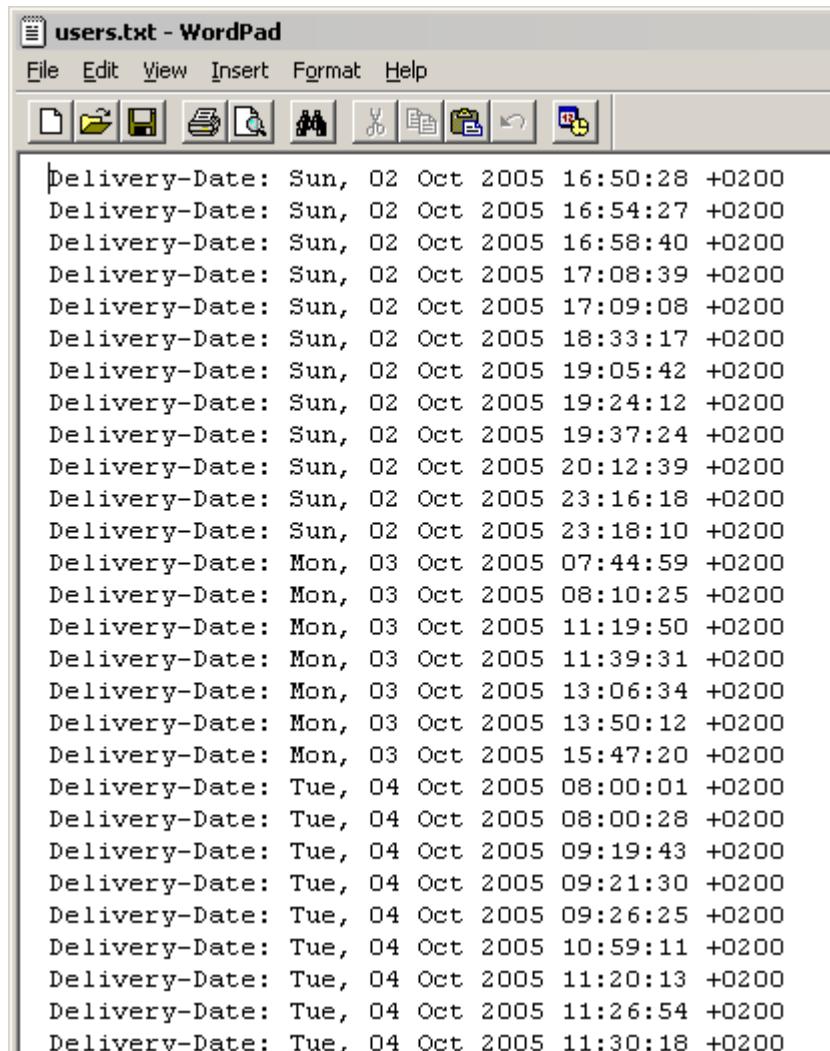


Figure 187: Raw data for the frequency of the messages

To import the data into a table in Calc, choose **Insert → Sheet From File** and select the text file **users.txt** containing the raw data. The Text Import dialog (Figure 188) appears. Here you can choose your import options. Use the following properties:

Separator options: *Fixed width*

Divide into columns at position 20, 31 and 40

Column types:

- Column 1: *Hide*
- Column 2: *Date (DMY)*
- Column 3: *Standard*
- Column 4: *Hide*

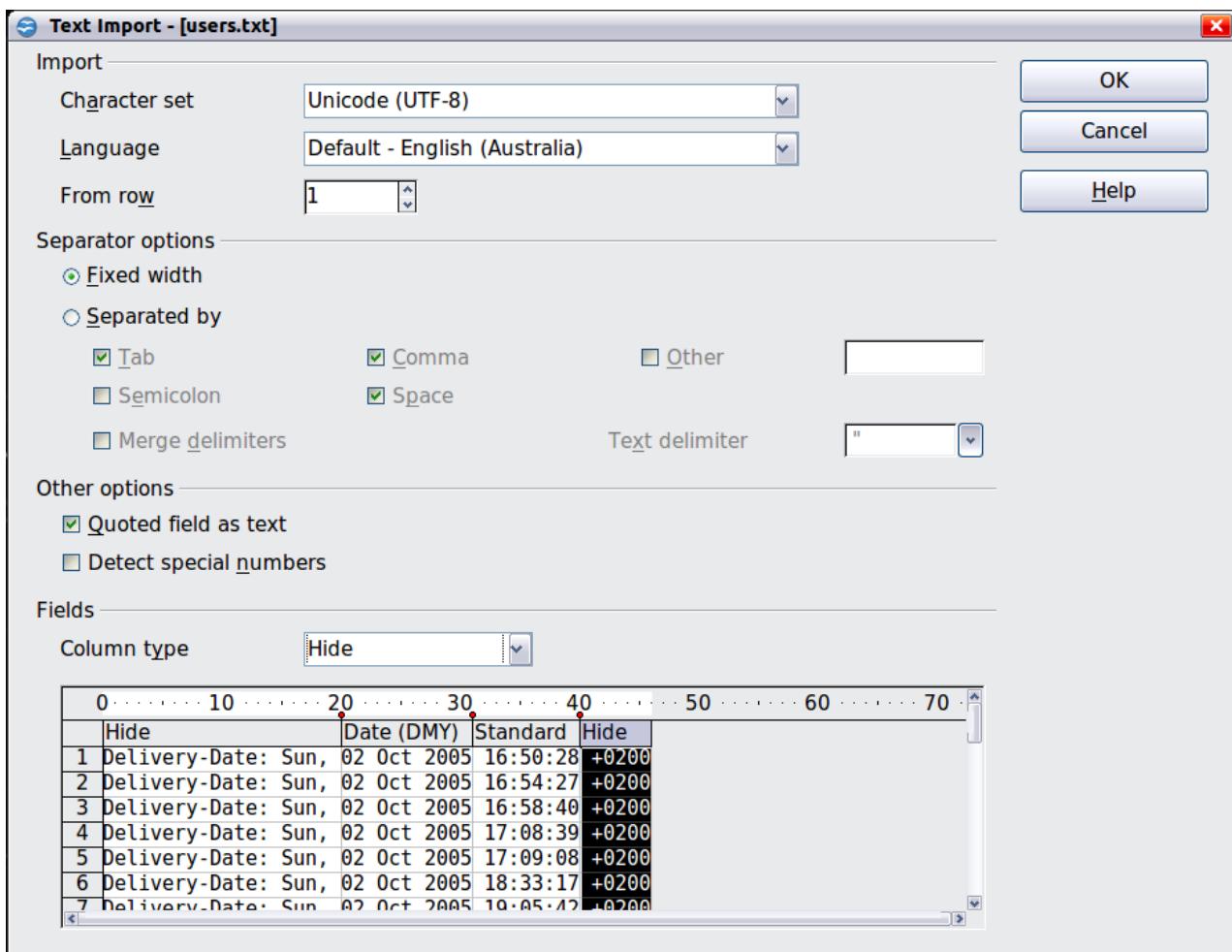


Figure 188: Import settings

Figure 189 shows the imported raw data with a row added at the top containing titles for each column.

	A	B
1	Date	Time
2	02/10/05	16:50:28
3	02/10/05	16:54:27
4	02/10/05	16:58:40
5	02/10/05	17:08:39
6	02/10/05	17:09:08
7	02/10/05	18:33:17
8	02/10/05	19:05:42
9	02/10/05	19:24:12
10	02/10/05	19:37:24
11	02/10/05	20:12:39

Figure 189: Raw data in Calc

Solution with a matrix formula

To calculate the frequency you have to create 24 classes, one for each hour. In the next column you enter the number of emails with the function FREQUENCY.

($=\text{FREQUENCY}(\text{B2:B38096};\text{E2:E25})$)		
D	E	F
	01:00	922
	02:00	466
	03:00	204
	04:00	123
	05:00	97
	06:00	110
	07:00	272
	08:00	772
	09:00	1538
	10:00	1944
	11:00	2214
	12:00	2418
	13:00	2382
	14:00	2327
	15:00	2428
	16:00	2524
	17:00	2398
	18:00	2273
	19:00	2260
	20:00	2368
	21:00	2264
	22:00	2131
	23:00	2089
	00:00	1571

Figure 190: FREQUENCY function in a matrix formula

The first argument is the cell area with the times of all approximately 38,000 emails. The second argument is the cell area E2:E25 that describes the frequency classes. To enter the formula, first select the cell area F2:F25, then enter the formula. Then finish the formula by using the key combination *Shift+Ctrl+Enter*. This indicates to the program that you want to use a matrix formula. To indicate the matrix formula, the program uses curly brackets.

This technique is most often known only to (and used by) advanced users.

Solution with the DataPilot

With the DataPilot you can achieve the same result much easier and faster. The solution is also possible for less advanced users. Starting with the raw data (Figure 189), you need only a few mouse clicks.

- 1) Select the cell **A1** (or any other cell within the list).
- 2) Choose **Data → DataPilot → Start** and click **OK**.
- 3) In the DataPilot:
 - Drag **Time** into the *Row Fields* area.
 - Drag **Date** into the *Data Fields* area.

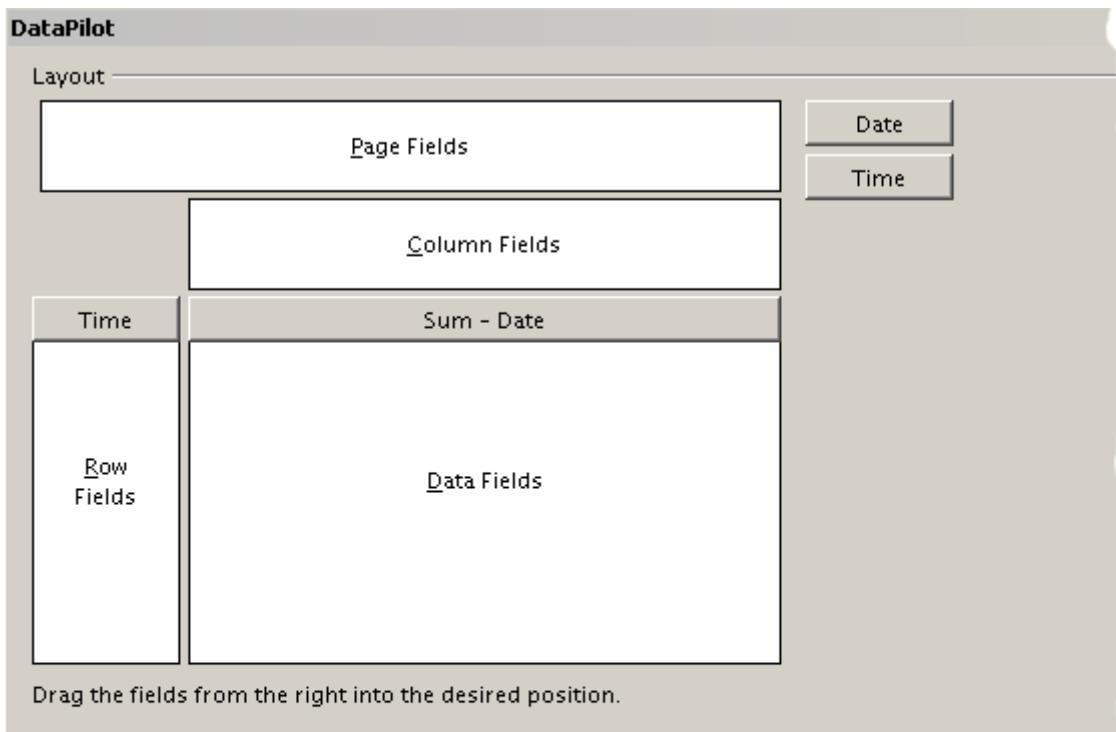


Figure 191: Part of DataPilot dialog

- 4) Click **More** to show more options in the lower part of the dialog.
- 5) Choose – **new sheet** – for *Results to*.
- 6) In this case we need to count the number of values, not their sum. Double-click on **Sum – Date** to open the Data Field dialog and select the function *Count* (see Figure 192).
- 7) Click **OK**. As an intermediate result, you get a DataPilot table that has for every time within the raw data a separate line.

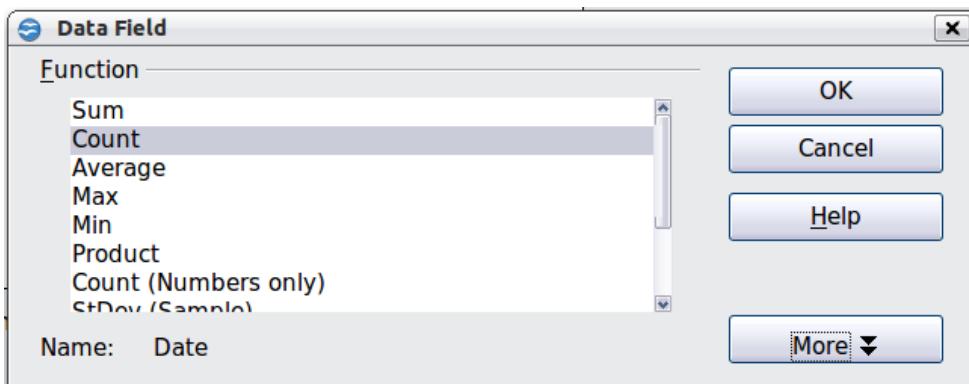


Figure 192: Properties of the data field

Note

This may be a very time-consuming process because of the large number of items. The time does not depend that much on the number of lines but rather on the number of rows needed for the table that contains the results.

- 8) For grouping the rows, select the cell **A4** or any other cell that contains a time.
- 9) Choose **Data → Group and Outline → Group**, select for the interval *Hours* and click **OK**. The result is now grouped according to hours as shown in Figure 195.

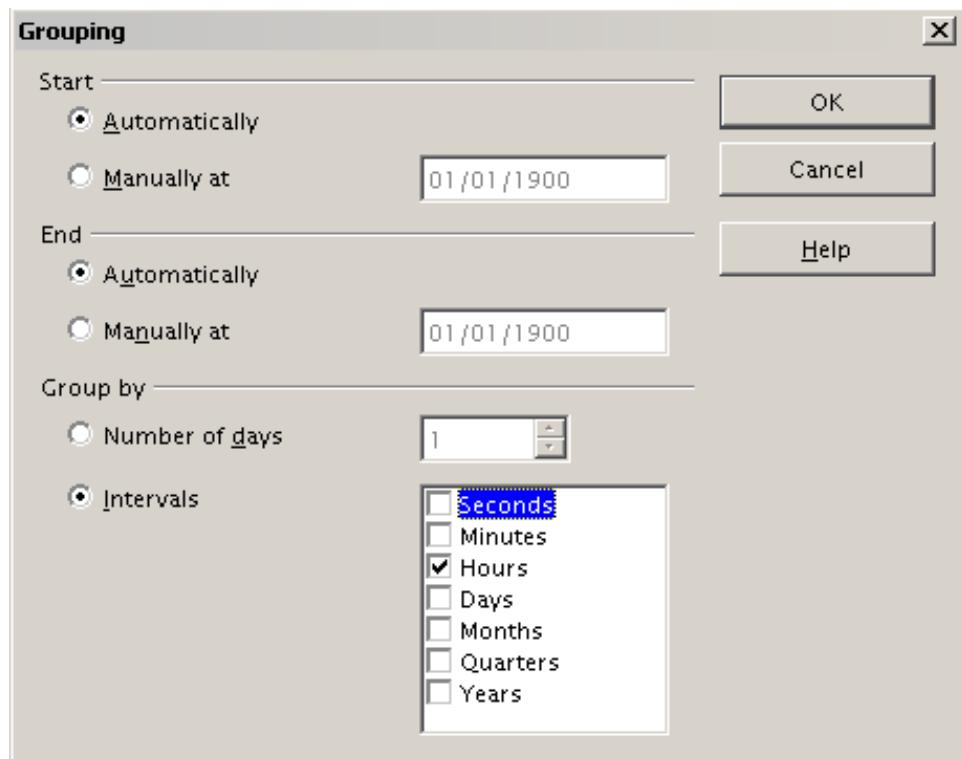


Figure 193: properties for grouping according to hours

- 10) Restart the DataPilot and double-click on the Sum-Date data field. Figure 194 shows the Data Field dialog for the data field **Number – Date**. Click **More** and select as type **% of column**. The result is shown in Figure 196. Figure 195 shows the absolute occurrence. Whether the relative values are shown as a decimal (0.1) or as a percentage (10%) depends only on the cell formatting itself and has nothing to do with the DataPilot.

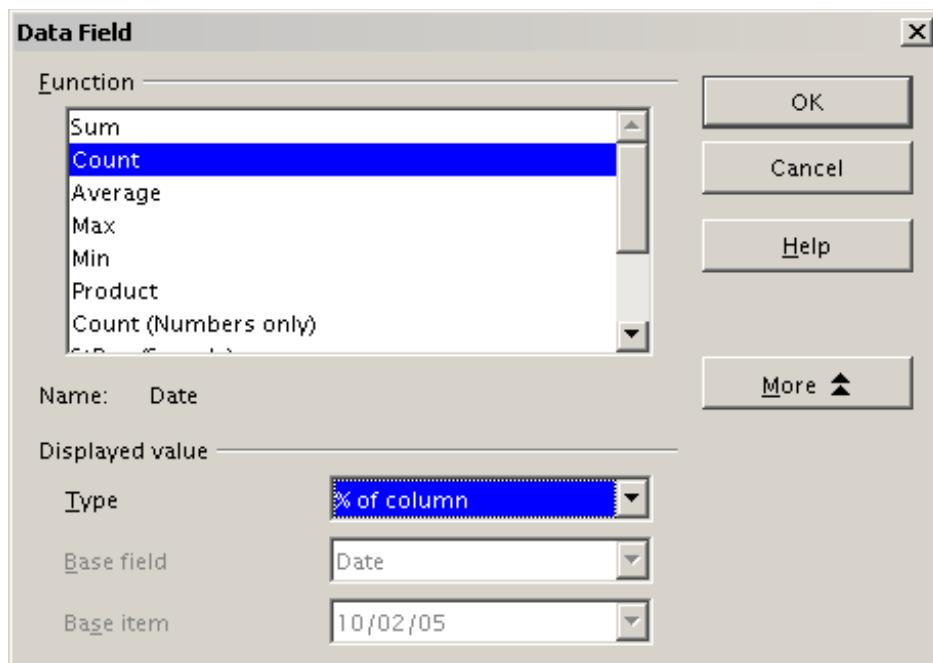


Figure 194: Data Field settings for relative values

	A	B
1	Filter	
2		
3	Time	▼
4	00	921
5	01	467
6	02	204
7	03	123
8	04	97
9	05	110
10	06	271
11	07	773
12	08	1537
13	09	1945
14	10	2212
15	11	2420
16	12	2382
17	13	2327
18	14	2427
19	15	2525
20	16	2397
21	17	2274
22	18	2259
23	19	2367
24	20	2266
25	21	2130
26	22	2089
27	23	1572
28	Total Result	38095

Figure 195: Frequency distribution with the DataPilot

	A	B
1	Filter	
2		
3	Time	▼
4	00	2.42%
5	01	1.23%
6	02	0.54%
7	03	0.32%
8	04	0.25%
9	05	0.29%
10	06	0.71%
11	07	2.03%
12	08	4.03%
13	09	5.11%
14	10	5.81%
15	11	6.35%
16	12	6.25%
17	13	6.11%
18	14	6.37%
19	15	6.63%
20	16	6.29%
21	17	5.97%
22	18	5.93%
23	19	6.21%
24	20	5.95%
25	21	5.59%
26	22	5.48%
27	23	4.13%
28	Total Result	100.00%

Figure 196: Relative occurrence

DataPilot functions in detail

This part describes the use and options of the DataPilot in detail.

The database (preconditions)

The first thing needed to work with the DataPilot is a list of raw data, similar to a database table, consisting of rows (data sets) and columns (data fields). The field names are in the first row above the list.

The data source could be an external file or database. For the simplest case, where data is contained in a Calc spreadsheet, Calc offers sorting functions that do not require the DataPilot.

For processing data in lists, the program needs to know where in the spreadsheet the table is. The table can be anywhere in the sheet, in any position. A spreadsheet can contain several unrelated tables.

Calc recognizes your lists automatically. It uses the following logic:

Starting from the cell you've selected (which must be within your list), Calc checks the surrounding cells in all 4 directions (left, right, above, below). The border is recognized if the program discovers an empty row or column, or if it hits the left or upper border of the spreadsheet.

This means that the described functions can only work correctly if there are no empty rows or columns in your list. Avoid empty lines (for example for formatting). You can format your list by using cell formats.

Rule

No empty rows or empty columns are allowed within lists.

If you select more than one single cell before you start sorting, filtering or calling the DataPilot, then the automatic list recognition is switched off. Calc assumes that the list matches exactly the cells you have selected.

Rule

For sorting, filtering, or using the DataPilot, always select only one cell.

A relatively common source of errors is to inadvertently declare a list by mistake and then sort the list. If you select multiple cells (for example, a whole column) then the sorting mixes up the data that should be together in one row.

In addition to these formal aspects, the logical structure of your table is very important when using the DataPilot.

Rule

Calc lists must have the *normal form*; that is, they must have a simple linear structure.

When entering the data, do not add outlines, groups, or summaries. This becomes clear when we think about what we could have done wrong in our Sales list example in the section "Examples with step by step descriptions" starting at page 188. Here are some mistakes commonly made by inexperienced spreadsheet users:

- 1) You made several sheets, for example, a sheet for each group of articles. Analyses are then possible only within each group. Analyses for several groups would be a lot of work.
- 2) In the Sales list, instead of only one column for the amount, you made a column for the amounts for each employee. The amounts then had to be entered into the appropriate column. An analysis with the DataPilot would not be possible any more. In contrast, one result of the DataPilot is that you can get results for each employee if you have entered everything in one column.

- 3) You entered the amounts in chronological order. At the end of each month you made a sum total. In this case, sorting the list for different criteria is not possible because the DataPilot will treat the sum totals the same as any other figure. Getting monthly results is one of the very fast and easy features of the DataPilot.

Start

Start the DataPilot with **Data → DataPilot → Start**. If the list to be analyzed is in a spreadsheet table, select only one cell within this list. Calc recognizes and selects the list automatically for use with the DataPilot.

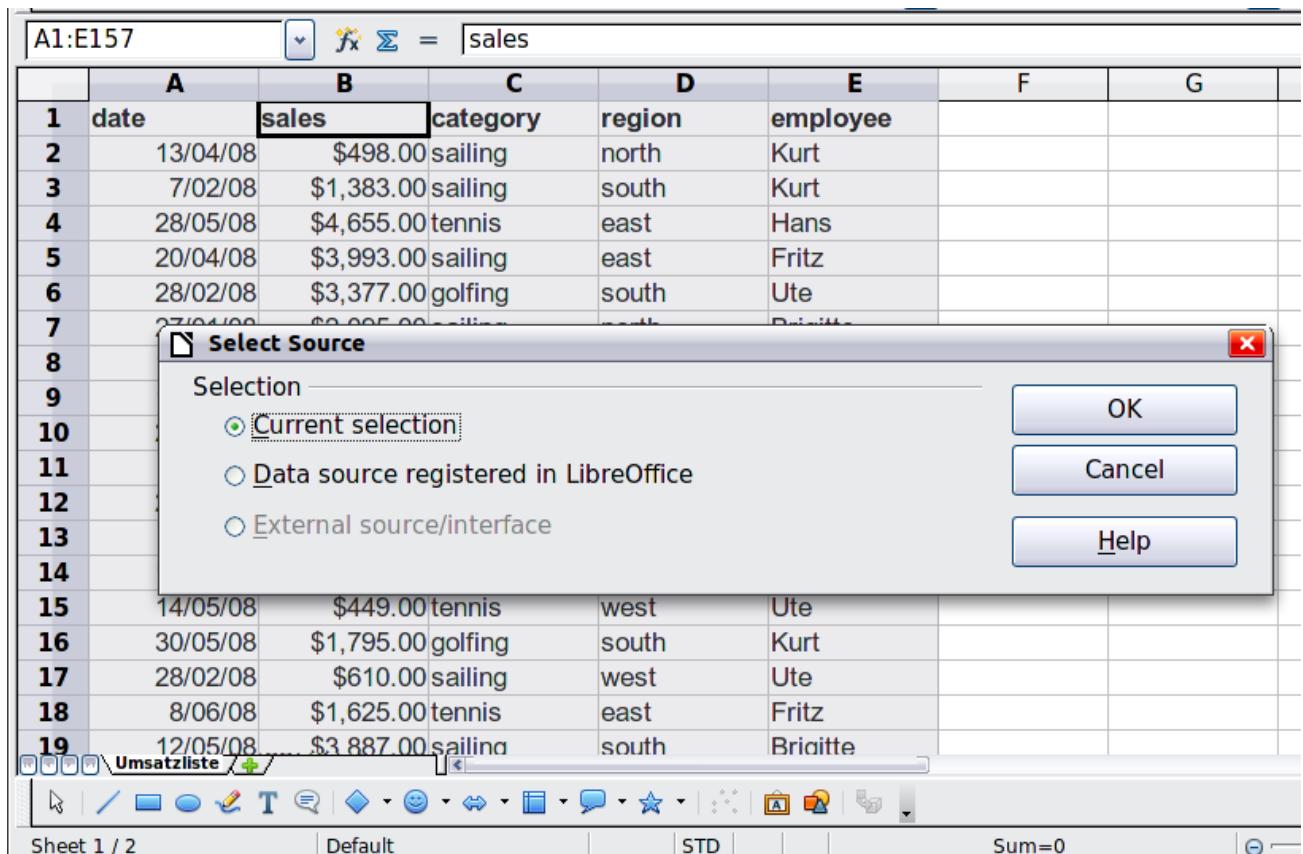


Figure 197: After starting the DataPilot

Data source

There are three possible data sources for the DataPilot: a Calc spreadsheet, an external data source that has to be registered in LibreOffice, or access to an OLAP system (not available at this time).

Calc spreadsheet

The simplest and most often used case is analyzing a list in a Calc spreadsheet. The list might be updated regularly or the data might be imported from a different application.

For example, a huge list can be copied from a different application and pasted into Calc. The behavior of Calc while inserting the data depends on the format of the data. If the data is in a common spreadsheet format, it is copied directly into Calc. However, if the data is in plain text, the Text Import dialog appears; see Figure 188 in this chapter and Chapter 1, Introducing Calc, for more information.

Calc can import data from a huge number of foreign data formats, for example from other spreadsheets (Excel, Lotus 1, 2, 3), from databases (like dBase), and from simple text files including CSV formats.

The drawback of copying or importing foreign data is that it will not update automatically if there are changes in the source file. With a Calc file you were previously limited to 65,535 rows but this has been expanded to one million rows.

Registered data source

A registered data source in LibreOffice is a connection to data held in a database outside Calc. This means that the data to be analyzed will not be saved in Calc; Calc always uses the data from the original source. Calc is able to use many different data sources and also databases that are created and maintained with LibreOffice Base. See Chapter 10, Linking Calc Data, for more information.

External data (OLAP)

No implementation exists at the moment so this option is not available.

The DataPilot dialog

The function of the DataPilot is managed in two places: first in the DataPilot dialog and second through manipulations of the result in the spreadsheet. This section describes the dialog in detail.

Basic layout

In the DataPilot (Figure 198) are four white areas that show the layout of the result. Beside these white areas are buttons with the names of the fields in your data source. To choose a layout, drag and drop the field buttons into the white areas.

The *Data Fields* area in the middle must contain at least one field. Advanced users can use more than one field here. For the data field an aggregate function is used. For example, if you move the **sales** field into the *Data Fields* area, it appears there as **Sum – sales**.

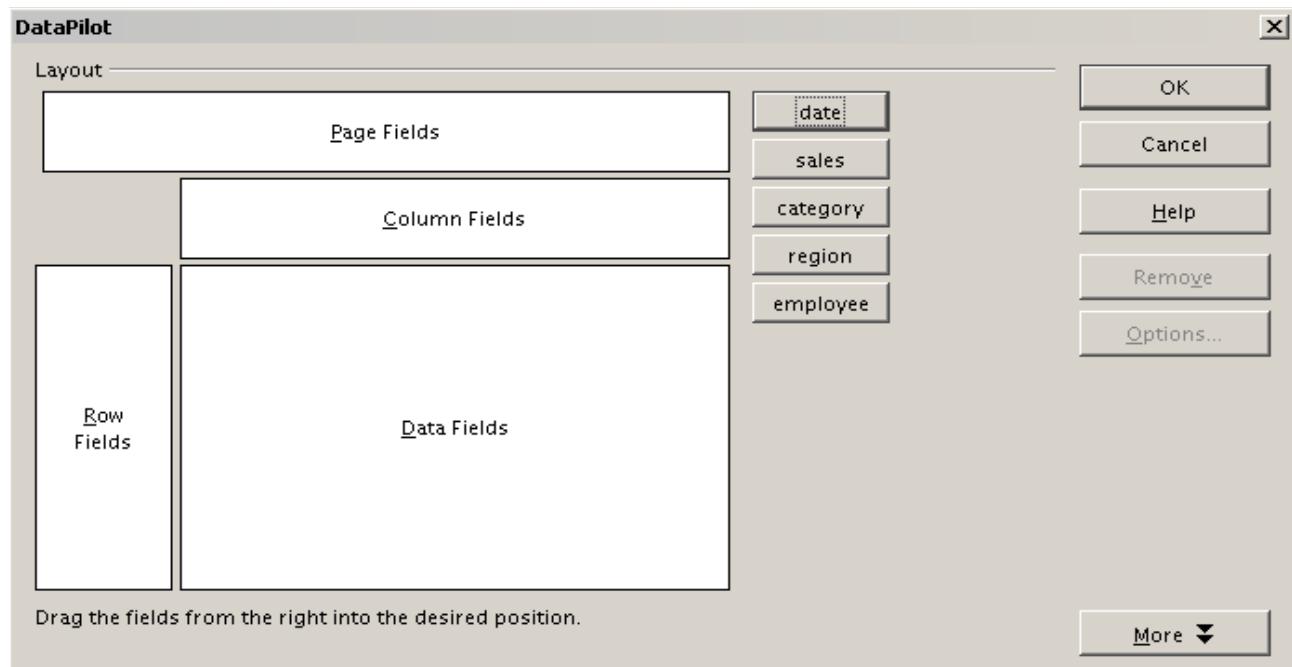


Figure 198: DataPilot dialog

Row Fields and *Column Fields* indicate in which groups the result will be sorted in the rows and columns. If there are no entries in one of these areas, then partial sums will not be provided for the corresponding rows or columns. Often more than one field is used at the same time to get partial sums for rows or columns. The order of the fields gives the order of the sums from overall to specific.

For example, if you drag **region** and **employee** into the *Row Fields* area, the sum will be divided into the employees. Within the employees will be the listing for the different regions.

Fields that are placed into the *Page Fields* area appear in the result above as a drop down list. The summary in your result takes only that part of your base data into account that you have selected. For example, if you use **employee** as a page field, you can filter the result shown for each employee.

To remove a field from the white layout area just drag it to the border and drop it (the cursor will change to a crossed symbol), or click the **Remove** button.

More options

To expand the DataPilot and show more options, click **More**.

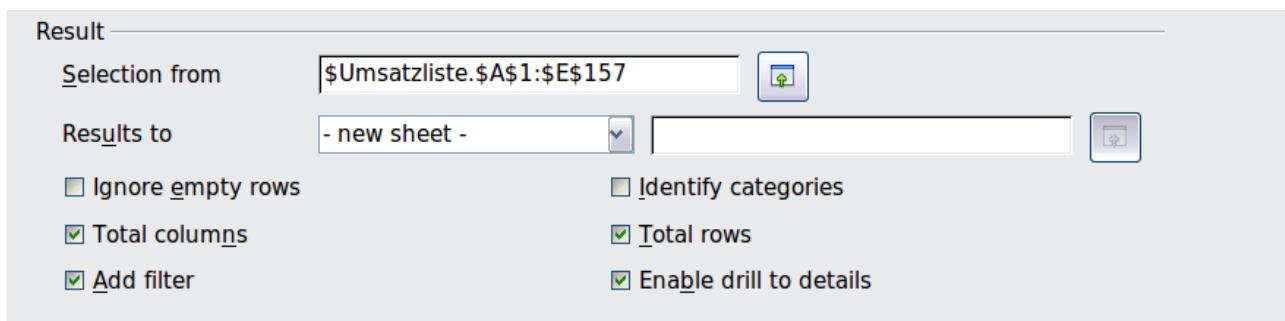


Figure 199: Expanded dialog of the DataPilot

Selection from

Shows the range of cells used in the DataPilot.

Results to

Results to defines where your result will be shown. If you do not enter anything, the DataPilot will put your result below the list that contains your data. This could result in overwriting any data that is already in that location. To avoid overwriting data, you can leave *Results to* as – **undefined** – and enter a cell reference to tell the DataPilot where to show the results.¹ However, a generally better approach is to use – **new sheet** – to add a new sheet to the spreadsheet file and place the results there.

Ignore empty rows

If the source data is not in the recommended form, this option tells the DataPilot to ignore empty rows.

Identify categories

If the source data has missing entries in a list and does not meet the recommended data structure (see Figure 200), the DataPilot adds it to the listed category above it. If this option is not chosen, then the DataPilot inserts (*empty*) (see Figure 202).

¹ In this case the word – *undefined* – is misleading because the output position is in fact defined.

	A	B	C
1	Produce	Region	Quantity
2	Apples	Italy	6.2 t
3		Lake Constance	19.2 t
4		California	3.6 t
5	Pears	Italy	7.0 t
6		Lake Constance	22.0 t
7			

Figure 200: Example of data with missing entries in Column A

The option *Identify categories* ensures that in this case rows 3 and 4 are added to the product Apples and row 6 is added to Pears (see Figure 201).

Sum - Quantity	Region				
Produce	California	Italy	Lake Constance	Total Result	
Apples		3.6 t	6.2 t	19.2 t	29.0 t
Pears			7.0 t	22.0 t	29.0 t
Total Result		3.6 t	13.2 t	41.2 t	58.0 t

Figure 201: DataPilot result with *Identify categories* selected

Without category recognition, the DataPilot shows an (*empty*) category (Figure 202).

Sum - Quantity	Region				
Product	California	Italy	Lake Constance	Total Result	
(empty)		3.6 t		41.2 t	44.8 t
Apples			6.2 t		6.2 t
Pears			7.0 t		7.0 t
Total Result		3.6 t	13.2 t	41.2 t	58.0 t

Figure 202: DataPilot result without *Identify categories* selected

Logically, the behavior without category recognition is better. A list with the shown missing entries is also less useful, because you cannot use other functions such as sorting or filtering.

Total columns / total rows

With this option you decide if the DataPilot will show an extra row with the sums of each column or if it adds on the very right a column with the sums of each row. In some cases, an added total sum is meaningless, for example if your entries are accumulated or the result of comparisons.

Add filter

Use this option to add or hide the cell labelled **Filter** above the DataPilot results. This cell is a convenient button for additional filtering options within the DataPilot.

Enable drill to details

If you double-click on a single cell in the DataPilot result, this function gives a more detailed listing of an individual entry. If this function is disabled, the double-click will keep its usual edit function within a spreadsheet.

More settings for the fields – Field Options

The options discussed in the previous section are valid for the DataPilot in general. Additionally, you can change settings for every field that you have added to the DataPilot layout. Do this either by clicking on the **Options** button in the DataPilot dialog or by double-clicking on the appropriate field.

There are differences between data fields, row or column fields, and page fields of the DataPilot.

Data fields

In the Options dialog of a **data** field you can select the Sum function for accumulating the values from your data source. In many cases you will need the sum function, but other functions (like standard distribution or a counting function) are also available. For example, the counting function can be useful for non-numerical data fields.

On the Data Field dialog, click **More** to see more options.

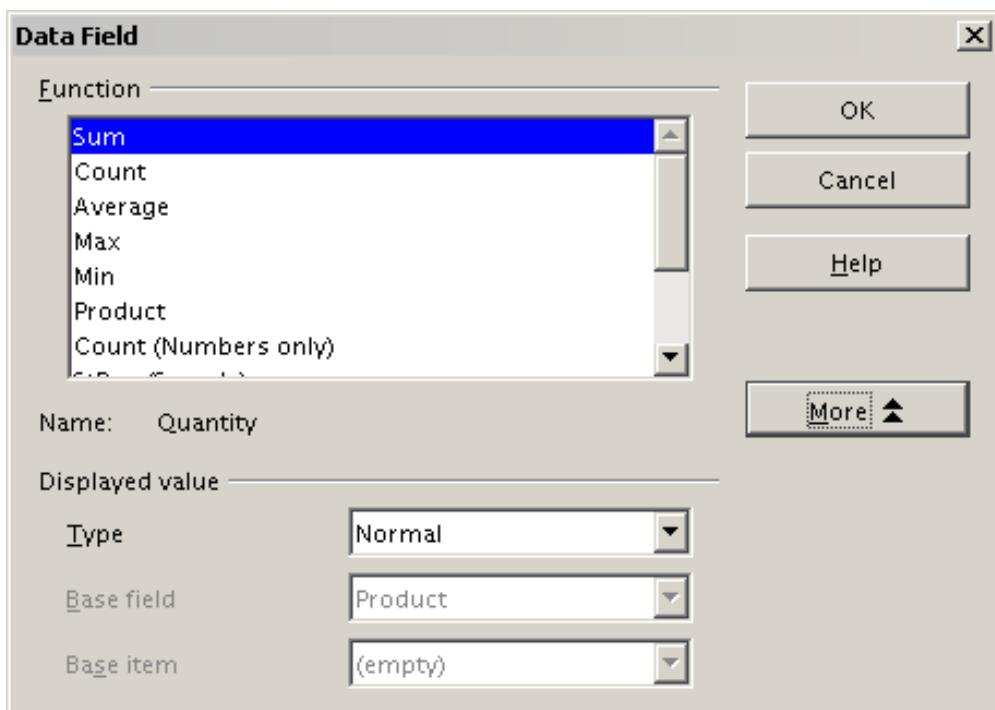


Figure 203: Expanded dialog for a data field

In the **Displayed value** section, you can choose other possibilities for analysis by using the aggregate function. Depending on the setting for **Type**, you may have to choose definitions for **Base field** and **Base element**. The table below lists the possible types of displayed value and associated base field and element, together with a note on usage.

Type	Base field	Base element	Analysis
Normal	—	—	Simple use of the chosen aggregate function (for example, sum)

Type	Base field	Base element	Analysis
Difference from	Selection of a field from the data source of the DataPilot (for example, employee)	Selection of an element from the selected base field (for example, Brigitte)	Result as difference to the result of the base element (for example, Sales volume of the employees as difference of the sales volume of Brigitte)
% of	Selection of a field from the data source of the DataPilot (for example, employee)	Selection of an element from the selected base field (for example, Brigitte)	Result as a ratio based on the result of the base element (for example, Sales result of the employee relative to the sales result of Brigitte)
% difference from	Selection of a field from the data source of the DataPilot (for example, employee)	Selection of an element from the selected base field (for example, Brigitte)	Result as relative difference to the result of the base element (for example, Sales volume of the employees as relative difference of the sales volume of Brigitte)
Running total in	Selection of a field from the data source of the DataPilot (for example, date)	—	Result as a continuing sum (for example, Continuing sum of the sales volume for days or months)
% of row	—	—	Result as relative part of the result in the whole row (for example the row sum)
% of column	—	—	Result as relative part of the total column (for example, the column sum)
% of total	—	—	Result as relative part of the overall result (for example the total sum)
Index	—	—	Default result x total result / (row result x column result)

Row and column fields

In the Options dialog for the [row](#) or [column](#) fields, you can choose to show partial sums for each category. Partial sums are deactivated by default. They are only useful if the values in one row or column field can be divided into partial sums for another (sub)field.

Some examples are shown in the next three figures.

Sum - sales	category				
region	golfing	sailing	tennis	Total Result	
east	\$41,971.00	\$22,484.00	\$35,966.00	\$100,421.00	
north	\$18,741.00	\$22,468.00	\$34,533.00	\$75,742.00	
south	\$56,257.00	\$44,801.00	\$34,258.00	\$135,316.00	
west	\$39,245.00	\$20,099.00	\$37,942.00	\$97,286.00	
Total Result	\$156,214.00	\$109,852.00	\$142,699.00	\$408,765.00	

Figure 204: No subdivision with only one row or column field

Sum - sales	category				
region	employee	golfing	sailing	tennis	Total Result
east	Brigitte	\$5,822.00	\$2,135.00	\$4,872.00	\$12,829.00
	Fritz	\$15,172.00	\$5,730.00	\$12,455.00	\$33,357.00
	Hans	\$5,316.00	\$909.00	\$12,220.00	\$18,445.00
	Kurt	\$9,707.00	\$6,475.00	\$2,417.00	\$18,599.00
	Ute	\$5,954.00	\$7,235.00	\$4,002.00	\$17,191.00
north	Brigitte	\$3,814.00	\$10,151.00	\$3,985.00	\$17,950.00
	Fritz	\$3,443.00	\$2,698.00	\$9,115.00	\$15,256.00
	Ute	\$11,939.00	\$19,030.00		\$30,969.00
west	Brigitte	\$12,174.00	\$7,704.00	\$8,864.00	\$28,742.00
	Fritz	\$4,934.00	\$6,742.00	\$1,427.00	\$13,103.00
	Hans	\$5,380.00	\$880.00	\$9,028.00	\$15,288.00
	Kurt	\$4,744.00	\$3,584.00		\$8,328.00
	Ute	\$12,013.00	\$1,189.00	\$18,623.00	\$31,825.00
Total Result		\$156,214.00	\$109,852.00	\$142,699.00	\$408,765.00

Figure 205: Division of the regions for employees (two row fields) without partial sums

Sum - sales		category			
region	employee	golfing	sailing	tennis	Total Result
east	Brigitte	\$5,822.00	\$2,135.00	\$4,872.00	\$12,829.00
	Fritz	\$15,172.00	\$5,730.00	\$12,455.00	\$33,357.00
	Hans	\$5,316.00	\$909.00	\$12,220.00	\$18,445.00
	Kurt	\$9,707.00	\$6,475.00	\$2,417.00	\$18,599.00
	Ute	\$5,954.00	\$7,235.00	\$4,002.00	\$17,191.00
east Sum - sales		\$41,971.00	\$22,484.00	\$35,966.00	\$100,421.00
north	Brigitte	\$3,814.00	\$10,151.00	\$3,985.00	\$17,950.00
	Fritz	\$3,443.00	\$2,698.00	\$9,115.00	\$15,256.00
	Hans	\$3,049.00	\$3,008.00	\$5,361.00	\$11,418.00
	Kurt	\$2,214.00	\$3,485.00	\$10,499.00	\$16,198.00
	Ute	\$6,221.00	\$3,126.00	\$5,573.00	\$14,920.00
north Sum - sales		\$18,741.00	\$22,468.00	\$34,533.00	\$75,742.00
south	Brigitte	\$5,151.00	\$4,432.00		\$9,583.00
	Fritz	\$23,290.00	\$4,806.00	\$15,641.00	\$43,737.00
	Hans	\$4,196.00	\$9,263.00	\$3,858.00	\$17,317.00
	Kurt	\$11,681.00	\$7,270.00	\$14,759.00	\$33,710.00
	Ute	\$11,939.00	\$19,030.00		\$30,969.00
south Sum - sales		\$56,257.00	\$44,801.00	\$34,258.00	\$135,316.00
west	Brigitte	\$12,174.00	\$7,704.00	\$8,864.00	\$28,742.00
	Fritz	\$4,934.00	\$6,742.00	\$1,427.00	\$13,103.00
	Hans	\$5,380.00	\$880.00	\$9,028.00	\$15,288.00
	Kurt	\$4,744.00	\$3,584.00		\$8,328.00
	Ute	\$12,013.00	\$1,189.00	\$18,623.00	\$31,825.00
west Sum - sales		\$39,245.00	\$20,099.00	\$37,942.00	\$97,286.00
Total Result		\$156,214.00	\$109,852.00	\$142,699.00	\$408,765.00

Figure 206: Division of the regions for employees with partial sums (by region)

Choose the option **Automatically** to use the aggregate function for the partial results that can also be used for the data fields (see above). To set up the aggregate function for the partial results independently from the overall settings of the DataPilot, choose **User-defined**.

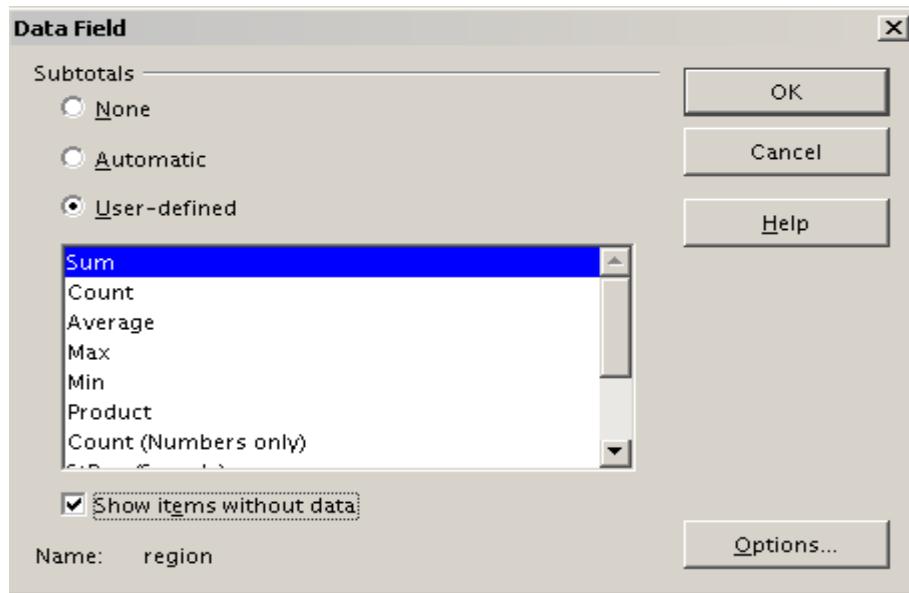


Figure 207: Preferences dialog of a row or column field

Normally, the DataPilot does not show a row or column for categories that have no entries in the underlying database. By choosing the **Show items with no data** option, you can force this.

For illustration purposes, the data was manipulated in such a way, that the employee Brigitte has no sales values for the category golfing.

employee	Brigitte		
Sum - sales	category		
region	sailing	tennis	Total Result
east	\$2,135.00	\$4,872.00	\$7,007.00
north	\$10,151.00	\$3,985.00	\$14,136.00
south	\$4,432.00		\$4,432.00
west	\$7,704.00	\$8,864.00	\$16,568.00
Total Result	\$24,422.00	\$17,721.00	\$42,143.00

Figure 208: Default setting

employee	Brigitte		
Sum - sales	category		
region	golfing	sailing	Total Result
east		\$2,135.00	\$4,872.00 \$7,007.00
north		\$10,151.00	\$3,985.00 \$14,136.00
south		\$4,432.00	
west		\$7,704.00	\$8,864.00 \$16,568.00
Total Result		\$24,422.00	\$17,721.00 \$42,143.00

Figure 209: Setting “Show Items with no data”

Page fields

The Options dialog for page fields is the same as for row and column fields, even though it appears to be useless to have the same settings as described for the row and column fields. With the flexibility of the DataPilot you can switch the different fields between pages, columns or rows. The fields keep the settings that you made for them. The page field has the same properties as a row or column field. These settings only take effect when you use the field not as page field but as row or column field.

Working with the results of the DataPilot

As mentioned above, the DataPilot is very flexible. An analysis can be totally restructured with only a few mouse clicks. Some functions of the DataPilot can be used only with the results of an analysis.

Start the dialog

Right-click in the area of the resulting table of the DataPilot. The command **Start** opens the DataPilot dialog with all current settings.

Change layout by using drag and drop

The easiest and fastest method to change the layout of the DataPilot is drag and drop. Within the result table of the DataPilot, move one of the page, column, or row fields to a different position (see “Examples with step by step descriptions” starting on page 188).

You can remove a column, row, or page field from the DataPilot by clicking on and dragging it out of the DataPilot.

Grouping rows or columns

For many analyses or summaries, the categories have to be grouped. You can merge the results in classes or periods. In the DataPilot you do a grouping only after you have first made an ungrouped DataPilot table.

You can access the grouping with the menu entry **Data → Group and Outline → Group** or by pressing **F12**. It is important that you select the correct cell area. How the grouping function works is determined mainly by the type of values that have to be grouped. You need to distinguish between scalar values, date or time values, or other values, such as text, that you want grouped.

Note

Before you can group, you have to produce a DataPilot with ungrouped data. The time needed for creating a DataPilot depends mostly on the number of columns and rows and not on the size of the basic data. Through grouping you can produce the DataPilot with a small number of rows and columns. The DataPilot can contain a lot of categories, depending on your data source.

Grouping of categories with scalar values

For grouping scalar values, select a single cell in the row or column of the category to be grouped.

km/h	
30	2
31	1
32	5
33	4
34	5
35	2
36	2
37	1
38	6
39	1
40	1
41	4
42	2
43	3

Figure 210: DataPilot without grouping
(frequency of the km/h values of a radar control)

km/h	
30-39	29
40-49	22
50-59	23
60-69	23
70-79	18
80-89	23
90-99	18
100-109	27
110-119	35
Total Result	218

Figure 211: DataPilot with grouping
(classes of 10 km/h each)

Choose **Data → Group and Outline → Group** from the menu bar or press **F12**; you get the following dialog.

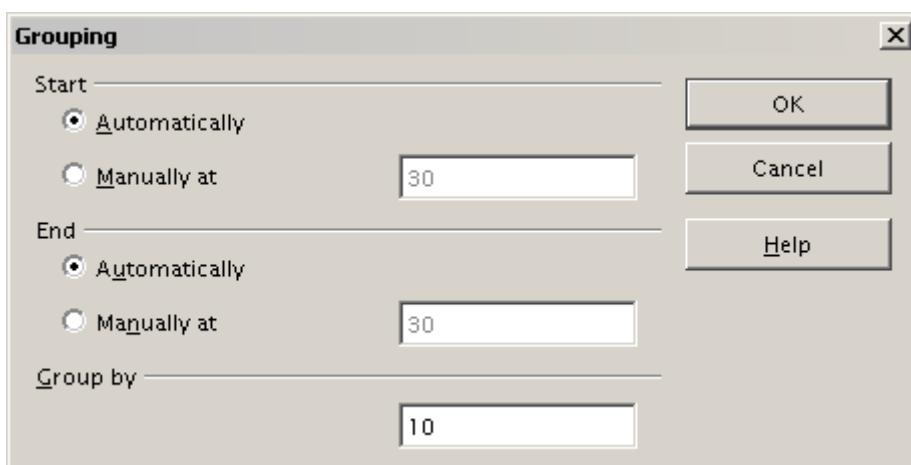


Figure 212: Grouping dialog with scalar categories

You can define in which value range (start/end) the grouping should take place. The default setting is the whole range from smallest to biggest value. In the field *Grouping after* you can enter the class size, this means the interval size (in this example groups of 10 km/h each).

Grouping of categories with date or time values

For grouping date or time values select a single cell in the column or row of the category to be grouped. This was demonstrated in all three examples in the section “Examples with step by step descriptions” starting on page 188.

With the menu entry **Data → Group and Outline → Group** or by pressing **F12**, you get the dialog shown in Figure 209.

You can decide the range of dates or times (start/finish) over which grouping should take place. The default setting is the entire period from the earliest to the latest value. In the field *Group by* you can enter the class size (the interval), that should be used for grouping.

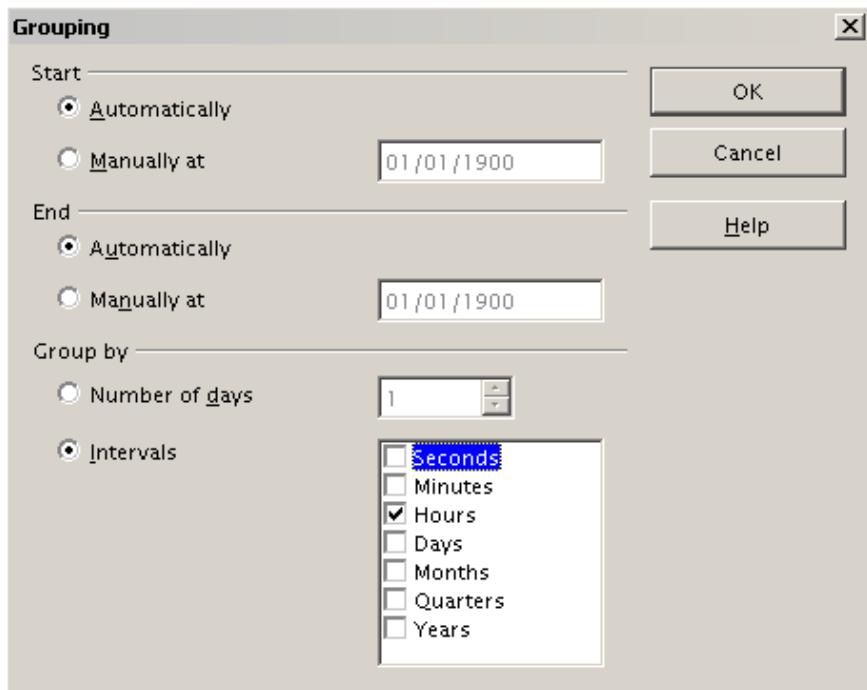


Figure 213: Grouping dialog for categories with dates or times

Possible intervals are: seconds, minutes, hours, days, months, quarters and years. These can be combined, for example grouping first by years and then within each year according to month.

Alternatively you can enter any number of days as grouping interval.

Tip

For grouping the output of the DataPilot in calendar weeks, choose the beginning date on a Sunday or Monday and enter the grouping interval (Number of Days) as 7.

Grouping without the automatic creation of intervals

If the categories contain text fields, then the automatic creation of intervals is not possible. You can define for each field (for example Department) which values you want to put together in one group.

Every time you use the menu entry **Data → Group and Outline → Group** or you press **F12** and you have more than one cell selected, then all the cells will be selected as one group.

Last name	First name	Department	Sick days
Meier	Hans	Sales	7
Muller	Karin	Accounting	7
Schuster	Josef	Purchasing	3
Huber	Erna	Purchasing	3
Aigner	Hermann	Production	7
Schulze	Josef	Production	7
Schroder	Gerhard	Production	4
Forster	Inge	Assembly	4
Meier	Gunter	Assembly	1
Gabriel	Juri	Warehouse	0
Schumacher	Helmut	Warehouse	5

Department	
Accounting	7
Assembly	5
Production	18
Purchasing	6
Sales	7
Warehouse	5
Total Result	48

Figure 215: DataPilot with nonscalar categories

Figure 214: Database with nonscalar categories (departments)

For grouping of non scalar categories, select in the result of the DataPilot all the individual field values that you want to put in the one group.

Tip

You can select several non-contiguous cells in one step by pressing and holding the **Control** key while left-clicking with the mouse.

Given the input data shown in Figure 208, execute the Data Pilot with Department in the Row Field and Sum (Sick Days) in the Data Field. The output should look like that in Figure 207. Select with the mouse the Departments Accounting, Purchasing and Sales.

Choose the **Data → Group and Outline → Group** from the Menu bar or press **F12**. The output should now look like that in Figure 206. Repeat this for all groups that you want to create from the different categories (Select Assembly, Production and Warehouse and Group again). The output should look like Figure 205.

Department2	Department	
Assembly	Assembly	5
Group1	Accounting	7
	Purchasing	6
	Sales	7
Production	Production	18
Warehouse	Warehouse	5
Total Result		48

Figure 216: Summary of single categories in one group

Department3	Department	
Group1	Accounting	7
	Purchasing	6
	Sales	7
Group2	Assembly	5
	Production	18
	Warehouse	5
Total Result		48

Figure 217: Grouping finished

You can change the automatically given names for the groups and the newly created group field by editing the name in the input field (for example changing 'Group2' to 'Technical'). The DataPilot will remember these settings, even if you change the layout later on. For the following pictures, the dialog was called again (with a right-click, Start) and by selecting the icon "Department 2", then Options, and finally from the preferences menu **Automatic** was selected. This generated the partial sum results shown in Figure 204. Double clicking Group 1 and Technical collapses the entries, as shown in Figure 203.

Department2	Department	
Group1	Accounting	7
	Purchasing	6
	Sales	7
Group1 Result		20
Technical	Assembly	5
	Production	18
	Warehouse	5
Technical Result		28
Total Result		48

Figure 218: Renamed groups and partial results

Department2	
Group1	20
Technical	28
Total Result	48

Figure 219: Reduced to the new groups

Note

A well-structured database makes manual sorting within the DataPilot obsolete. In the example shown, you could add another column with the name Department, that has the correct entry for each person based on whether the employee's department belongs to the group Office or Technical. The mapping for this (1:n relationship) can be done easily with the VLOOKUP function from Calc.

Sorting the result

The result of any DataPilot is sorted (categories) in columns and rows in an ascending order. You can change the sorting in three ways:

- Select sort order from drop-down menus on each column heading.
- Sort manually by using drag and drop.
- Sort automatically by choosing the options in the preferences dialog of the row or column field.

Select sort order from drop-down menus on each column heading

The simplest way to sort entries is to click the arrow on the right side of the heading and check the box(es) for the desired sort order. The custom sorting dialog is shown in Figure 199. Additional options exist to show all, show only the current item, or hide only the current item.

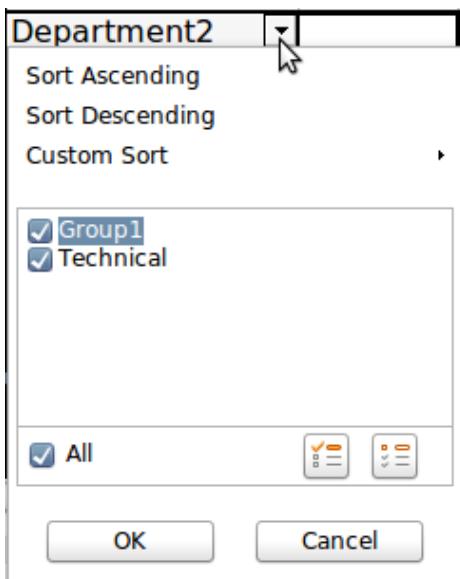


Figure 220: Custom sorting

Sort manually by using drag and drop

You can change the order within the categories by moving the cells with the category values in the result table of the DataPilot.

Be aware that in Calc a cell must be selected. It is not enough that this cell contains the cell cursor. The background of a selected cell is marked with a different color. To achieve this, click in one cell with no extra key pressed and redo this by pressing also the *Shift* or *Ctrl* key. Another possibility is to keep the mouse button pressed on the cell you want to select, move the mouse to a neighbor cell and move back to your original cell before you release the mouse button.

Sort automatically

To sort automatically, start the options of the preferences of the row or column field: right-click on the table area with the DataPilot result and choose **Start** to open the DataPilot (Figure 167). Within the Layout area of the DataPilot, double-click the field you want to sort. In the Data Field dialog (Figure 197), click **Options** to display the Data Field Options dialog (Figure 193).

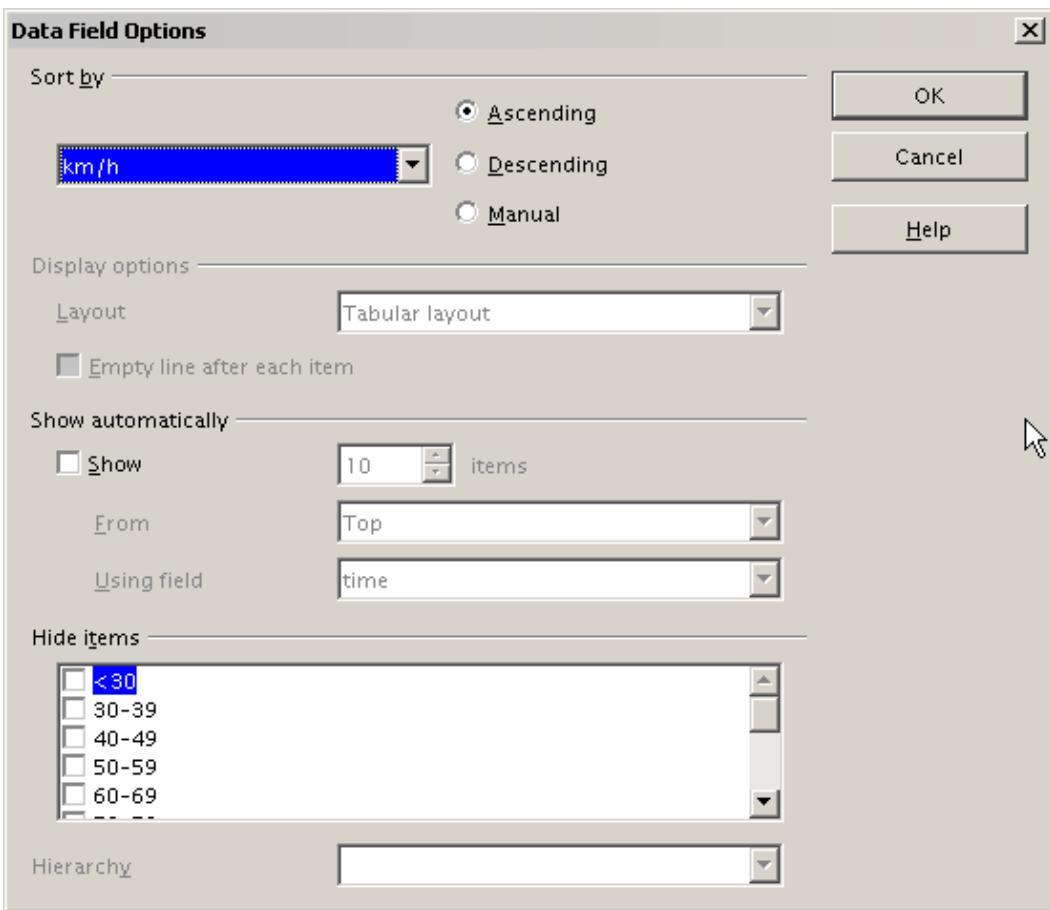


Figure 221: Options for a row or column field

For **Sort by** choose either *Ascending* or *Descending*. On the left side is a drop-down list where you can choose the field this setting should apply to. With this method you can specify that sorting does not happen according to the categories but according to the results of the data field.

Drilling (showing details)

Drill allows you to show the related detailed data for a single, compressed value in the DataPilot result. To activate a drill, double-click on the cell or choose **Data → Group and Outline → Show Details**. You have to distinguish two cases:

- 1) The active cell is the category of a row or column field.

In this case drill means an additional breakdown into the categories of another field.

For example, double-click on the cell with the value *golfing* in the row field **region**. In this case the values that are aggregated in the category *golfing* are subdivided according to another field.

Sum - sales	region	east	north	south	west	Total Result
category						
golfing		\$41,971.00	\$18,741.00	\$56,257.00	\$39,245.00	\$156,214.00
sailing		\$22,484.00	\$22,468.00	\$44,801.00	\$20,099.00	\$109,852.00
tennis		\$35,966.00	\$34,533.00	\$34,258.00	\$37,942.00	\$142,699.00
Total Result		\$100,421.00	\$75,742.00	\$135,316.00	\$97,286.00	\$408,765.00

Figure 222: Before the drill down for the category *golfing*

Since there are more possibilities for subdivision, a dialog appears so you can choose your setting.

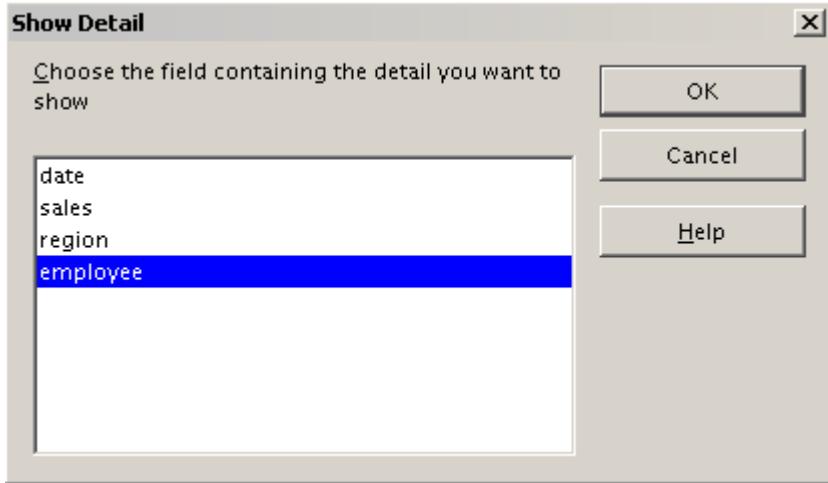


Figure 223: Selecting the field for the subdivision

Sum - sales	region	east	north	south	west	Total Result
category	employee					
golfing	Brigitte	\$5,822.00	\$3,814.00	\$5,151.00	\$12,174.00	\$26,961.00
	Fritz	\$15,172.00	\$3,443.00	\$23,290.00	\$4,934.00	\$46,839.00
	Hans	\$5,316.00	\$3,049.00	\$4,196.00	\$5,380.00	\$17,941.00
	Kurt	\$9,707.00	\$2,214.00	\$11,681.00	\$4,744.00	\$28,346.00
	Ute	\$5,954.00	\$6,221.00	\$11,939.00	\$12,013.00	\$36,127.00
sailing		\$22,484.00	\$22,468.00	\$44,801.00	\$20,099.00	\$109,852.00
tennis		\$35,966.00	\$34,533.00	\$34,258.00	\$37,942.00	\$142,699.00
Total Result		\$100,421.00	\$75,742.00	\$135,316.00	\$97,286.00	\$408,765.00

Figure 224: After the drill down

To hide the details again, double-click on the cell **golfing** or choose **Data → Group and Outline → Hide Details**.

The DataPilot remembers your selection (in our example the field **employee**), so that for the next drill down for a category in the field **region** the dialog does not appear. To remove the selection **employee**, open the DataPilot dialog by right-clicking and choosing **Start**, then delete the unwanted selection in the row or column field.

- 2) The active cell is a value of the data field.

In this case drill down means a listing of all data entries of the data source that aggregates to this value.

Double-click on the cell with the value \$18,741 from Figure 191. You now have a new list of all data sets that are included in this value. This list is shown in a new sheet.

A1	A	B	C	D	E
1	date	sales	category	region	employee
2	2/6/08	\$3,443.00	golfing	north	Fritz
3	3/18/08	\$3,814.00	golfing	north	Brigitte
4	1/17/08	\$4,842.00	golfing	north	Ute
5	6/28/08	\$3,049.00	golfing	north	Hans
6	3/6/08	\$1,379.00	golfing	north	Ute
7	5/30/08	\$2,214.00	golfing	north	Kurt
8					

Figure 225: New table sheet after the drilldown for a value in a data field

Filtering

To limit the DataPilot analysis to a subset of the information that is contained in the data basis, you can filter with the DataPilot.

Note

An Autofilter or default filter used on the sheet has no effect on the DataPilot analysis process. The DataPilot always uses the complete list that was selected when it was started.

To do this, click **Filter** on the top left side above the results.

	A	B	C	D	E	F	G
1	Filter						
2							
3	Sum - sales	employee ▾					
4	region ▾	Brigitte	Fritz	Hans	Kurt	Ute	Total Result
5	east	\$12,829.00	\$33,357.00	\$18,445.00	\$18,599.00	\$17,191.00	\$100,421.00
6	north	\$17,950.00	\$15,256.00	\$11,418.00	\$16,198.00	\$14,920.00	\$75,742.00
7	south	\$9,583.00	\$43,737.00	\$17,317.00	\$33,710.00	\$30,969.00	\$135,316.00
8	west	\$28,742.00	\$13,103.00	\$15,288.00	\$8,328.00	\$31,825.00	\$97,286.00
9	Total Result	\$69,104.00	\$105,453.00	\$62,468.00	\$76,835.00	\$94,905.00	\$408,765.00

Figure 226: Filter field in the upper left area of the DataPilot

In the Filter dialog, you can define up to 3 filter options that are used in the same way as Calc's default filter.

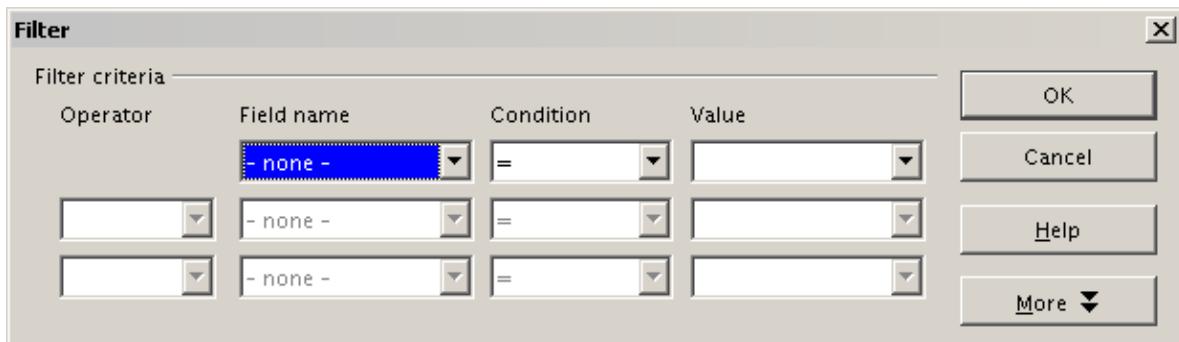


Figure 227: Dialog for defining the filter

Note

Even if they are not called a filter, page fields are a practical way to filter the results. The advantage is that the filtering criteria used are clearly visible.

Updating (refreshing) changed values

After you have created the DataPilot, changes in the source data do not cause an automatic update in the resulting table. You have to always update (refresh) the DataPilot manually after changing any of the underlying data values.

Changes in the source data could appear in two ways:

- 1) The content of existing data sets has been changed.
For example, you might have changed a sales value afterward. To update the DataPilot, right-click in the result area and choose **Refresh** (or choose **Data → DataPilot → Refresh** from the menu bar).
- 2) You have added or deleted data sets in the original list.

In this case the change means that the DataPilot has to use a different area of the spreadsheet for its analysis. A change of the data reference for an existing DataPilot is not possible. You must redo the DataPilot from the beginning.

Cell formatting

The cells in the results area of the DataPilot are automatically formatted in a simple format by Calc. You can change this formatting using all the tools in Calc, but note that if you make any change in the design of the DataPilot or any updates, the formatting will return to the format applied automatically by Calc.

For the number format in the data field, Calc uses the number format that is used in the corresponding cell in the source list. In most cases, this is useful (for example, if the values are in the currency format, then the corresponding cell in the result area is also formatted as currency). However, if the result is a fraction or a percentage, the DataPilot does not recognize that this might be a problem; such results must either be without a unit or be displayed as a percentage. Although you can correct the number format manually, the correction stays in effect only until the next update.

Multiple data fields

Until now we have assumed that the layout of the DataPilot contains only one data field. However, it is possible to have several data fields in the middle of the layout. This makes summaries and analyses of multiple aspects possible.

You could, for example, list all the sales values per day and additionally give the number of entries per day. To do this, put both the **sales** field and the **date** field into the *Data Fields* area. For the **date** field, choose the Count option for the aggregate function (see Figure 190).

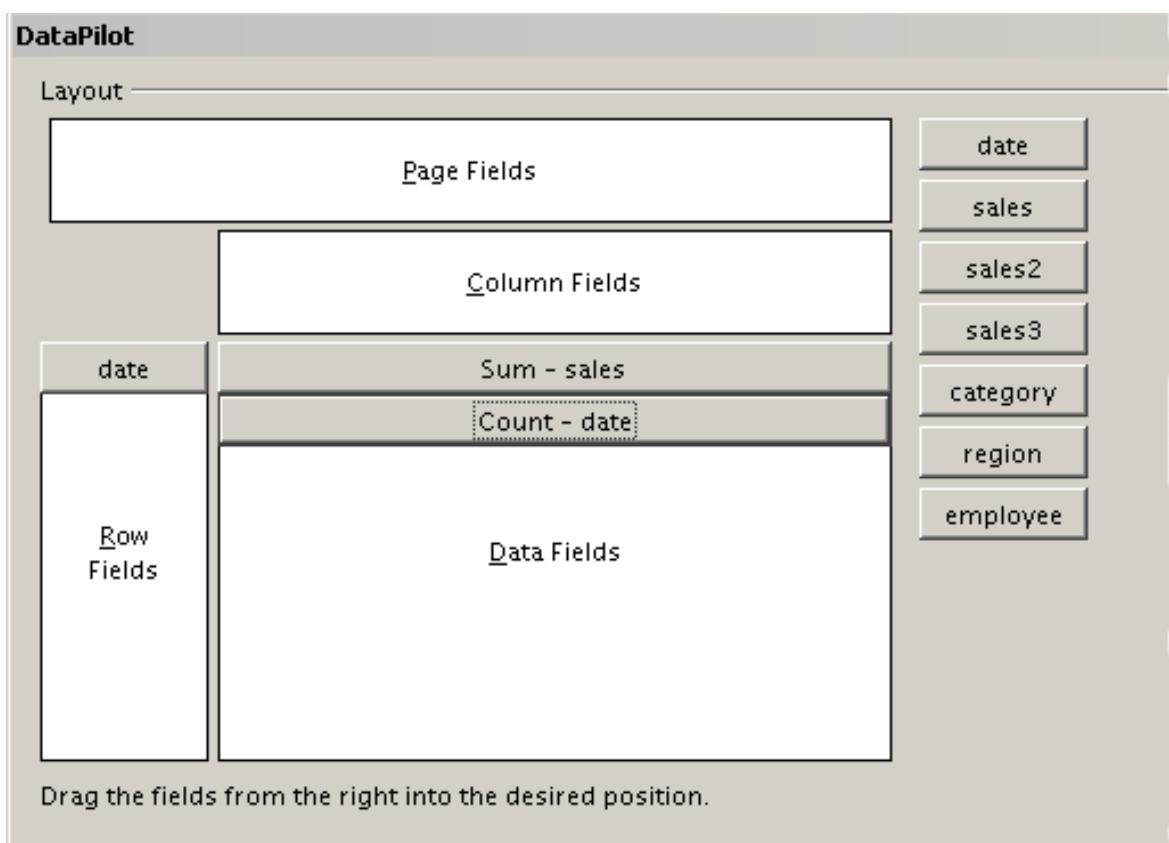


Figure 228: Multiple data fields in the DataPilot

Since every entry has a specific date, this field will give you the number of entries for each date. If you group the values per month, you get an overview with the sales value and the number of closed sales for each category and month (see Figure 186).

		category				
date	Data	golfing	sailing	tennis	Total Result	
Jan	Sum - sales	\$26,180.00	\$13,979.00	\$39,206.00	\$79,365.00	
	Count - date	9	8	13	30	
Feb	Sum - sales	\$30,444.00	\$15,625.00	\$23,710.00	\$69,779.00	
	Count - date	11	8	10	29	
Mar	Sum - sales	\$31,714.00	\$17,409.00	\$12,097.00	\$61,220.00	
	Count - date	10	7	5	22	
Apr	Sum - sales	\$24,747.00	\$19,769.00	\$31,918.00	\$76,434.00	
	Count - date	8	8	9	25	
May	Sum - sales	\$24,686.00	\$21,799.00	\$11,439.00	\$57,924.00	
	Count - date	11	9	6	26	
Jun	Sum - sales	\$18,443.00	\$21,271.00	\$24,329.00	\$64,043.00	
	Count - date	8	7	9	24	
Total Sum - sales		156214	109852	142699	408765	
Total Count - date		57	47	52	156	

Figure 229: DataPilot shows sales value and number of entries

When using multiple data fields, the DataPilot result area contains a field called Data to allow for manipulating the existing data fields. You can move this field just like any other row or column field by using drag and drop. This is an easy way to achieve different structures for the results (Figures 185 and 182; drag and drop the Data field onto the date field label, or onto the category field label).

		category				
Data	date	golfing	sailing	tennis	Total Result	
Sum - sales	Jan	\$26,180.00	\$13,979.00	\$39,206.00	\$79,365.00	
	Feb	\$30,444.00	\$15,625.00	\$23,710.00	\$69,779.00	
	Mar	\$31,714.00	\$17,409.00	\$12,097.00	\$61,220.00	
	Apr	\$24,747.00	\$19,769.00	\$31,918.00	\$76,434.00	
	May	\$24,686.00	\$21,799.00	\$11,439.00	\$57,924.00	
	Jun	\$18,443.00	\$21,271.00	\$24,329.00	\$64,043.00	
Count - date	Jan	9	8	13	30	
	Feb	11	8	10	29	
	Mar	10	7	5	22	
	Apr	8	8	9	25	
	May	11	9	6	26	
	Jun	8	7	9	24	
Total Sum - sales		\$156,214.00	\$109,852.00	\$142,699.00	\$408,765.00	
Total Count - date		57	47	52	156	

Figure 230: Layout option for presenting the sums and numbers of the sales values

	category	Data							
	golfing		sailing		tennis		Total Sum - sales	Total Count - date	
date	Sum - sales	Count - date	Sum - sales	Count - date	Sum - sales	Count - date			
Jan	\$26,180.00	9	\$13,979.00	8	\$39,206.00	13	\$79,365.00	30	
Feb	\$30,444.00	11	\$15,625.00	8	\$23,710.00	10	\$69,779.00	29	
Mar	\$31,714.00	10	\$17,409.00	7	\$12,097.00	5	\$61,220.00	22	
Apr	\$24,747.00	8	\$19,769.00	8	\$31,918.00	9	\$76,434.00	25	
May	\$24,686.00	11	\$21,799.00	9	\$11,439.00	6	\$57,924.00	26	
Jun	\$18,443.00	8	\$21,271.00	7	\$24,329.00	9	\$64,043.00	24	
Total Result	\$156,214.00	57	\$109,852.00	47	\$142,699.00	52	\$408,765.00	156	

Figure 231: Another layout option for presenting the sums and numbers of the sales values

If you want to put the different data fields in different columns and your DataPilot does not contain another column field or you sort the different data fields in different rows and don't have another row field, then it is useful to disable the view of the row or column sums. Just drag the category field label up to the Filter area.

	Data				
date	Sum - sales	Count - date	Total Sum - sales	Total Count - date	
Jan	\$79,365.00	30	\$79,365.00	30	
Feb	\$69,779.00	29	\$69,779.00	29	
Mar	\$61,220.00	22	\$61,220.00	22	
Apr	\$76,434.00	25	\$76,434.00	25	
May	\$57,924.00	26	\$57,924.00	26	
Jun	\$64,043.00	24	\$64,043.00	24	
Total Result	\$408,765.00	156	\$408,765.00	156	

Figure 232: Unnecessary columns

Filter		
region	- all -	
category	- all -	
employee	- all -	
date	Data	
Jan	Sum - sales value	79,365 €
	Count - date	30
Feb	Sum - sales value	69,779 €
	Count - date	29
Mar	Sum - sales value	61,220 €
	Count - date	22
Apr	Sum - sales value	76,434 €
	Count - date	25
May	Sum - sales value	57,924 €
	Count - date	26
Jun	Sum - sales value	64,043 €
	Count - date	24
Total Sum - sales value		408765
Total Count - date		156

Figure 233: Disabled column sums

A frequent use case for multiple data fields is the aggregation of one value according to different aggregate functions at the same time. You can create a DataPilot that shows you the monthly sales values and shows you additionally the smallest and the largest amounts.

	Data			
date	Sum - sales	Min - sales2	Max - sales3	
Jan	\$79,365.00	\$155.00	\$4,872.00	
Feb	\$69,779.00	\$204.00	\$4,893.00	
Mar	\$61,220.00	\$669.00	\$4,881.00	
Apr	\$76,434.00	\$498.00	\$4,873.00	
May	\$57,924.00	\$112.00	\$4,655.00	
Jun	\$64,043.00	\$454.00	\$4,839.00	
Total Result	\$408,765.00	\$112.00	\$4,893.00	

Figure 234: Multiple analyses for the same data field

Unfortunately, Calc does not allow you to use the same data field multiple times. For such multiple analyses you have to duplicate the respective column in the source. This column is then available within the DataPilot; it just happens to have identical values (but the three columns are referenced in the example as sales, sales2 and sales3).

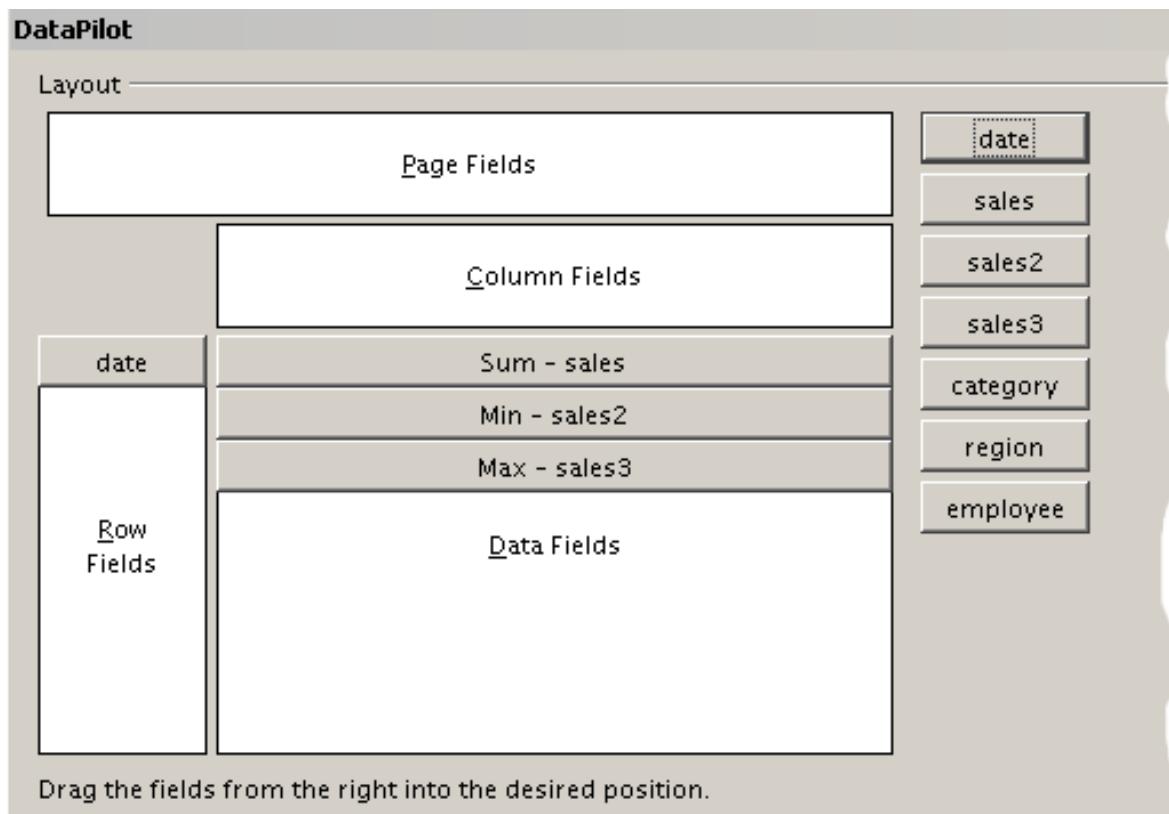


Figure 235: Multiple identical fields for sales value, that have been created as duplicates within your source.

Shortcuts

If you use the DataPilot very often, you might find the frequent use of the menu paths (**Data** → **DataPilot** → **Start** and **Data** → **Group and Outline** → **Group**) inconvenient.

For grouping, a shortcut is already defined: **F12**. For starting the DataPilot, you can define your own keyboard shortcut. If you prefer to have toolbar icons instead of keyboard shortcuts, you can create a user-defined symbol and add it to either your own custom made toolbar or the Standard toolbar.

For an explanation how to create keyboard shortcuts or add icons to toolbars, see Chapter 14, Setting Up and Customizing Calc.

Function GETPIVOTDATA

The function **GETPIVOTDATA** can be used with formulas in Calc if you want to reuse the results from the DataPilot elsewhere in your spreadsheet.

Difficulty

Normally you create a reference to a value by entering the address of the cell that contains the value. For example, the formula **=C6*2** creates a reference to cell **C6** and returns the doubled value.

If this cell is located in the results area of the DataPilot, it contains the result that was calculated by referencing specific categories of the row and column fields. In Figure 166, the cell **C6** contains the sum of the sales values of the employee Hans in the category Sailing. The formula in the cell **C12** uses this value.

The screenshot shows a Microsoft Excel spreadsheet with a DataPilot table. The formula bar at the top displays the formula `=C6*2`. The DataPilot table has columns for employee, category, and Total Result. The cell C12 contains the value `$28,120.00`.

	A	B	C	D	E
1	Filter				
2					
3	Sum - sales	category			
4	employee	golfing	sailing	tennis	Total Result
5	Brigitte	\$26,961.00	\$24,422.00	\$17,721.00	\$69,104.00
6	Hans	\$17,941.00	\$14,060.00	\$30,467.00	\$62,468.00
7	Kurt	\$28,346.00	\$20,814.00	\$27,675.00	\$76,835.00
8	Ute	\$36,127.00	\$30,580.00	\$28,198.00	\$94,905.00
9	Total Result	\$109,375.00	\$89,876.00	\$104,061.00	\$303,312.00
10					
11					
12				\$28,120.00	

Figure 236: Formula reference to a cell of the DataPilot

If the underlying data or the layout of the DataPilot changes, then you must take into account that the sales value for Hans might appear in a different cell. Your formula still references the cell **C6** and therefore uses a wrong value. The correct value is in a different location. For example, in Figure 168, the location is now **C7**.

The screenshot shows a Microsoft Excel spreadsheet with a DataPilot table. The formula bar at the top displays the formula `=C6*2`. The DataPilot table has columns for employee, category, and Total Result. The cell C12 contains the value `$39,952.00`.

	A	B	C	D	E
1	Filter				
2					
3	Sum - sales	category			
4	employee	golfing	sailing	tennis	Total Result
5	Brigitte	\$26,961.00	\$24,422.00	\$17,721.00	\$69,104.00
6	Fritz	\$46,839.00	\$19,976.00	\$38,638.00	\$105,453.00
7	Hans	\$17,941.00	\$14,060.00	\$30,467.00	\$62,468.00
8	Kurt	\$28,346.00	\$20,814.00	\$27,675.00	\$76,835.00
9	Ute	\$36,127.00	\$30,580.00	\$28,198.00	\$94,905.00
10	Total Result	\$156,214.00	\$109,852.00	\$142,699.00	\$408,765.00
11					
12				\$39,952.00	

Figure 237: The value that you really want to use can be found now in a different location.

The function GETPIVOTDATA allows you to have a reference to a value inside the DataPilot by using the specific identifying categories for this value.

Syntax

The syntax has two variations:

```
GETPIVOTDATA(target field, DataPilot; [ Field name / Element; ... ])
GETPIVOTDATA(DataPilot; specification)
```

First syntax variation

The **target field** to specify which data field of the DataPilot is used within the function. If your DataPilot has only one data field, this entry is ignored, but you must enter it anyway.

If your DataPilot has more than one data field, then you have to enter the field name from the underlying data source (for example “sales value”) or the field name of the data field itself (for example “sum – sales value”).

The argument **DataPilot** specifies the DataPilot that you want to use. It is possible that your document contains more than one DataPilot. Enter here a cell reference that is inside the results area of your DataPilot. It might be a good idea to always use the upper left corner cell of your DataPilot, so you can be sure that the cell will always be within your DataPilot even if the layout changes.

Example: **=GETPIVOTDATA("sales value";A1)**

If you enter only the first two arguments, then the function returns the total result of the DataPilot (“Sum – sales value” as the field will return a value of 408,765).

You can add more arguments as pairs with **field name** and **element** to retrieve specific partial sums. In the example in Figure 166, where we want to get the partial sum of Hans for sailing, the formula in cell **C12** would look like this:

=GETPIVOTDATA("sales value";A1;"employee";"Hans";"category";"sailing")

The screenshot shows a LibreOffice Calc spreadsheet. The formula bar at the top displays the formula =GETPIVOTDATA("sales value";A1). Below the formula bar is a DataPilot table with the following data:

	A	B	C	D	E	F	G
1	Filter						
2							
3	Sum - sales	category					
4	employee	golfing	sailing	tennis	Total Result		
5	Brigitte	\$26,961.00	\$24,422.00	\$17,721.00	\$69,104.00		
6	Fritz	\$46,839.00	\$19,976.00	\$38,638.00	\$105,453.00		
7	Hans	\$17,941.00	\$14,060.00	\$30,467.00	\$62,468.00		
8	Kurt	\$28,346.00	\$20,814.00	\$27,675.00	\$76,835.00		
9	Ute	\$36,127.00	\$30,580.00	\$28,198.00	\$94,905.00		
10	Total Result	\$156,214.00	\$109,852.00	\$142,699.00	\$408,765.00		
11							
12			14060				

Figure 238: First syntax variation

Second syntax variation

The argument **DataPilot** has to be given in the same way as for the first syntax variation.

For the **specifications**, enter a list separated by spaces to specify the value you want from the DataPilot. This list must contain the name of the data field, if there is more than one data field, otherwise it is not required. To select a specific partial result, add more entries in the form of **Field name[element]**.

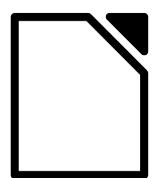
In the example in Figure 166, where we want to get the partial sum of Hans for Sailing, the formula in cell **C12** would look like this:

=GETPIVOTDATA(A1;"sales value employee[Hans] category[sailing]")

C12 ▾ = GETPIVOTDATA(A1;"sales employee[Hans] category[sailing]")

	A	B	C	D	E	F	G
1	Filter						
2							
3	Sum - sales	category					
4	employee	golfing	sailing	tennis	Total Result		
5	Brigitte	\$26,961.00	\$24,422.00	\$17,721.00	\$69,104.00		
6	Fritz	\$46,839.00	\$19,976.00	\$38,638.00	\$105,453.00		
7	Hans	\$17,941.00	\$14,060.00	\$30,467.00	\$62,468.00		
8	Kurt	\$28,346.00	\$20,814.00	\$27,675.00	\$76,835.00		
9	Ute	\$36,127.00	\$30,580.00	\$28,198.00	\$94,905.00		
10	Total Result	\$156,214.00	\$109,852.00	\$142,699.00	\$408,765.00		
11							
12			14060				

Figure 239: Second syntax variation



LibreOffice
The Document Foundation

Chapter 9

Data Analysis

Using Scenarios, Goal Seek, Solver, others

Introduction

Once you are familiar with functions and formulas, the next step is to learn how to use Calc's automated processes to quickly perform useful analysis of your data.

Calc includes several tools to help you manipulate the information in your spreadsheets, ranging from features for copying and reusing data, to creating subtotals automatically, to varying information to help you find the answers you need. These tools are divided between the Tools and Data menus.

If you are a newcomer to spreadsheets, these tools can be overwhelming at first. However, they become simpler if you remember that they all depend on input from either a cell or a range of cells that contain the data with which you are working.

You can always enter the cells or range manually, but in many cases it is easier to select the cells with the mouse. Click the Shrink/Maximize icon beside a field to temporarily reduce the size of the tool's window, so you can see the spreadsheet underneath and select the cells required.

Sometimes, you may have to experiment to find out which data goes into which field, but then you can set a selection of options, many of which can be ignored in any given case. Just keep the basic purpose of each tool in mind, and you should have little trouble with Calc's function tools.

You don't need to learn them, especially if your spreadsheet use is simple, but as your manipulation of data becomes more sophisticated, they can save time in making calculations, especially as you start to deal with hypothetical situations. Just as importantly, they can allow you to preserve your work and to share it with other people—or yourself at a later session.

One function tool not mentioned here are DataPilots (also known as *pivot tables*), but they are a topic that is sufficiently complex that it requires a separate chapter. (See Chapter 8.)

Consolidating data

Data → Consolidate provides a way to combine data from two or more ranges of cells into a new range while running one of several functions (such as Sum or Average) on the data. During consolidation, the contents of cells from several sheets can be combined into one place. The effect is that copies of the identified ranges are stacked with their top left corners at the specified result position, and the selected operation is used in each cell to calculate the result value.

- 1) Open the document containing the cell ranges to be consolidated.
- 2) Choose **Data → Consolidate** to open the Consolidate dialog. Figure 240 shows this dialog after making the changes described below.
- 3) The **Source data range** list contains any existing named ranges (created using **Data → Define Range**) so you can quickly select one to consolidate with other areas.
- 4) If the source range is not named, click in the field to the right of the drop-down list and either type a reference for the first source data range or use the mouse to select the range on the sheet. (You may need to move the Consolidate dialog or click on the Shrink icon to reach the required cells.)
- 5) Click **Add**. The selected range is added to the Consolidation ranges list.
- 6) Select additional ranges and click **Add** after each selection.
- 7) Specify where you want to display the result by selecting a target range from the **Copy results to** drop-down list.
- 8) If the target range is not named, click in the field next to **Copy results to** and enter the reference of the target range or select the range using the mouse or position the cursor in the top left cell of the target range. *Copy results to* takes only the first cell of the target range instead of the entire range as is the case for *Source data range*.

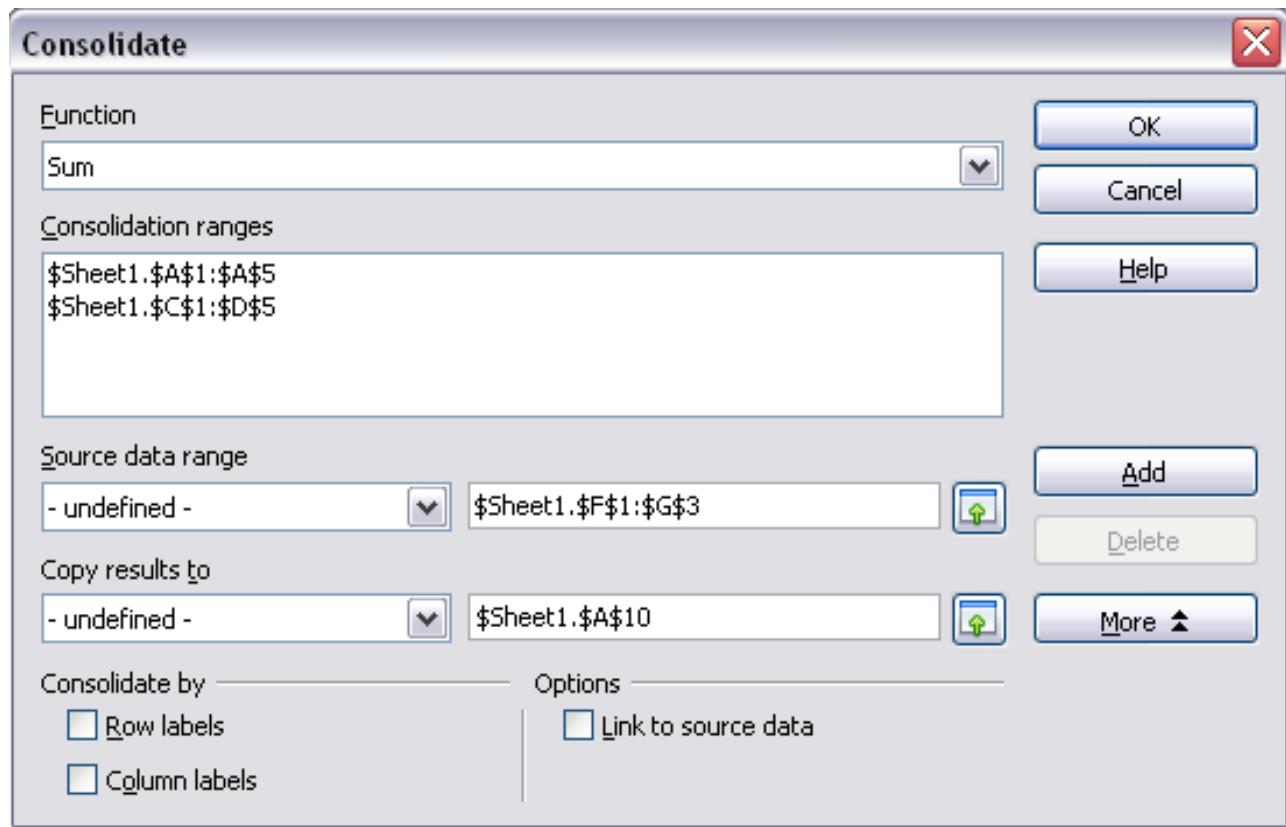


Figure 240: Defining the data to be consolidated

- 9) Select a function from the Function list. This specifies how the values of the consolidation ranges will be calculated. The default setting is Sum, which adds the corresponding cell values of the Source data range and gives the result in the target range.
Most of the available functions are statistical (such as Average, Min, Max, Stdev), and the tool is most useful when you are working with the same data over and over.
- 10) At this point you can click **More** in the Consolidate dialog to access the following additional settings:
 - Select **Link to source data** to insert the formulas that generate the results into the target range, rather than the actual results. If you link the data, any values modified in the source range are automatically updated in the target range.

Caution



The corresponding cell references in the target range are inserted in consecutive rows, which are automatically ordered and then hidden from view. Only the final result, based on the selected function, is displayed.

- Under **Consolidate by**, select either *Row labels* or *Column labels* if the cells of the source data range are not to be consolidated corresponding to the identical position of the cell in the range, but instead according to a matching row label or column label. To consolidate by row labels or column labels, the label must be contained in the selected source ranges. The text in the labels must be identical, so that rows or columns can be accurately matched. If the row or column label of one source data range does not match any that exist in other source data ranges, it is added to the target range as a new row or column.

- 11) Click **OK** to consolidate the ranges.
- 12) If you are continually working with the same range, then you probably want to use **Data → Define Range** to give it a name.

The consolidation ranges and target range are saved as part of the document. If you later open a document in which consolidation has been defined, this data is still available.

Creating subtotals

SUBTOTAL is a function listed under the Mathematical category when you use the Function Wizard (**Insert → Function**). Because of its usefulness, the function has a graphical interface accessible from **Data → Subtotals**.

As the name suggests, SUBTOTAL totals data arranged in an array—that is, a group of cells with labels for columns. Using the Subtotals dialog, you can select up to three arrays, then choose a statistical function to apply to them. When you click **OK**, Calc adds subtotal and grand total rows to the selected arrays, using the Result and Result2 cell styles to differentiate those entries. By default, matching items throughout your array will be gathered together as a single group above a subtotal.

To insert subtotal values into a sheet:

- 1) Ensure that the columns have labels.
- 2) Select the range of cells that you want to calculate subtotals for, and then choose **Data → Subtotals**.
- 3) In the Subtotals dialog (Figure 241), in the **Group by** list, select the column by which the subtotals need to be grouped. A subtotal will be calculated for each distinct value in this column.

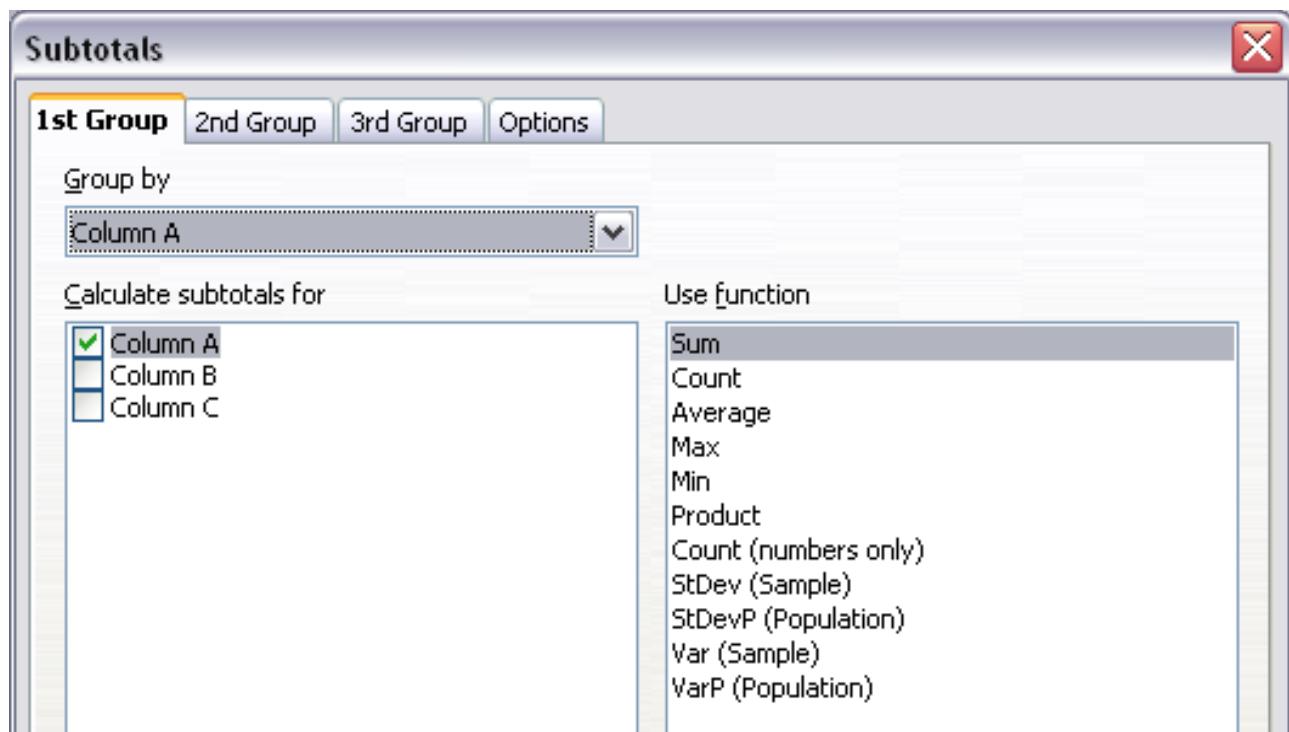


Figure 241: Setting up subtotals

- 4) In the **Calculate subtotals for** box, select the columns containing the values that you want to create subtotals for. If the contents of the selected columns change later, the subtotals are automatically recalculated.
- 5) In the **Use function** box, select the function that you want to use to calculate the subtotals.
- 6) Click **OK**.

If you use more than one group, then you can also arrange the subtotals according to choices made on the dialog's *Options* page (Figure 242), including ascending and descending order or using one of the predefined custom sorts defined in **Tools → Options → LibreOffice Calc → Sort Lists**.

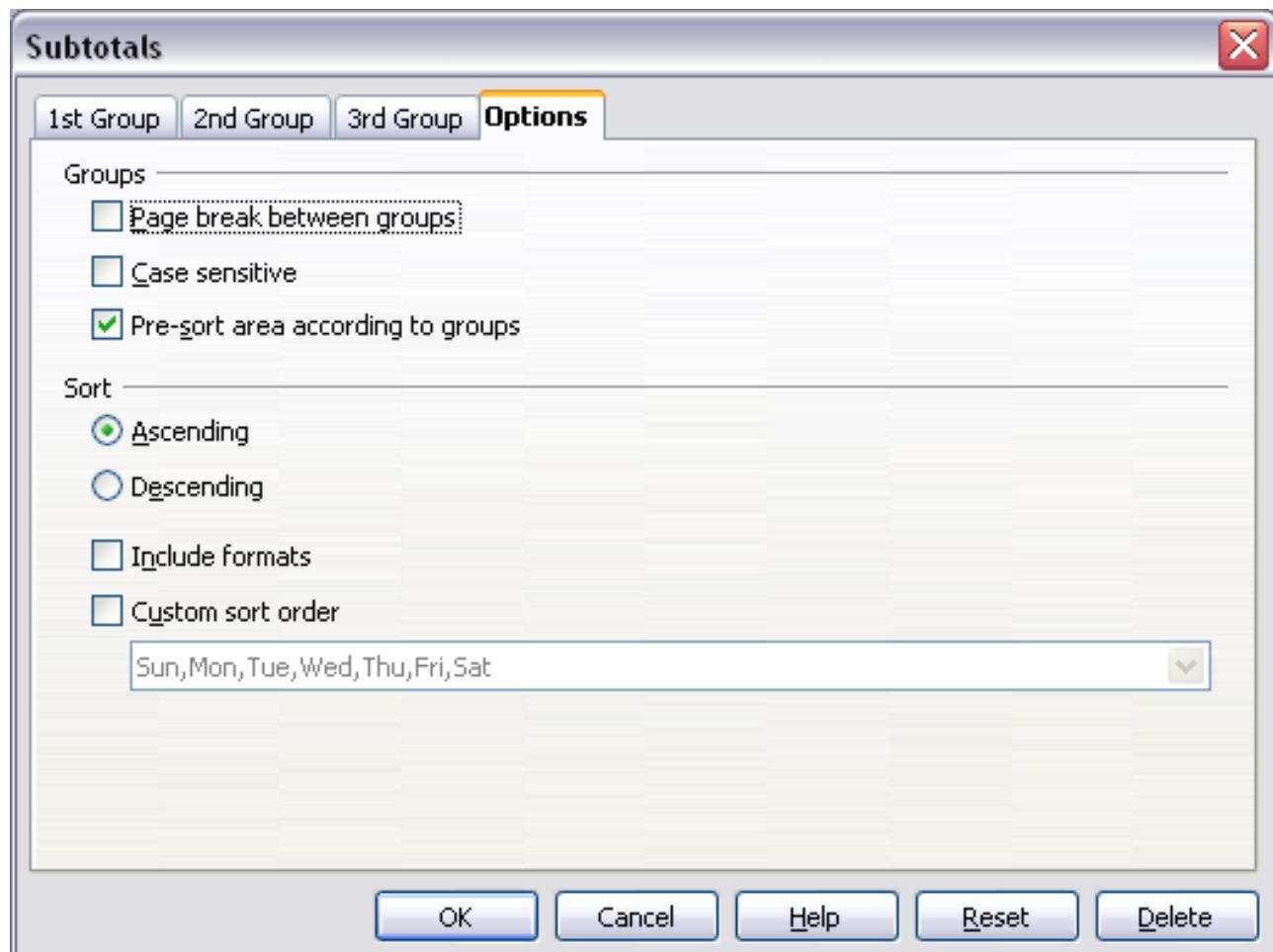


Figure 242: Choosing options for subtotals

Using “what if” scenarios

Scenarios are a tool to test “what-if” questions. Each scenario is named, and can be edited and formatted separately. When you print the spreadsheet, only the contents of the currently active scenario are printed.

A scenario is essentially a saved set of cell values for your calculations. You can easily switch between these sets using the Navigator or a drop-down list which can be shown beside the changing cells. For example, if you wanted to calculate the effect of different interest rates on an investment, you could add a scenario for each interest rate, and quickly view the results. Formulas that rely on the values changed by your scenario are updated when the scenario is opened. If all your sources of income used scenarios, you could efficiently build a complex model of your possible income.

Creating scenarios

Tools → Scenarios opens a dialog with options for creating a scenario.

To create a new scenario:

- 1) Select the cells that contain the values that will change between scenarios. To select multiple ranges, hold down the *Ctrl* key as you click. You must select at least two cells.
- 2) Choose **Tools → Scenarios**.
- 3) On the Create Scenario dialog (Figure 243), enter a name for the new scenario. It's best to use a name that clearly identifies the scenario, not the default name as shown in the illustration. This name is displayed in the Navigator and in the title bar of the border around the scenario on the sheet itself.

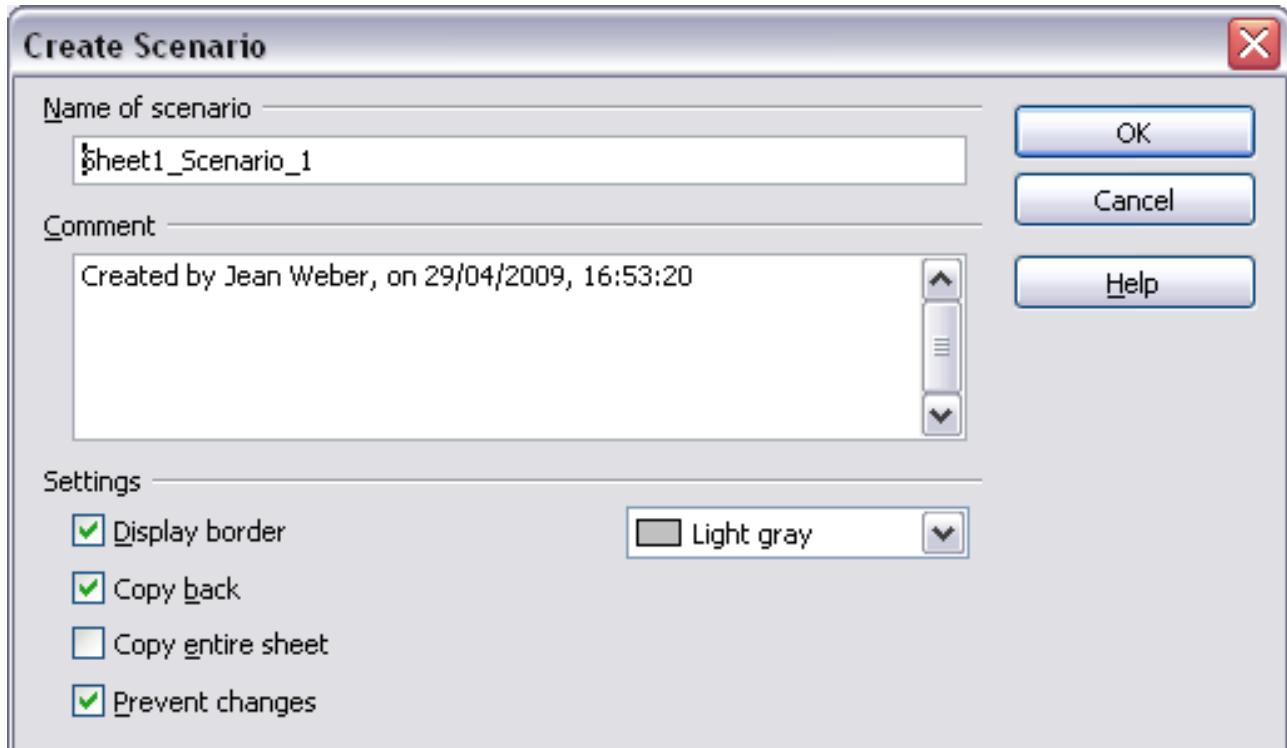


Figure 243: Creating a scenario

- 4) Optionally add some information to the **Comment** box. The example shows the default comment. This information is displayed in the Navigator when you click the Scenarios icon and select the desired scenario.
- 5) Optionally select or deselect the options in the **Settings** section. See page 238 for more information about these options.
- 6) Click **OK** to close the dialog. The new scenario is automatically activated.

You can create several scenarios for any given range of cells.

Settings

The lower portion of the Create Scenario dialog contains several options. The default settings (as shown in Figure 243) are likely to be suitable in most situations.

Display border

Places a border around the range of cells that your scenario alters. To choose the color of the border, use the field to the right of this option. The border has a title bar displaying the name of the active scenario. Click the arrow button to the right of the scenario name to open a drop-down list of all the scenarios that have been defined for the cells within the border. You can choose any of the scenarios from this list at any time.

Copy back

Copies any changes you make to the values of scenario cells back into the active scenario. If you do not select this option, the saved scenario values are never changed when you make changes. The actual behavior of the **Copy back** setting depends on the cell protection, the sheet protection, and the **Prevent changes** setting (see Table 11 on page 239).

Caution



If you are viewing a scenario which has **Copy back** enabled and then create a new scenario by changing the values and selecting **Tools** → **Scenarios**, you also inadvertently overwrite the values in the first scenario.

This is easily avoided if you leave the current values alone, create a new scenario with **Copy back** enabled, and then change the values only when you are viewing the new scenario.

Copy entire sheet

Adds to your document a sheet that permanently displays the new scenario in full. This is in addition to creating the scenario and making it selectable on the original sheet as normal.

Prevent changes

Prevents changes to a **Copy back**-enabled scenario when the sheet is protected but the cells are not. Also prevents changes to the settings described in this section while the sheet is protected. A fuller explanation of the effect this option has in different situations is given below.

Changing scenarios

Scenarios have two aspects that can be altered independently:

- Scenario properties (the settings described above)
- Scenario cell values (the entries within the scenario border)

The extent to which either of these aspects can be changed is dependent upon both the existing properties of the scenario and the current protection state of the sheet and cells.

Changing scenario properties

If the sheet is protected (**Tools** → **Protect Document** → **Sheet**), and **Prevent changes** is selected then scenario properties cannot be changed.

If the sheet is protected, and **Prevent changes** is not selected, then all scenario properties can be changed except **Prevent changes** and **Copy entire sheet**, which are disabled.

If the sheet is not protected, then **Prevent changes** does not have any effect, and all scenario properties can be changed.

Changing scenario cell values

Table 11 summarizes the interaction of various settings in preventing or allowing changes in scenario cell values.

Table 11: Prevent changes behavior for scenario cell value changes

Settings	Change allowed
Sheet protection ON	Scenario cell values cannot be changed.
Scenario cell protection OFF	
Prevent changes ON	
Copy back ON	

Settings	Change allowed
Sheet protection ON	Scenario cell values can be changed, and the scenario is updated.
Scenario cell protection OFF	
Prevent changes OFF	
Copy back ON	
Sheet protection ON	Scenario cell values can be changed, but the scenario is not updated due to the Copy back setting.
Scenario cell protection OFF	
Prevent changes ON or OFF	
Copy back OFF	
Sheet protection ON	Scenario cell values cannot be changed.
Scenario cell protection ON	
Prevent changes ANY SETTING	
Copy back ANY SETTING	
Sheet protection OFF	Scenario cell values can be changed and the scenario is updated or not, depending on the Copy back setting.
Scenario cell protection ANY SETTING	
Prevent changes ANY SETTING	
Copy back ANY SETTING	

Working with scenarios using the Navigator

After scenarios are added to a spreadsheet, you can jump to a particular scenario by selecting it from the list in the Navigator.

Click the **Scenarios** icon in the Navigator (see Figure 244). The defined scenarios are listed, along with the comments that were entered when the scenarios were created.

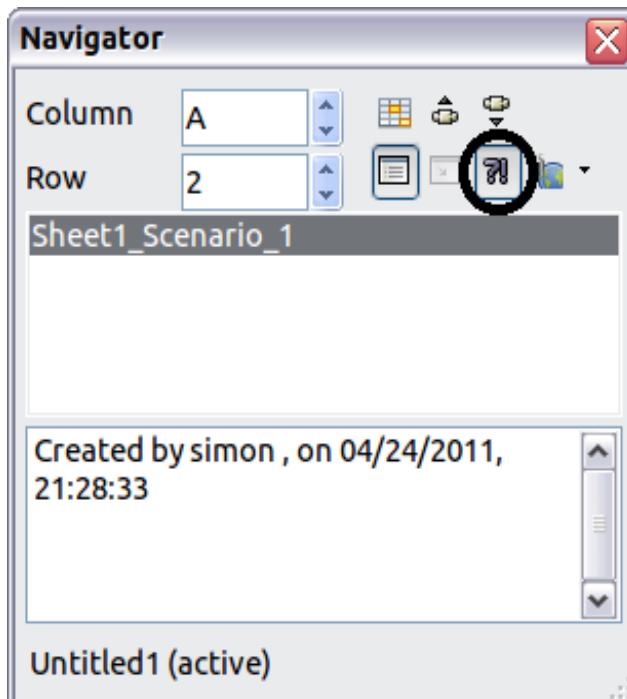


Figure 244: Scenarios in the Navigator

To apply a scenario to the current sheet, double-click the scenario name in the Navigator.

To delete a scenario, right-click the name in the Navigator and choose **Delete**.

To edit a scenario, including its name and comments, right-click the name in the Navigator and choose **Properties**. The Edit Properties dialog is the same as the Create Scenario dialog (Figure 243).

Tracking values in scenarios

To learn which values in the scenario affect other values, choose **Tools** → **Detective** → **Trace Dependents**. Arrows point to the cells that are directly dependent on the current cell.

Using other “what if” tools

Like scenarios, **Data** → **Multiple Operations** is a planning tool for “what if” questions. Unlike a scenario, the Multiple Operations tool does not present the alternate versions in the same cells or with a drop-down list. Instead, the Multiple Operations tool creates a formula array: a separate set of cells showing the results of applying the formula to a list of alternative values for the variables used by the formula. Although this tool is not listed among the functions, it is really a function that acts on other functions, allowing you to calculate different results without having to enter and run them separately.

To use the Multiple Operations tool, you need two arrays of cells. The first array contains the original or default values and the formulas applied to them. The formulas must be in a range.

The second array is the formula array. It is created by entering a list of alternative values for one or two of the original values.

Once the alternative values are created, you use the Multiple Operations tool to specify which formulas you are using, as well as the original values used by the formulas. The second array is then filled with the results of using each alternative value in place of the original values.

The Multiple Operations tool can use any number of formulas, but only one or two variables. With one variable, the formula array of alternative values for the variables will be in a single column or row. With two variables, you should outline a table of cells such that the alternative values for one variable are arranged as column headings, and the alternative values for the other variable act as row headings.

Setting up multiple operations can be confusing at first. For example, when using two variables, you need to select them carefully, so that they form a meaningful table. Not every pair of variables is useful to add to the same formula array. Yet, even when working with a single variable, a new user can easily make mistakes or forget the relationships between cells in the original array and cells in the formula array. In these situations, **Tools** → **Detective** can help to clarify the relations.

You can also make formula arrays easier to work with if you apply some simple design logic. Place the original and the formula array close together on the same sheet, and use labels for the rows and columns in both. These small exercises in organizational design make working with the formula array much less painful, particularly when you are correcting mistakes or adjusting results.

Note

If you export a spreadsheet containing multiple operations to Microsoft Excel, the location of the cells containing the formula must be fully defined relative to the data range.

Multiple operations in columns or rows

In your spreadsheet, enter a formula to calculate a result from values that are stored in other cells. Then, set up a cell range containing a list of alternatives for one of the values used in the formula. The **Multiple Operations** command produces a list of results adjacent to your alternative values by running the formula against each of these alternatives.

Note

Before you choose the **Data → Multiple Operations** option, be sure to select not only your list of alternative values but also the adjacent cells into which the results should be placed.

In the *Formulas* field of the Multiple Operations dialog, enter the cell reference to the formula that you wish to use.

The arrangement of your alternative values dictates how you should complete the rest of the dialog. If you have listed them in a single column, you should complete the field for *Column input cell*. If they are along a single row, complete the *Row input cell* field. You may also use both in more advanced cases. Both single and double-variable versions are explained below.

The above can be explained best by examples. Cell references correspond to those in the following figures.

Let's say you produce toys that you sell for \$10 each (cell B1). Each toy costs \$2 to make (cell B2), in addition to which you have fixed costs of \$10,000 per year (cell B3). How much profit will you make in a year if you sell a particular number of toys?

Calculating with one formula and one variable

- 1) To calculate the profit, first enter any number as the quantity (items sold); in this example, 2000 (cell B4). The profit is found from the formula *Profit=Quantity * (Selling price – Direct costs) – Fixed costs*. Enter this formula in B5: **=B4*(B1-B2)-B3**.
- 2) In column D enter a variety of alternative annual sales figures, one below the other; for example, 500 to 5000, in steps of 500.
- 3) Select the range D2:E11, and thus the values in column D and the empty cells (which will receive the results of the calculations) alongside in column E.
- 4) Choose **Data → Multiple Operations**.
- 5) With the cursor in the *Formulas* field of the Multiple operations dialog, click cell B5.
- 6) Set the cursor in the *Column input cell* field and click cell B4. This means that B4, the quantity, is the variable in the formula, which is to be replaced by the column of alternative values. Figure 245 shows the worksheet and the Multiple operations dialog.
- 7) Click **OK**. The profits for the different quantities are now shown in column E. See Figure 246.

Tip

You may find it easier to mark the required reference in the sheet if you click the Shrink icon to reduce the Multiple operations dialog to the size of the input field. The icon then changes to the Maximize icon; click it to restore the dialog to its original size.

A screenshot of a spreadsheet application showing a 'Multiple operations' dialog box. The dialog box contains three input fields: 'Formulas' set to '\$B\$5', 'Row input cell' set to an empty cell, and 'Column input cell' set to '\$B\$4'. There are also 'OK', 'Cancel', and 'Help' buttons. The background shows a grid of data from row 1 to 12, columns A to E. Row 4 is highlighted with a blue border.

	A	B	C	D	E
1		10			
2		2		500	
3		10000		1000	
4		2000		1500	
5		6000		2000	
6				2500	
7				3000	
8				3500	
9				4000	
10				4500	
11				5000	
12					

Figure 245: Sheet and Multiple operations dialog showing input

A screenshot of a spreadsheet showing the results of multiple operations calculations. The formula bar displays the formula '=MULTIPLE.OPERATIONS(B\$5;\$B\$4;\$D11)'. The data grid shows columns A through E with values from row 1 to 12. Column E contains calculated values based on the formulas in B5 and B4 across the range D2:D11.

	A	B	C	D	E
1		10			
2		2		500	-6000
3		10000		1000	-2000
4		2000		1500	2000
5		6000		2000	6000
6				2500	10000
7				3000	14000
8				3500	18000
9				4000	22000
10				4500	26000
11				5000	30000
12					

Figure 246: Sheet showing results of multiple operations calculations

Calculating with several formulas simultaneously

- 1) In the sheet from the previous example, delete the contents of column E.
- 2) Enter the following formula in C5: $=B5/B4$. You are now calculating the annual profit per item sold.
- 3) Select the range D2:F11, thus three columns.

- 4) Choose **Data → Multiple Operations**.
- 5) With the cursor in the *Formulas* field of the Multiple operations dialog, select cells B5 and C5.
- 6) Set the cursor in the *Column input cell* field and click cell B4. Figure 247 shows the worksheet and the Multiple operations dialog.

The screenshot shows a Calc spreadsheet with data in rows 1 through 12. Rows 1, 2, 3, 5, 6, 7, 8, 9, 10, and 11 have single values. Row 4 has two values: 2000 in cell B4 and 3 in cell C4. A blue box highlights cell B4. A black box highlights cell F11, which is empty. Below the spreadsheet is the 'Multiple operations' dialog box. In the 'Formulas' field, the range \$B\$5:\$C\$5 is entered. In the 'Row input cell' field, there is no value. In the 'Column input cell' field, the value \$B\$4 is entered. The dialog has 'OK', 'Cancel', and 'Help' buttons.

	A	B	C	D	E	F
1		10				
2		2		500		
3		10000		1000		
4		2000		1500		
5		6000	3	2000		
6				2500		
7				3000		
8				3500		
9				4000		
10				4500		
11				5000		
12						

Figure 247: Sheet and dialog showing input

- 7) Click **OK**. Now the profits are listed in column E and the annual profit per item in column F.

The screenshot shows the same Calc spreadsheet after performing the multiple operations. The formulas in row 4 have been applied across the entire range from B5 to F11. Column E contains the results of the formula =MULTIPLE.OPERATIONS(C\$5;\$B\$4;\$D11), which are the products of the values in columns C and D for each row. Column F contains the annual profit per item, calculated as the product of the values in columns B and C for each row. The formula bar at the top shows =MULTIPLE.OPERATIONS(C\$5;\$B\$4;\$D11).

	A	B	C	D	E	F
1		10				
2		2		500	-6000	-12
3		10000		1000	-2000	-2
4		2000		1500	2000	1.33
5		6000	3	2000	6000	3
6				2500	10000	4
7				3000	14000	4.67
8				3500	18000	5.14
9				4000	22000	5.5
10				4500	26000	5.78
11				5000	30000	6
12						

Figure 248: Results of multiple operations calculations

Multiple operations across rows and columns

You can carry out multiple operations simultaneously for both columns and rows in so-called cross-tables. The formula must use at least two variables, the alternative values for which should be arranged so that one set is along a single row and the other set appears in a single column. These two sets of alternative values will form column and row headings for the results table produced by the Multiple Operations procedure.

Select the range defined by both data ranges (thus including all of the blank cells that are to contain the results) and choose **Data → Multiple operations**. Enter the cell reference to the formula in the *Formulas* field. The *Row input cell* and the *Column input cell* fields are used to enter the reference to the corresponding cells of the formula.

Caution



Beware of entering the cell reference of a variable into the wrong field. The Row input cell field should contain not the cell reference of the variable which changes down the rows of your results table, but that of the variable whose alternative values have been entered along a single row.

Calculating with two variables

You now want to vary not just the quantity produced annually, but also the selling price, and you are interested in the profit in each case.

Expand the table shown in Figure 247. D2 thru D11 already contain the numbers 500, 1000 and so on, up to 5000. In E1 through H1 enter the numbers 8, 10, 15 and 20.

- 1) Select the range D1:H11.
- 2) Choose **Data → Multiple Operations**.

The screenshot shows a Microsoft Excel spreadsheet with data in rows 1 through 11 and columns A through H. The data is as follows:

	A	B	C	D	E	F	G	H
1		10		8	10	15		
2		2		500	-6000	-12		
3		10000		1000	-2000	-2		
4		2000		1500	2000	1.33		
5		6000	3	2000	6000	3		
6				2500	10000	4		
7				3000	14000	4.67		
8				3500	18000	5.14		
9				4000	22000	5.5		
10				4500	26000	5.78		
11				5000	30000	6		

Below the spreadsheet, a 'Multiple operations' dialog box is displayed. It contains the following settings:

- Default settings
- Formulas: \$B\$5
- Row input cell: \$B\$1
- Column input cell: \$B\$4
- Buttons: OK, Cancel, Help

Figure 249: Sheet and dialog showing input

- 3) With the cursor in the *Formulas* field of the Multiple operations dialog, click cell B5 (profit).
- 4) Set the cursor in the *Row input cell* field and click cell B1. This means that B1, the selling price, is the horizontally entered variable (with the values 8, 10, 15 and 20).
- 5) Set the cursor in the *Column input cell* field and click cell B4. This means that B4, the quantity, is the vertically entered variable.
- 6) Click **OK**. The profits for the different selling prices are now shown in the range E2:H11.

	A	B	C	D	E	F	G	H
1		10			8	10	15	20
2		2		500	-7000	-6000	-3500	-1000
3		10000		1000	-4000	-2000	3000	8000
4		2000		1500	-1000	2000	9500	17000
5		6000	3	2000	2000	6000	16000	26000
6				2500	5000	10000	22500	35000
7				3000	8000	14000	29000	44000
8				3500	11000	18000	35500	53000
9				4000	14000	22000	42000	62000
10				4500	17000	26000	48500	71000
11				5000	20000	30000	55000	80000

Figure 250: Results of multiple operations calculations

Working backwards using Goal Seek

Usually, you create a formula to calculate a result based upon existing values. By contrast, using **Tools → Goal Seek** you can discover what values will produce the result that you want.

To take a simple example, imagine that the Chief Financial Officer of a company is developing sales projections for each quarter of the forthcoming year. She knows what the company's total income must be for the year to satisfy stockholders. She also has a good idea of the company's income in the first three quarters, because of the contracts that are already signed. For the fourth quarter, however, no definite income is available. So how much must the company earn in Q4 to reach its goal? The CFO can enter the projected earnings for each of the other three quarters along with a formula that totals all four quarters. Then she runs a goal seek on the empty cell for Q4 sales, and receives her answer.

Other uses of goal seek may be more complicated, but the method remains the same. Only one argument can be altered in a single goal seek.

Goal Seek example

To calculate annual interest (I), create a table with the values for the capital (C), number of years (n), and interest rate (i). The formula is $I = C \cdot n \cdot i$.

Let us assume that the interest rate i of 7.5% and the number of years n (1) will remain constant. However, you want to know how much the investment capital C would have to be modified in order to attain a particular return I . For this example, calculate how much capital C would be required if you want an annual return of \$15,000.

Enter each of the values mentioned above into adjacent cells (for Capital, C , an arbitrary value like \$100,000 or it can be left blank; for number of years, n , 1; for interest rate, i , 7.5%). Enter the formula to calculate the interest, I , in another cell. Instead of C , n , and i , use the reference to the cell with the corresponding value. In our example (Figure 251), this would be =B1*B2*B3.

- 1) Place the cursor in the formula cell (B4), and choose **Tools → Goal Seek**.
- 2) In the Goal Seek dialog, the correct cell is already entered in the *Formula cell* field.
- 3) Place the cursor in the *Variable cell* field. In the sheet, click in the cell that contains the value to be changed, in this example it is B1.
- 4) Enter the desired result of the formula in the *Target value* field. In this example, the value is 15000. Figure 251 shows the cells and fields.

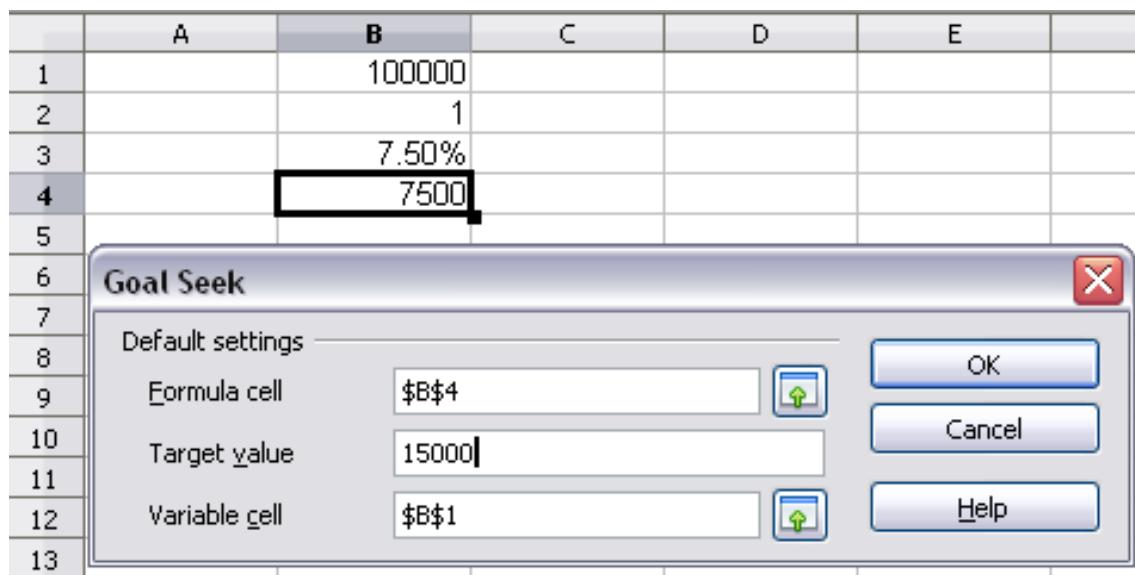


Figure 251: Example setup for goal seek

- 5) Click **OK**. A dialog appears informing you that the Goal Seek was successful. Click **Yes** to enter the goal value into the variable cell. The result is shown below.

B4	A	B	C
		200000	
		1	
		7.50%	
4		15000	
5			

Figure 252: Result of goal seek operation

Using the Solver

Tools → **Solver** amounts to a more elaborate form of Goal Seek. The difference is that the Solver deals with equations with multiple unknown variables. It is specifically designed to minimize or maximize the result according to a set of rules that you define.

Each of these rules defines whether an argument in the formula should be greater than, less than, or equal to the figure you enter. If you want the argument to remain unchanged, you must enter a rule that specifically states that the cell should be equal to its current entry. For arguments that you would like to change, you need to add two rules to define a range of possible values: the limiting conditions. For example, you can set the constraint that one of the variables or cells must not be bigger than another variable, or not bigger than a given value. You can also define the constraint that one or more variables must be integers (values without decimals), or binary values (where only 0 and 1 are allowed).

Once you have finished setting up the rules, click the **Solve** button to begin the automatic process of adjusting values and calculating results. Depending on the complexity of the task, this may take some time.

Solver example

Let's say you have \$10,000 that you want to invest in two mutual funds for one year. Fund X is a low risk fund with 8% interest rate and Fund Y is a higher risk fund with 12% interest rate. How much money should be invested in each fund to earn a total interest of \$1000?

To find the answer using Solver:

- 1) Enter labels and data:
 - Row labels: Fund X, Fund Y, and total, in cells A2 thru A4.
 - Column labels: interest earned, amount invested, interest rate, and time period, in cells B1 thru E1.
 - Interest rates: 8 and 12, in cells D2 and D3.
 - Time period: 1, in cells E2 and E3.
 - Total amount invested: 10000, in cell C4.
- 2) Enter an arbitrary value (0 or leave blank) in cell C2 as amount invested in Fund X.
- 3) Enter formulas:
 - In cell C3, enter the formula $C4-C2$ (total amount – amount invested in Fund X) as the amount invested in Fund Y.
 - In cells B2 and B3, enter the formula for calculating the interest earned (see Figure 250).
 - In cell B4, enter the formula $B2+B3$ as the total interest earned.

		$f(x)$	Σ	=	= $=C3*D3/100*E3$	
	A	B	C	D	E	F
1		interest earned	amount invested	interest rate	time period	
2	Fund X		0	0	8	1
3	Fund Y		1200	10000	12	1
4	total		1200	10000		
5						
6						

Figure 253: Example setup for Solver

- 4) Choose **Tools** → **Solver**. The Solver dialog (Figure 249) opens.
- 5) Click in the *Target cell* field. In the sheet, click in the cell that contains the target value. In this example it is cell B4 containing total interest value.
- 6) Select *Value of* and enter 1000 in the field next to it. In this example, the target cell value is 1000 because your target is a total interest earned of \$1000. Select *Maximum* or *Minimum* if the target cell value needs to be one of those extremes.
- 7) Click in the *By changing cells* field and click on cell C2 in the sheet. In this example, you need to find the amount invested in Fund X (cell C2).
- 8) Enter limiting conditions for the variables by selecting the *Cell reference*, *Operator* and *Value* fields. In this example, the amount invested in Fund X (cell C2) should not be greater than the total amount available (cell C4) and should not be less than 0.
- 9) Click **OK**. A dialog appears informing you that the Solving successfully finished. Click **Keep Result** to enter the result in the cell with the variable value. The result is shown in Figure 248.

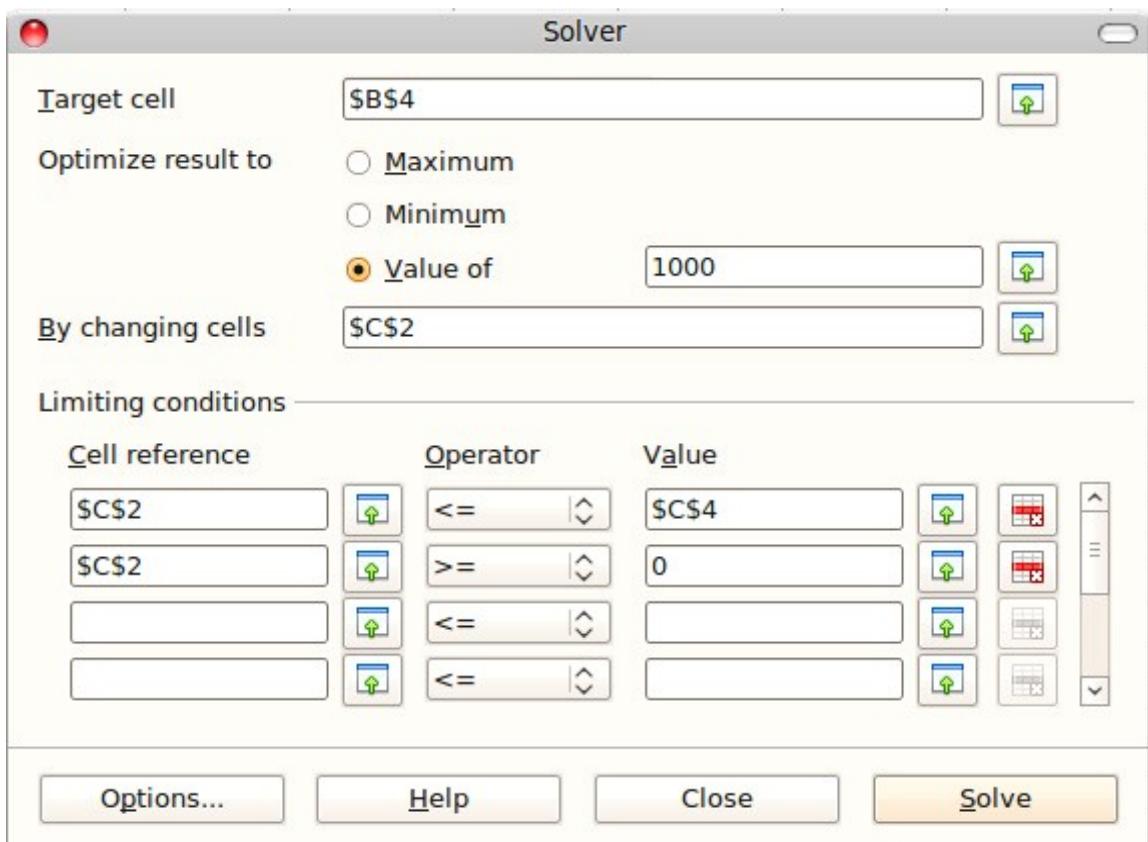


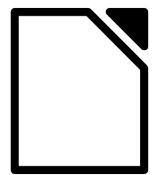
Figure 254: The Solver dialog

C3		f(x)	$\sum =$	=	-C4-C2	
	A	B	C	D	E	F
1		interest earned	amount invested	interest rate	time period	
2	Fund X	400	5000	8	1	
3	Fund Y	600	5000	12	1	
4	total	1000	10000			
5						
6						
7						

Figure 255: Result of Solver operation

Note

The default solver supports only linear equations. For nonlinear programming requirements, try the EuroOffice Solver or Sun's Solver for Nonlinear Programming [Beta]. Both are available from the LibreOffice extensions repository. (For more about extensions, see Chapter 14, Setting up and Customizing Calc.)



LibreOffice
The Document Foundation

Chapter 10

Linking Calc Data

Sharing data in and out of Calc

Why use multiple sheets?

Chapter 1 introduced the concept of multiple sheets in a spreadsheet. Multiple sheets help keep information organized; once you link those sheets together, you unleash the full power of Calc. Consider this case.

John is having trouble keeping track of his personal finances. He has several bank accounts and the information is scattered and disorganized. He can't get a good grasp on his finances until he can see everything at once.

To resolve this, John decided to track his finances in LibreOffice Calc. John knows Calc can do simple mathematical computations to help him keep a running tab of his accounts, and he wants to set up a summary sheet so that he can see all of his account balances at once.

This can be accomplished easily.

Note

For users with experience using Microsoft Excel, a Calc *sheet* is called either a *sheet* or *worksheet* in Excel. What Excel calls a *workbook*, Calc calls a *spreadsheet* (the whole document).

Setting up multiple sheets

Chapter 1 gives a detailed explanation of how to set up multiple sheets in a spreadsheet. Here is a quick review.

Identifying sheets

When you open a new spreadsheet it has, by default, three sheets named *Sheet1*, *Sheet2*, and *Sheet3*. Sheets in Calc are managed using tabs at the bottom of the spreadsheet.

Inserting new sheets

There are several ways to insert a new sheet. The fastest method is to click on the Add Sheet button . This inserts one new sheet at that point, without opening the Insert Sheet dialog.

Use one of the other methods to insert more than one sheet, to rename the sheet at the same time, or to insert the sheet somewhere else in the sequence. The first step for these methods is to select the sheet that the new sheet will be inserted next to. Then do any of the following:

- Select **Insert → Sheet** from the menu bar, or
- Right-click on the tab and select **Insert Sheet**, or
- Click in an empty space at the end of the line of sheet tabs.

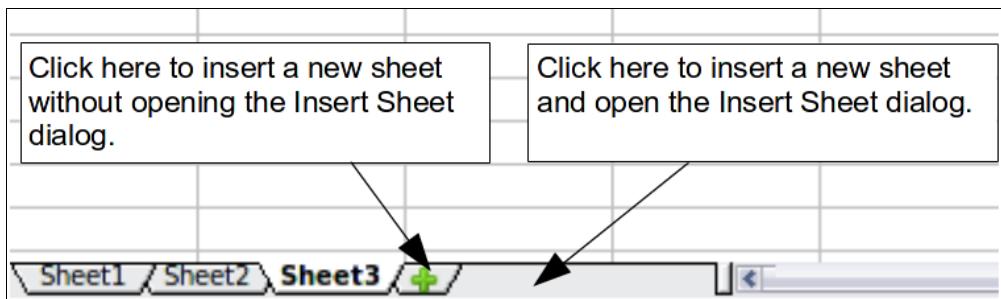


Figure 256: Creating a new sheet

Each method opens the Insert Sheet dialog. Here you can choose to put the new sheet before or after the selected sheet and how many sheets to insert.

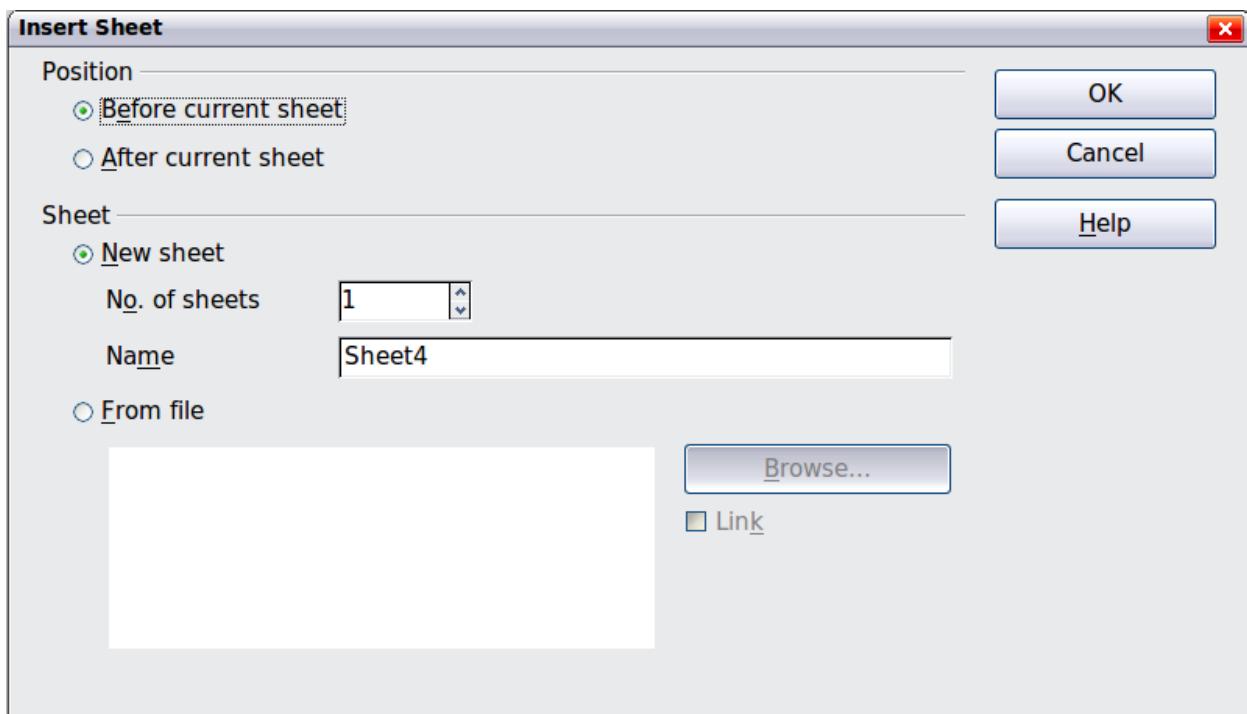


Figure 257. Insert Sheet dialog

We need 6 sheets, one for each of the 5 accounts and one as a summary sheet, so we will add 3 more. We also want to name each of these sheets for the account they represent: Summary, Checking Account, Savings Account, Credit Card 1, Credit Card 2, and Car Loan.

We have two choices: insert 3 new sheets and rename all 6 sheets afterwards; or rename the existing sheets, then insert the 3 new sheets one at a time, renaming each new sheet during the insert step.

To insert sheets and rename afterwards:

- 1) In the Insert Sheet dialog, choose the position for the new sheets (in this example, we use **After current sheet**).
- 2) Choose **New sheet** and **3** as the *No. of sheets*. (Three sheets are already provided by default.) Because you are inserting more than one sheet, the *Name* box is not available.
- 3) Click **OK** to insert the sheets.
- 4) For the next steps, go to “Renaming sheets” on page 254.

To insert sheets and name them at the same time:

- 1) Rename the existing sheets Summary, Checking Account, and Savings Account, as described in “Renaming sheets” on page 254.
- 2) In the Insert Sheet dialog, choose the position for the first new sheet.
- 3) Choose **New sheet** and 1 as the *No. of sheets*. The **Name** box is now available.
- 4) In the **Name** box, type a name for this new sheet, for example **Credit Card 1**.
- 5) Click **OK** to insert the sheet.
- 6) Repeat steps 1–4 for each new sheet, giving them the names Credit Card 2 and Car Loan.

Inserting sheets from a different spreadsheet

On the Insert Sheet dialog, you can also add a sheet from a different spreadsheet file (for example, another Calc or Excel spreadsheet), by choosing the **From file** option. Click **Browse** and select the file; a list of the available sheets appears in the box. Select the sheet to import. If, after you select the file, no sheets appear you probably selected an invalid file type (not a spreadsheet, for example).

Tip

For a shortcut to inserting a sheet from another file, choose **Insert → Sheet from file** from the menu bar. The Insert Sheet dialog opens with the **From file** option preselected, and then the Insert dialog opens on top of it.

If you prefer, select the **Link** option to insert the external sheet as a link instead as a copy. This is one of several ways to include “live” data from another spreadsheet. (See also “Linking to external data” on page 261.) The links can be updated manually to show the current contents of the external file; or, depending on the options you have selected in **Tools → Options → LibreOffice Calc → General → Updating**, whenever the file is opened.

Renaming sheets

Sheets can be renamed at any time. To give a sheet a more meaningful name:

- Enter the name in the name box when you create the sheet, or
- Double click on the sheet tab, or
- Right-click on a sheet tab, select **Rename Sheet** from the context menu and replace the existing name.

Note

If you want to save the spreadsheet to Microsoft Excel format, the following characters are not allowed in sheet names: \ / ? * [] : and ' as the first or last character of the name.

Your sheet tab area should now look like this.

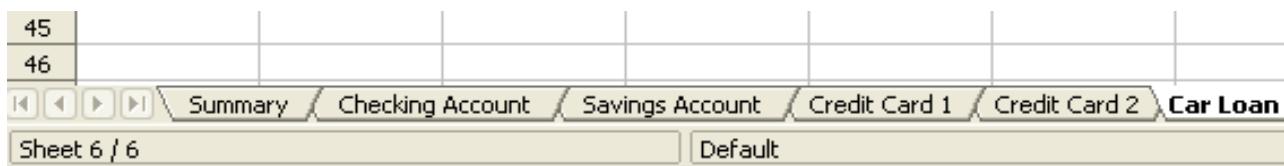


Figure 258: Six renamed sheets

Now we will set up the account ledgers. This is just a simple summary that includes the previous balance plus the amount of the current transaction. For withdrawals, we enter the current

transaction as a negative number so the balance gets smaller. A basic ledger is shown in Figure 259.

This ledger is set up in the sheet named *Checking Account*. The total balance is added up in cell F3. You can see the equation for it in the formula bar. It is the summary of the opening balance, cell C3, and all of the subsequent transactions.

	A	B	C	D	E	F	G
1	Checking Account						
2	Description	Amount	Balance				
3	Opening Balance	\$75.00	\$75.00		Total Balance	\$380.05	
4	Pay	\$425.00	\$500.00				
5	Groceries	-\$75.00	\$425.00				
6	Cable Bill	-\$44.95	\$380.05				
7							
8							
9							

Figure 259: Checking ledger

Referencing other sheets

On the *Summary* sheet we display the balance from each of the other sheets. If you copy the example in Figure 259 onto each account, the current balances will be in cell F3 of each sheet.

There are two ways to reference cells in other sheets: by entering the formula directly using the keyboard or by using the mouse. We will look at the mouse method first.

Creating the reference with the mouse

On the *Summary* sheet, set up a place for all five account balances, so we know where to put the cell reference. Figure 260 shows a summary sheet with a blank Balance column. We want to place the reference for the checking account balance in cell B3.

	A	B	C	D	E
1	My Account Summary				
2	Account	Balance			
3	Checking Account				
4	Savings Account				
5	Credit Card 1				
6	Credit Card 2				
7	Car Loan				
8					

Figure 260: Blank summary

To make the cell reference in cell B3, select the cell and follow these steps:

- 1) Click on the = icon next to the input line. The icons change and an equals sign appears in the input line as in Figure 261.

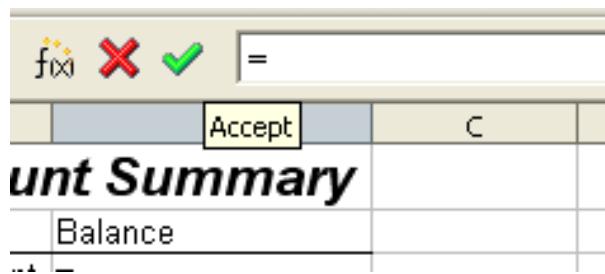


Figure 261: Equal sign in input line

- 2) Now, click on the sheet tab for the sheet containing the cell to be referenced. In this case, that is the *Checking Account* sheet as shown in Figure 262.



Figure 262: Click on the checking account tab

- 3) Click on cell F3 (where the balance is) in the *Checking Account* sheet. The phrase '*Checking Account*'.F3 should appear in the input line as in Figure 263.

SUM	A	B	C	D	E	F
Checking Account						
2	Description	Amount	Balance			
3	Opening Balance	\$75.00	\$75.00		Total Balance	\$380.05
4	Pay	\$425.00	\$500.00			
5	Groceries	-\$75.00	\$425.00			
6	Cable Bill	-\$44.95	\$380.05			
7						
8						

Figure 263: Cell reference selected

- 4) Click the green checkmark in the input line to finish.
- 5) The *Summary* sheet should now look like Figure 264.

B3	A	B	C	D	E
My Account Summary					
2	Account	Balance			
3	Checking Account	\$380.05			
4	Savings Account				
5	Credit Card 1				
6	Credit Card 2				
7	Car Loan				
8					

Figure 264: Finished checking account reference

Creating the reference with the keyboard

From Figure 264, you can deduce how the cell reference is constructed. The reference has two parts: the sheet name ('*Checking Account*') and the cell reference (*F3*). Notice that they are separated by a period.

Note

The sheet name is in single quotes because it contains a space, and the mandatory period (.) always falls outside any quotes.

So, you can fill in the Savings Account cell reference by just typing it in. Assuming that the balance is in the same cell (*F3*) in the *Savings Account* sheet, the cell reference should be ='Savings Account'.*F3* (see Figure 265).

A screenshot of a LibreOffice Calc spreadsheet titled "My Account Summary". The spreadsheet contains the following data:

	A	B	C
1	<i>My Account Summary</i>		
2	Account	Balance	
3	Checking Account	\$380.05	
4	Savings Account	\$1,285.00	
5	Credit Card 1		
6	Credit Card 2		
7	Car Loan		
8			

The formula bar at the top shows the formula ='*'Savings Account'*.F3. The status bar at the bottom indicates Sheet 1 / 6 and Default. The tab bar shows Summary, Checking Account, and Savings Account, with Summary selected.

Figure 265: Savings account reference

Referencing other documents

John decides to keep his family account information in a different spreadsheet file from his own summary. Fortunately Calc can link different files together. The process is the same as described for different sheets in a single spreadsheet, but we add one more step to indicate which file the sheet is in.

Creating the reference with the mouse

To create the reference with the mouse, both spreadsheets need to be open. Select the cell in which the formula is going to be entered.

- 1) Click the = icon next to the input line.
- 2) Switch to the other spreadsheet (the process to do this will vary depending on which operating system you are using).
- 3) Select the sheet (*Savings Account*) and then the reference cell (*F3*). See Figure 266.
- 4) Switch back to the original spreadsheet.
- 5) Click on the green check mark on the input line.

Your spreadsheet should now resemble Figure 267.

	A	B	C	D	E	F
1	Savings Account					
2	Description	Amount	Balance			
3	Opening Balance	\$2,500.00	\$2,500.00		Total Balance	\$1,285.00
4	Savings Account	\$35.00	\$2,535.00			
5	Car Down Payment	-\$1,250.00	\$1,285.00			
6						
7						
8						

Summary Checking Account **Savings Account** Credit Card 1 Credit Card 2 Car Loan

Figure 266: Selecting the savings account reference cell

	A	B	C	D	E	F	G	H
1	Family Account Balances							
2	John	-\$20,053.51						
3	Melissa	-\$30,025.36						

Figure 267: Linked files

You will get a good feel for the format of the reference if you look closely at the input line. Based on this line you can create the reference using the keyboard.

Creating the reference with the keyboard

Typing the reference is simple once you know the format the reference takes. The reference has three parts to it:

- Path and file name
- Sheet name
- Cell

Looking at Figure 267 you can see the the general format for the reference is

=file:///Path & File Name'#\$SheetName.CellName

Note

The reference for a file has three forward slashes /// and the reference for a hyperlink has two forward slashes //.

Hyperlinks and URLs

Hyperlinks can be used in Calc to jump to a different location from within a spreadsheet and can lead to other parts of the current file, to different files or even to web sites.

Relative and absolute hyperlinks

Hyperlinks can be stored within your file as either relative or absolute.

A relative hyperlink says, *Here is how to get there starting from where you are now* (meaning from the folder in which your current document is saved) while an absolute hyperlink says, *Here is how to get there no matter where you start from*.

An absolute link will stop working only if the target is moved. A relative link will stop working only if the start and target locations change relative to each other. For instance, if you have two spreadsheets in the same folder linked to each other and you move the entire folder to a new location, a relative hyperlink will not break.

To change the way that LibreOffice stores the hyperlinks in your file, select **Tools** → **Options** → **Load/Save** → **General** and choose if you want URLs saved relatively when referencing the *File System*, or the *Internet*, or both.

Calc will always display an absolute hyperlink. Don't be alarmed when it does this even when you have saved a relative hyperlink—this 'absolute' target address will be updated if you move the file.

Note

Make sure that the folder structure on your computer is the same as the file structure on your web server if you save your links as relative to the file system and you are going to upload pages to the Internet.

Tip

When you rest the mouse pointer on a hyperlink, a help tip displays the absolute reference, since LibreOffice uses absolute path names internally. The complete path and address can only be seen when you view the result of the HTML export (saving the spreadsheet as an HTML file), by loading the HTML file as Text, or by opening it with a text editor.

Creating hyperlinks

When you type text that can be used as a hyperlink (such as a website address or URL), Calc formats it automatically, creating the hyperlink and applying to the text a color and background shading. If this does not happen, you can enable this feature using **Tools** → **AutoCorrect Options** → **Options** and selecting **URL Recognition**.

Tips

To change the color of hyperlinks, go to **Tools** → **Options** → **LibreOffice** → **Appearance**, scroll to *Unvisited links* and/or *Visited links*, pick the new colors and click **OK**. Caution: this will change the color for all hyperlinks in all components of LibreOffice—this may not be what you want.

You can also insert and modify links using the Hyperlink dialog. To display the dialog, click the **Hyperlink** icon  on the Standard toolbar or choose **Insert** → **Hyperlink** from the menu bar. To turn existing text into a link, highlight it before opening the dialog.

On the left side, select one of the four categories of hyperlinks:

- **Internet**: the hyperlink points to a web address, normally starting with `http://`
- **Mail & News**: the hyperlink opens an email message that is pre-addressed to a particular recipient.

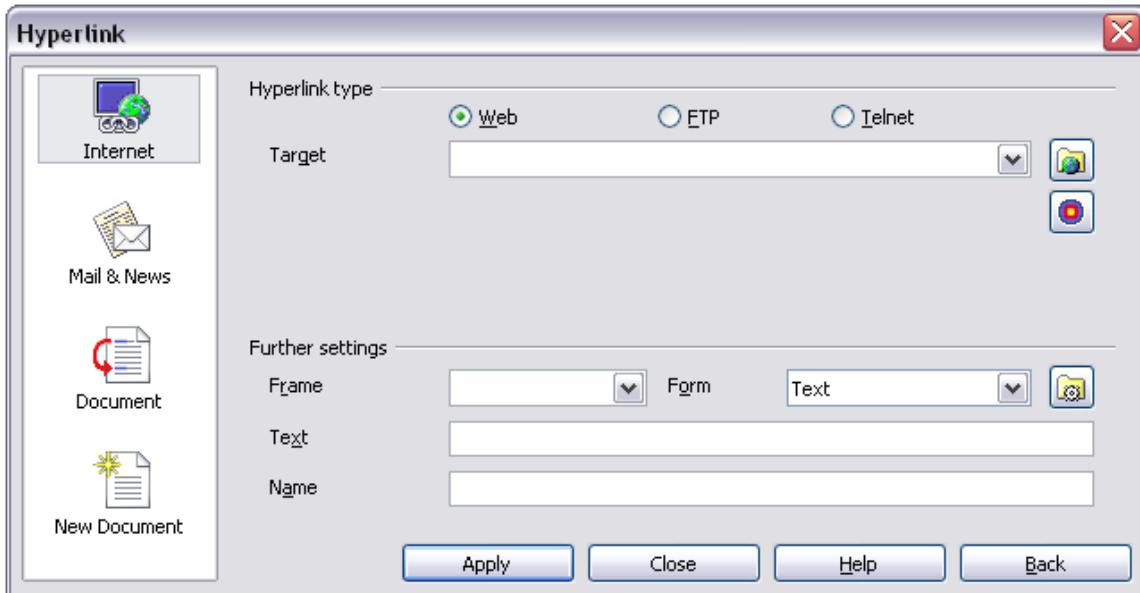


Figure 268. Hyperlink dialog showing details for Internet links

- **Document:** the hyperlink points to a place in either the current document or another existing document.
- **New document:** the hyperlink creates a new document.

The top right part of the dialog changes according to the choice made for the hyperlink category from the left panel. A full description of all the choices, and their interactions, is beyond the scope of this chapter. Here is a summary of the most common choices used in spreadsheets.

For an *Internet* hyperlink, choose the type of hyperlink (Web, FTP, or Telnet), and enter the required web address (URL).

For a *Mail and News* hyperlink, specify whether it is a mail or news link, the receiver address and for email, also the subject.

For a *Document* hyperlink, specify the document path (the **Open File** button opens a file browser); leave this blank if you want to link to a target in the same spreadsheet. Optionally specify the target in the document (for example a specific sheet). Click on the **Target in document** icon to open the Navigator where you can select the target, or if you know the name of the target, you can type it into the box.

For a *New Document* hyperlink, specify whether to edit the newly created document immediately (**Edit now**) or just create it (**Edit later**), and enter the file name and the type of document to create (text, spreadsheet, etc.). The **Select path** button opens a directory picker dialog.

The *Further settings* section in the bottom right of the dialog is common to all the hyperlink categories, although some choices are more relevant to some types of links.

- Set the value of **Frame** to determine how the hyperlink will open. This applies to documents that open in a Web browser.
- **Form** specifies if the link is to be presented as text or as a button. Figure 269 shows a link formatted as a button.

	A	B	C	D
1				
2				
3		Calc Guide		
4				
5				
6				
7				

Figure 269: Hyperlink as button

- **Text** specifies the text that will be visible to the user. If you do not enter anything here, Calc will use the full URL or path as the link text. Note that if the link is relative and you move the file, this text will not change, though the target will.
- **Name** is applicable to HTML documents. It specifies text that will be added as a **NAME** attribute in the HTML code behind the hyperlink.
- **Events** button: this button will be activated to allow Calc to react to events for which the user has written some code (macro). This function is not covered in this chapter.

Note

A hyperlink button is a type of form control. As with all form controls, it can be anchored or positioned by right-clicking on the button in design mode. More information about forms can be found in Chapter 15 of the *Writer Guide*.

For the button to work, the spreadsheet must *not* be in design mode. To toggle design mode on and off, view the Form Controls toolbar (**View → Toolbars → Form Controls**) and click the **Design Mode On/Off** button .

Editing hyperlinks

To edit an existing link, place the cursor anywhere in the link and click the Hyperlink icon  on the Standard toolbar or select **Edit → Hyperlink** from the menu bar. The Hyperlink dialog (Figure 268) opens. If the Hyperlink is in button form, the spreadsheet must have Design Mode on in order to edit the Hyperlink. Make your changes and click **Apply**. If you need to edit several hyperlinks, you can leave the Hyperlink dialog open until you have edited all of them. Be sure to click **Apply** after each one. When you are finished, click **Close**.

Removing hyperlinks

You can remove the clickable link from hyperlink text—leaving just the text—by right-clicking on the link and selecting **Default Formatting**. This option is also available from the **Format** menu. You may then need to re-apply some formatting in order for it to match the rest of your document.

To erase the link text or button from the document completely, select it and press the *Backspace* or *Delete* key.

Linking to external data

You can insert tables from HTML documents, and data located within named ranges from a LibreOffice Calc or Microsoft Excel spreadsheet, into a Calc spreadsheet. (To use other data sources, including database files in LibreOffice Base, see “Linking to registered data sources” on page 266.)

You can do this in two ways: using the External Data dialog or using the Navigator. If your file has named ranges or named tables, and you know the name of the range or table you want to link to, using the External Data dialog method is quick and easy. However, if the file has several tables, and you want to pick only one of them, you may not be able to easily determine which is which; in that case, the Navigator method may be easier.

Using the External Data dialog

- 1) Open the Calc document where the external data is to be inserted. This is the target document.
- 2) Select the cell where the upper left-hand cell of the external data is to be inserted.
- 3) Choose **Insert → Link to External Data**.
- 4) On the External Data dialog, type the URL of the source document or click the [...] button to open a file selection dialog. Press *Enter* to get Calc to load the list of available tables.

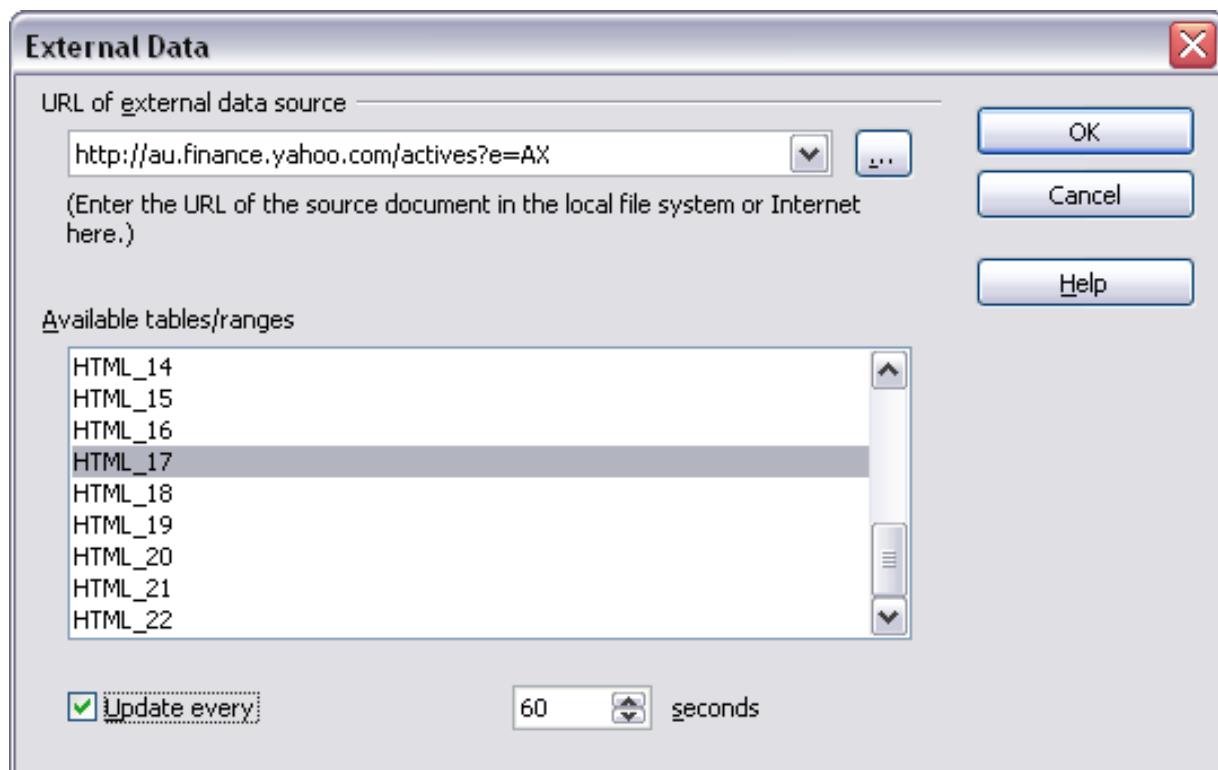


Figure 270: Selecting a table or range in a source document from the Web

- 5) In the *Available tables/ranges* list, select the named ranges or tables you want to insert. You can also specify that the ranges or tables are updated every (number of) seconds.
- 6) Click **OK** to close the dialog and insert the linked data.

Notes

- 1) The *Available tables/ranges* list remains empty until you press *Enter* after typing the URL of the source. If you select the source document using the [...] button, then pressing *Enter* is not required.
- 2) The **OK** button remains unavailable (grayed out) until you select one or more tables/ranges in the list. You can hold down the *Ctrl* key while clicking on tables/ranges to select more than one.
- 3) No images are imported.

Using the Navigator

- 1) Open the Calc spreadsheet in which the external data is to be inserted (target document).
- 2) Open the document from which the external data is to be taken (source document). If the source document is a Web page, choose **Web Page Query (LibreOffice Calc)** as the file type.

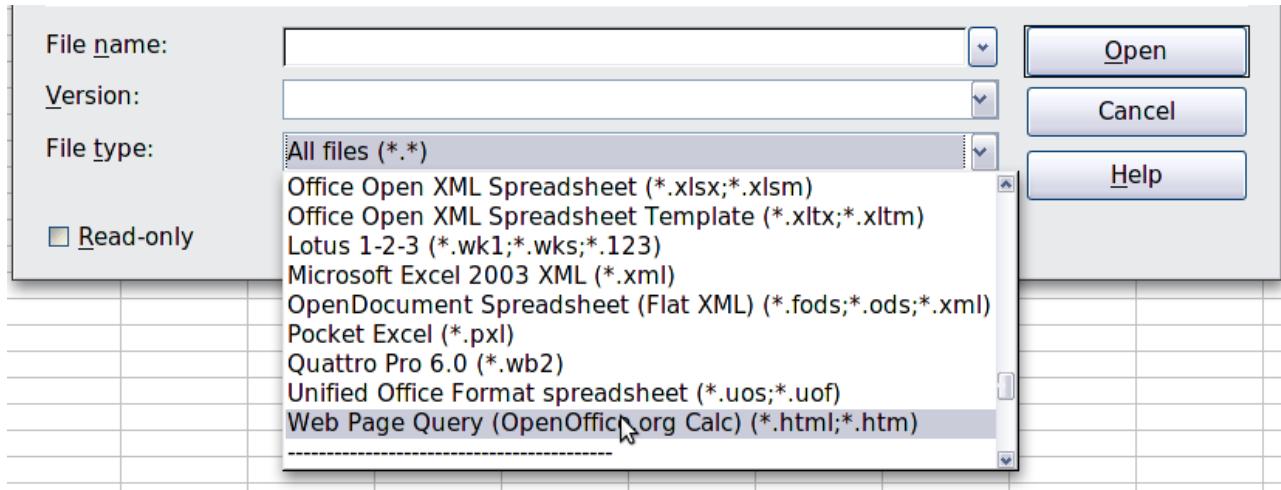


Figure 271: Opening a file using the Web Page Query filter

- 3) In the target document, press F5 to open the Navigator.
- 4) At the bottom of the Navigator, select the source document. (In Figure 272, the source is named *actives*.)

The Navigator now shows the range names or the tables contained in the source document (the example contains range names; other documents have a list of tables). Click on the + next to *Range names* to display the list.

- 5) In the Navigator, select the **Insert as Link** drag mode, as shown in Figure 272.
- 6) Select the required range or table and drag it from the Navigator into the target document, to the cell where you want the upper left-hand cell of the data range to be.

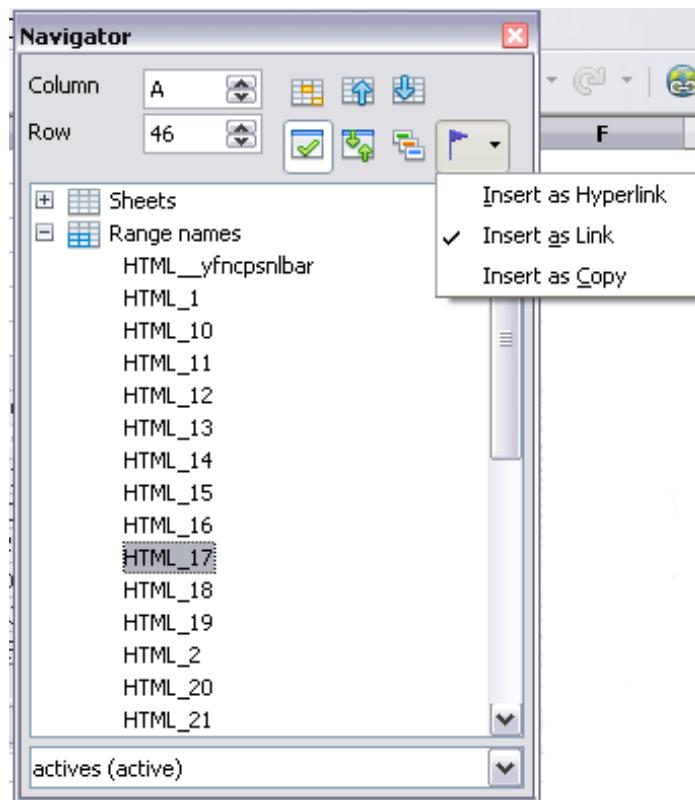


Figure 272: Selecting a data range in a source document, to be inserted as a link

- 7) In the target document, check the Navigator. Instead of a + by *Range names*, it shows a + by *Linked areas*. Click the + to see the same range name (see Figure 273).

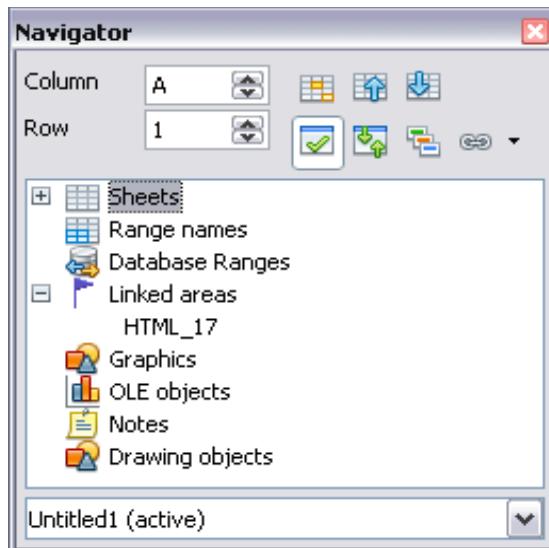


Figure 273: Linked areas in target spreadsheet

How to find the required data range or table

The examples above show that the import filter gave names to the data ranges (tables) in the sample web page starting from HTML_1. It also created two additional range names (not visible in the illustration):

HTML_all – designates the entire document

HTML_tables – designates all HTML tables in the document

If the data tables in the source HTML document have been given names (using the ID attribute on the TABLE tag), or the external spreadsheet includes named ranges, those names appear in the list along with the ranges Calc has sequentially numbered.

If the data range or table you want is not named, how can you tell which one to select?

Go to the source document, which you opened in Calc. In the Navigator, double-click on a range name: that range is highlighted on the sheet (see Figure 274).

If the Formula Bar is visible, the range name is also displayed in the Name box at the left-hand end (see Figure 275).

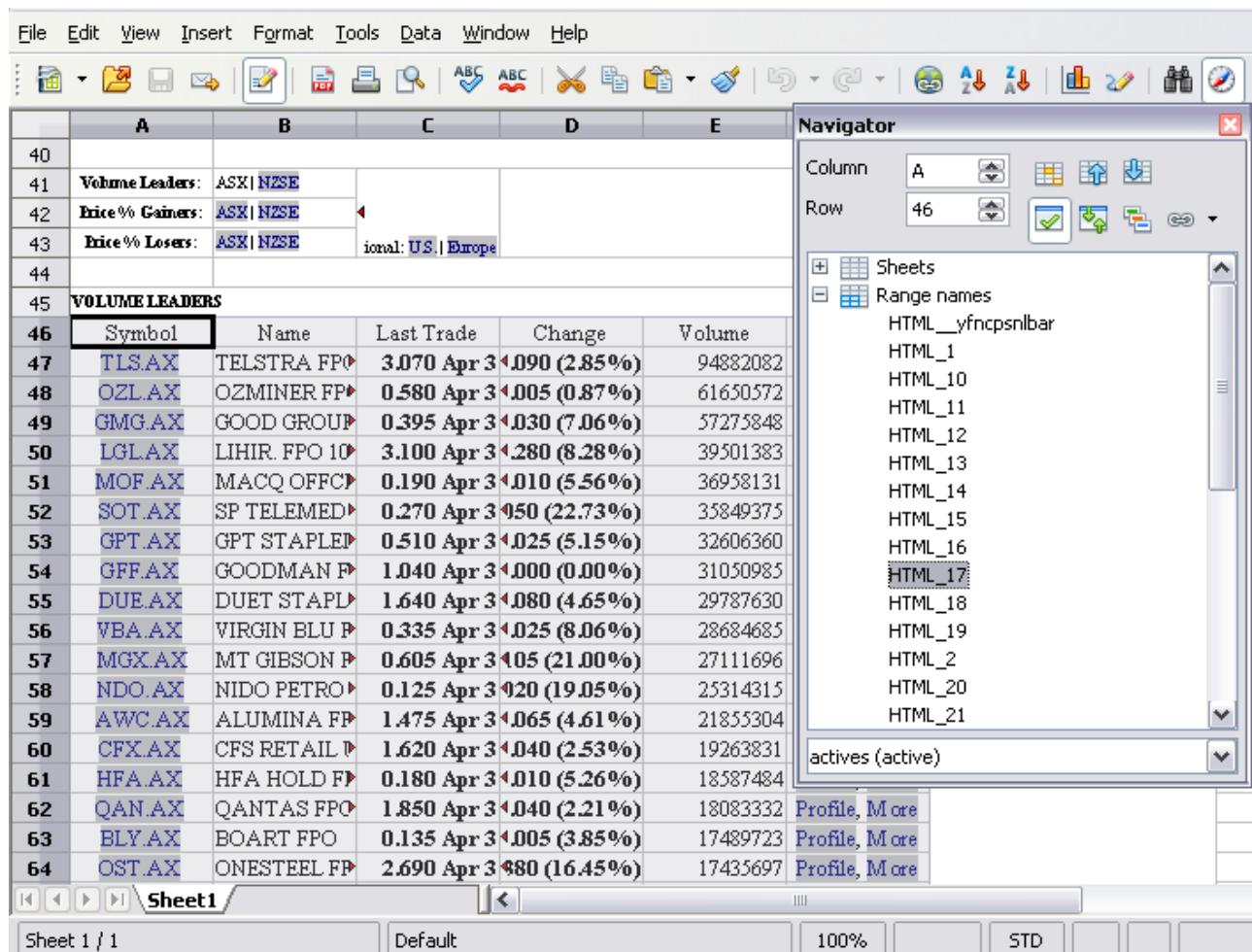


Figure 274: Using the Navigator to find a data range name

		B	C	D	E
	X NZSE				
	X NZSE				
	X NZSE				
		ional: US Europe			
		Name	Last Trade	Change	Volume
47	TLSAX	TELSTRA FP	3.070 Apr 31 0.090 (2.85%)	94882082	
48	OZLAX	OZMINER FP	0.580 Apr 31 0.005 (0.87%)	61650572	
49	ANOND GROUTING	ANOND GROUTING	0.205 Apr 31 0.000 (-0.00%)	57775942	

Figure 275: Using the Name box to find a data range name

Linking to registered data sources

You can access a variety of databases and other data sources and link them into Calc documents.

First you need to register the data source with LibreOffice. (To register means to tell LibreOffice what type of data source it is and where the file is located.) The way to do this depends on whether or not the data source is a database in *.odb format.

To register a data source that is in *.odb format:

- 1) Choose **Tools** → **Options** → **LibreOffice Base** → **Databases**.
- 2) Click the **New** button (below the list of registered databases) to open the Create Database Link dialog (Figure 271).

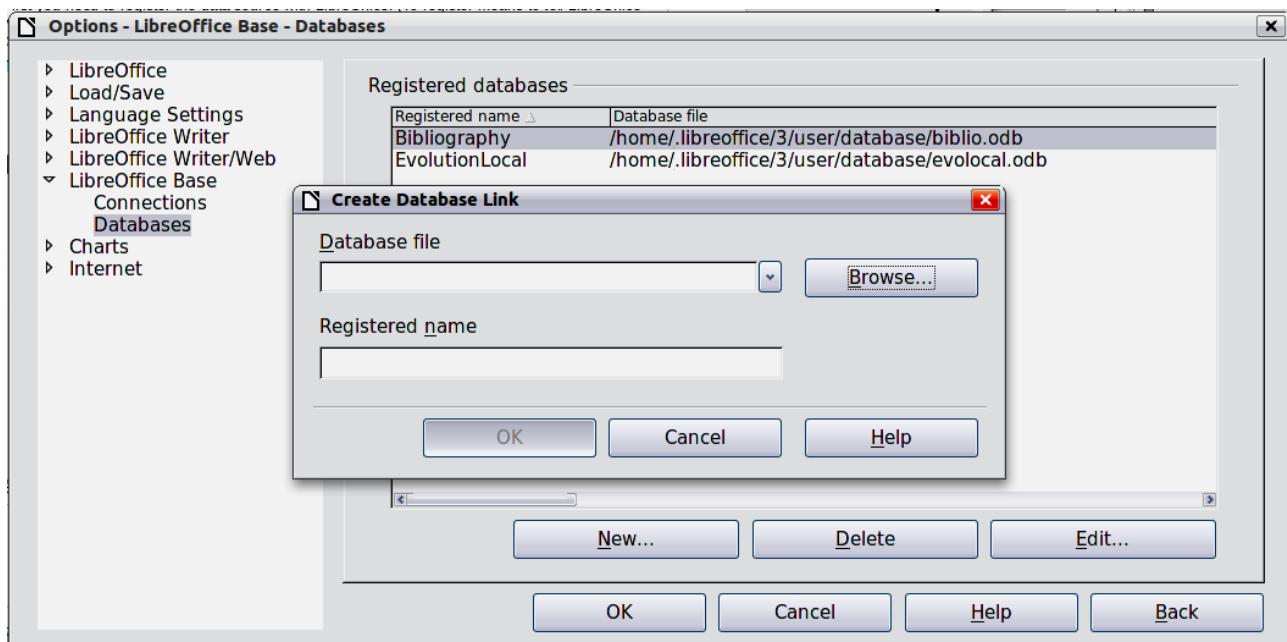


Figure 276: Registering databases

- 3) Enter the location of the database file, or click **Browse** to open a file browser and select the database file.

- 4) Type a name to use as the registered name for the database and click **OK**. The database is added to the list of registered databases. The **OK** button is enabled only when both fields are filled in.

To register a data source that is *not* in *.odb format:

- 1) Choose **File → New → Database** to open the Database Wizard.
- 2) Select **Connect to an existing database**. The choices for database type depend on your operating system. For example, Microsoft Access and other Microsoft products are not among the choices if you are using Linux. In our example, we chose dBASE.

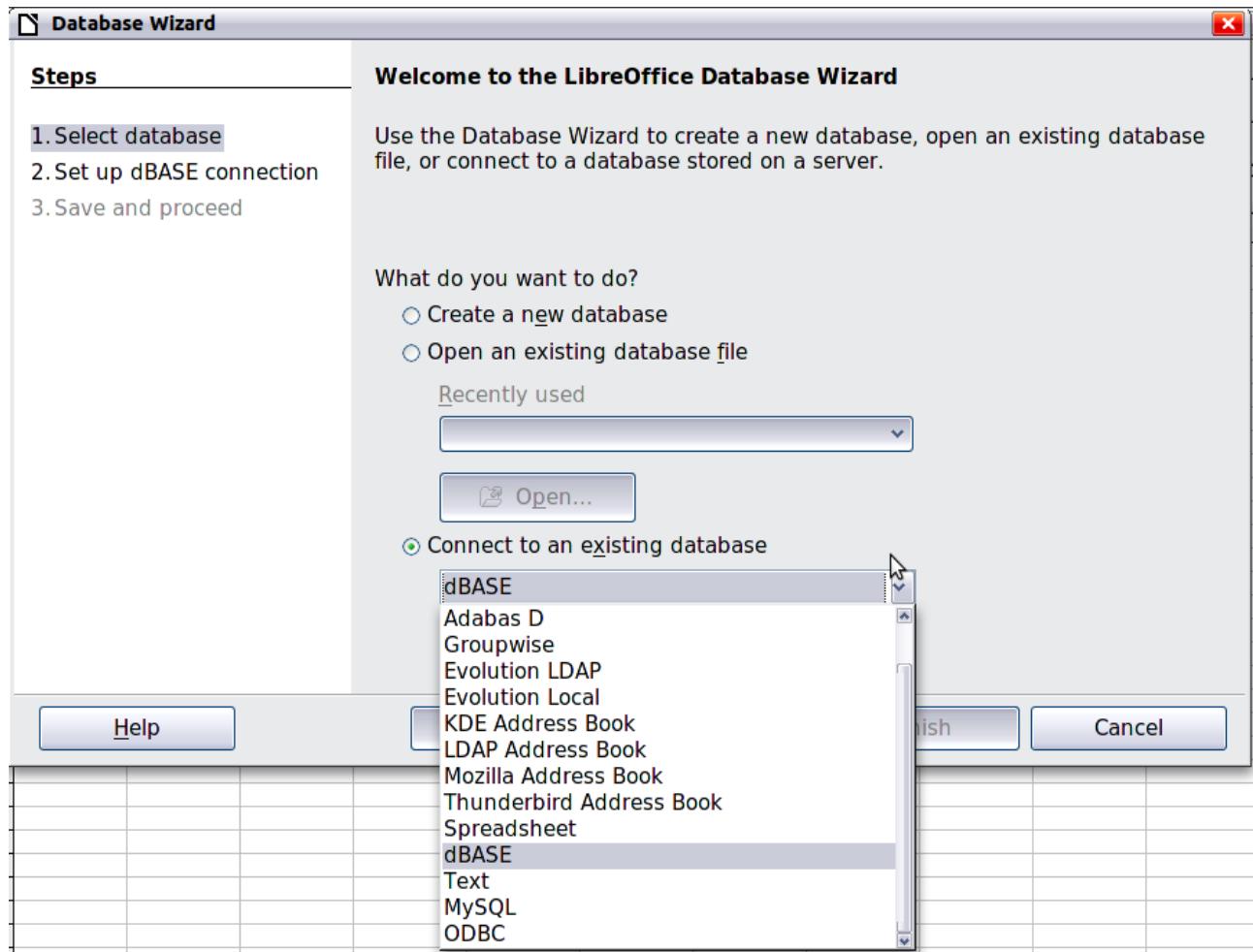


Figure 277: Registering a database using the Database Wizard

- 3) Click **Next**. Type the path to the database file or click **Browse** and use the Open dialog to navigate to and select the database file before clicking **Open**.
- 4) Click **Next**. Select *Yes, register the database for me*, but clear the checkbox marked *Open the database for editing*.
- 5) Click **Finish**. Name and save the database in the location of your choice. Note: changes made to the *.odb do not affect the original dBASE file.

Once a data source has been registered, it can be used by any LibreOffice component (for example Calc).

Viewing data sources

Open a document in Calc. To view the data sources available, press **F4** or select **View → Data Sources** from the menu bar. The Data Source View pane opens above the spreadsheet. A list of registered databases is in the Data Explorer area on the left. (The built-in Bibliography database is included in the list.)

To view each database, click on the **+** to the left of the name of the database. (This has been done for the Automobile database in Figure 270.) Click on the **+** next to Tables to view the individual tables.

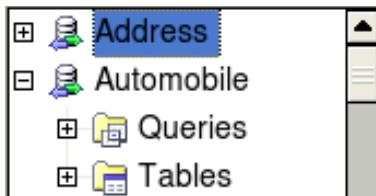


Figure 278: Databases

Now click on a table to see all the records held in it. The data records are displayed on the right side of the Data Source View pane. To see more columns, you can click the Explorer On/Off button to hide the Data Explorer area.

At the top of the Data Source View pane, below the Calc toolbars, is the Table Data bar. This toolbar includes buttons for saving records, editing data, finding records, sorting, filtering, and other functions. For more details about this toolbar, see the Help for *data source browser*.

Below the records is the Form Navigation bar, which shows which record is selected and the total number of records. To the right are five tiny buttons; the first four move backwards or forwards through the records, or to the beginning or end.



Figure 279: Data Source View navigation buttons

Editing data sources

Some data sources (such as spreadsheets) cannot be edited in the data source view.

In editable data sources, records can be edited, added, or deleted. If you cannot save your edits, you need to open the database in Base and edit it there; see “Launching Base to work on data sources”. You can also hide columns and make other changes to the display.

Launching Base to work on data sources

You can launch LibreOffice Base at any time from the Data Source View pane. Right-click on a database or the Tables or Queries icons and select **Edit Database File**. Once in Base, you can edit, add, and delete tables, queries, forms, and reports.

For more about using Base, see Chapter 8, Getting Started with Base, in the *Getting Started* guide.

Using data sources in Calc spreadsheets

Data from the tables in the data source pane can be placed into Calc documents in a variety of ways.

You can select a cell or an entire row in the data source pane and drag and drop the data into the spreadsheet. The data is inserted at the place where you release the mouse button.

An alternative method uses the *Data to Text* icon and will include the column headings above the data you insert:

- 1) Click the cell of the spreadsheet which you want to be the top left of your data including the column names.
- 2) Press *F4* to open the database source window and select the table containing the data you want to use.
- 3) Select the rows of data you want to add to the spreadsheet:
 - Click the gray box to the left of the row you want to select if only selecting one row. That row is highlighted.
 - To select multiple adjacent rows, hold down the *Shift* key while clicking the gray box of the rows you need.
 - To select multiple separate rows, hold down the *Control* key while selecting the rows. The selected rows are highlighted.
 - To select all the rows, click the gray box in the upper left corner. All rows are highlighted.
- 4) Click the *Data to text* icon  to insert the data into the spreadsheet cells.

You can also drag the data source column headings (field names) onto your spreadsheet to create a form for viewing and editing individual records one at a time. Follow these steps:

- 1) Click the gray box at the top of the column (containing the field name you wish to use) to highlight it.
- 2) Drag and drop the gray box to where you want the record to appear in the spreadsheet.
- 3) Repeat until you have moved all of the fields you need to where you want them.
- 4) Close the Data Source window: press *F4*.
- 5) Save the spreadsheet and click the *Edit File* button  on the Standard toolbar, to make the spreadsheet read-only. All of the fields will show the value for the data of the first record you selected.
- 6) Add the *Form Navigation* toolbar: **View → Toolbars → Form Navigation**. By default, this toolbar opens at the bottom of the Calc window, just above the status bar.
- 7) Click the arrows on the Form Navigation toolbar to view the different records of the table. The number in the Record box changes as you move through the records. The data in the fields changes to correspond to the data for that particular record number. You can also search for a specific record, sort and filter records, and do other tasks using this toolbar.

Embedding spreadsheets

Spreadsheets can be embedded in other LibreOffice files. This is often used in Writer or Impress documents so that Calc data can be used in a text document. You can embed the spreadsheet as either an *OLE* or *DDE* object. The difference between a DDE object and a Linked OLE object is that a Linked OLE object can be edited from the document in which it is added as a link, but a DDE object cannot.

For example, if a Calc spreadsheet is pasted into a Writer document as a DDE object, then the spreadsheet cannot be edited in the Writer document. But if the original Calc spreadsheet is updated, the changes are automatically made in the Writer document. If the spreadsheet is inserted as a Linked OLE object into the Writer document, then the spreadsheet can be edited in the Writer as well as in the Calc document and both documents are in sync with each other.

Object Linking and Embedding (OLE)

The major benefit of an OLE (Object Linking and Embedding) object is that it is quick and easy to edit the contents just by double-clicking on it. You can also insert a link to the object that will appear as an icon rather than an area showing the contents itself.

OLE objects can be linked to a target document or be embedded in the target document. Linking inserts information which will be updated with any subsequent changes to the original file, while embedding inserts a static copy of the data. If you want to edit the embedded spreadsheet, double-click on the object.

To embed a spreadsheet as an OLE object in a presentation:

- 1) Place the cursor in the document and location you want the OLE object to be.
- 2) Select **Insert → Object → OLE Object**. The dialog below opens.

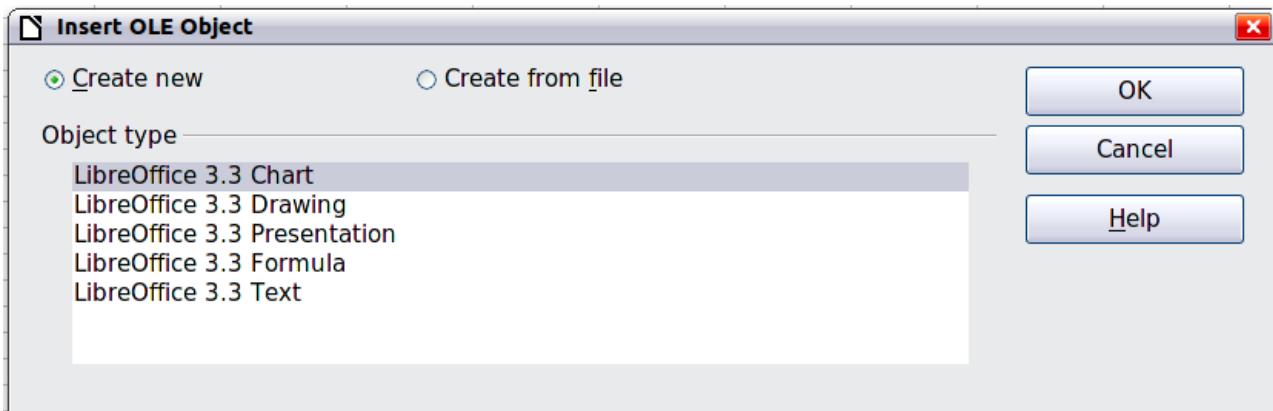


Figure 280: Insert OLE object dialog

- 3) You can either create a new OLE object or create from a file.

To create a new object:

- 1) Select **Create new** and select the object type among the available options.
- 2) Click **OK**. An empty container is placed in the slide.
- 3) Double-click on the OLE object to enter the edit mode of the object. The application devoted to handling that type of file will open the object.

Note

If the object inserted is handled by LibreOffice, then the transition to the program to manipulate the object will be seamless; in other cases the object opens in a new window and an option in the File menu becomes available to update the object you inserted.

To insert an existing object:

- 1) To create from a file, select **Create from file**. The dialog changes to look like Figure 258.
- 2) To insert the object as a link, select the **Link to file** option. Otherwise, the object will be embedded.
- 3) Click **Search**, select the required file in the Open dialog, then click **Open**. A section of the inserted file is shown in the document.

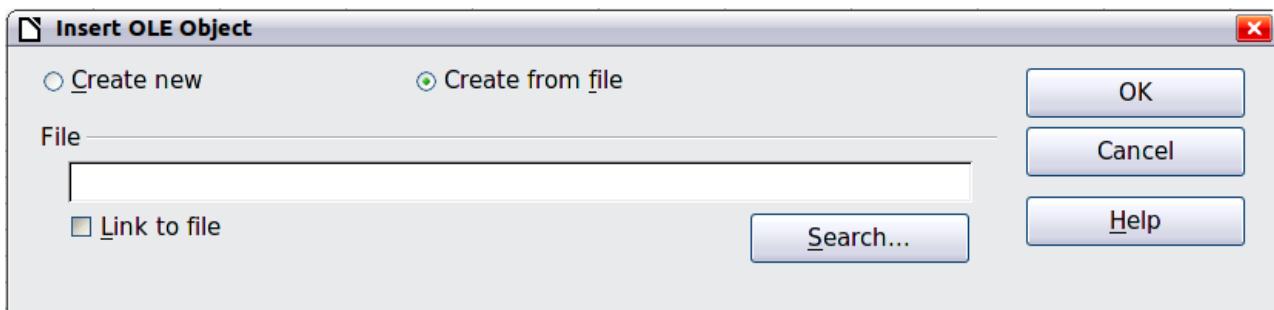


Figure 281: Inserting an object as a link

Other OLE objects

Under Windows, the Insert OLE Object dialog box has an extra entry, **Further objects**.

- 1) Double-click on the entry **Further objects** to open the dialog shown below.

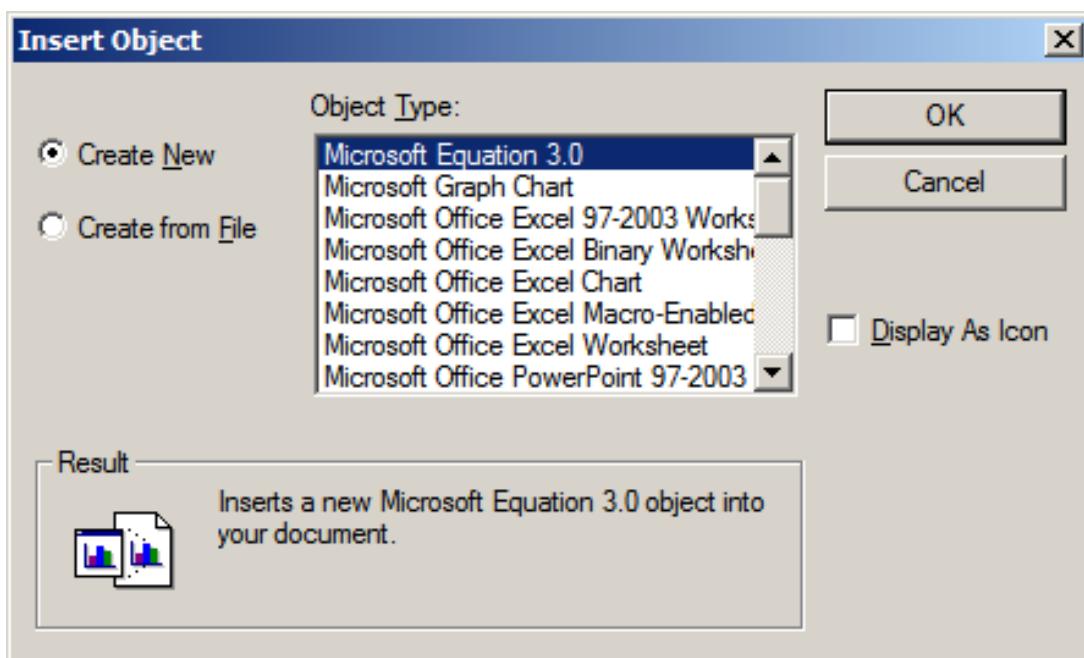


Figure 282: Inserting an OLE object under Windows

- 2) Select **Create New** to insert a new object of the type selected in the Object Type list, or select **Create from File** to create a new object from a file.
- 3) If you choose **Create from File**, the dialog shown below opens. Click **Browse** and choose the file to insert. The inserted file object is editable by the Windows program that created it. If instead of inserting an object, you want to insert a *link* to an object, select the **Display As Icon** option.

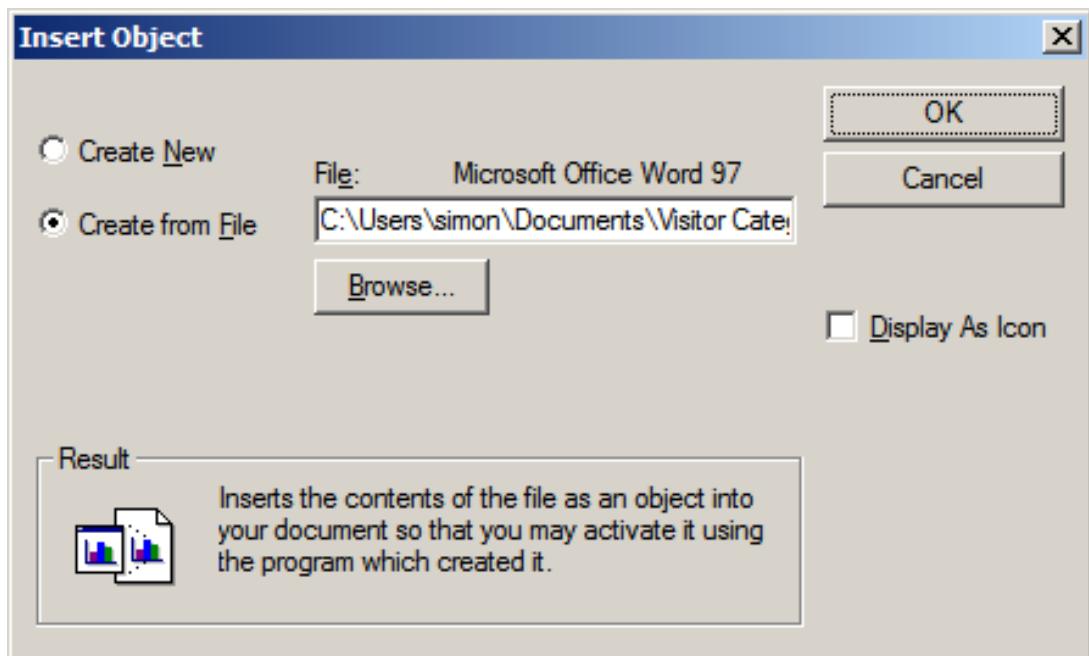


Figure 283: Insert object from a file

Non-linked OLE object

If the OLE object is not linked, it can be edited in the new document. For instance, if you insert a spreadsheet into a Writer document, you can essentially treat it as a Writer table (with a little more power). To edit it, double-click on it.

Linked OLE object

When the spreadsheet OLE object is linked, if you change it in Writer it will change in Calc; if you change it in Calc, it will change in Writer. This can be a very powerful tool if you create reports in Writer using Calc data, and want to make a quick change without opening Calc.

Note

You can only edit one copy of a spreadsheet at a time. If you have a linked OLE spreadsheet object in an open Writer document and then open the same spreadsheet in Calc, the Calc spreadsheet will be a read-only copy.

Dynamic Data Exchange (DDE)

DDE is an acronym for Dynamic Data Exchange, a mechanism whereby selected data in document *A* can be pasted into document *B* as a linked, ‘live’ copy of the original. It would be used, for example, in a report written in Writer containing time-varying data, such as sales results sourced from a Calc spreadsheet. The DDE link ensures that, as the source spreadsheet is updated so is the report, thus reducing the scope for error and reducing the work involved in keeping the Writer document up to date.

DDE is a predecessor of OLE. With DDE, objects are linked through file reference, but not embedded. You can create DDE links either within Calc cells in a Calc sheet, or in Calc cells in another LibreOffice doc such as in Writer.

DDE link in Calc

Creating a DDE link in Calc is similar to creating a cell reference. The process is a little different, but the result is the same.

- 1) In Calc, select the cells that you want to make the DDE link to.
- 2) Copy them: **Edit → Copy** or **Ctrl+C**.
- 3) Go to the place in the spreadsheet where you want the link to be.
- 4) Select **Edit → Paste Special**.
- 5) When the Paste Special dialog opens, select the **Link** option on the bottom left of the dialog (Figure 257). Click **OK**.

The cells now reference the copied data, and the formula bar shows a reference beginning with **{=DDE**.

If you now edit the original cells, the linked cells will update.

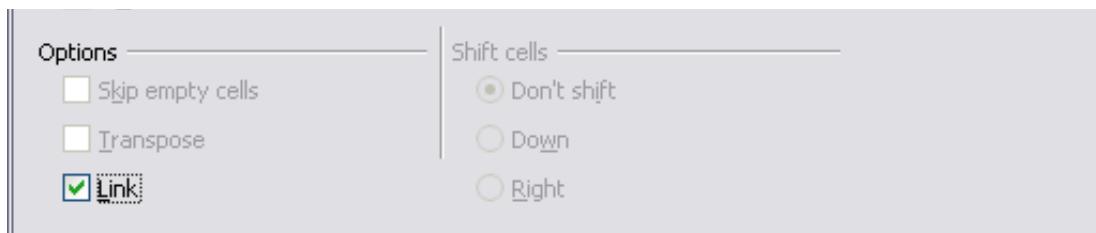


Figure 284: Location of Link option on Paste Special dialog in Calc

DDE link in Writer

The process for creating a DDE link from Calc to Writer is similar to creating a link within Calc.

- 1) In Calc, select the cells to make the DDE link to. Copy them.
- 2) Go to the place in your Writer document where you want the DDE link. Select **Edit → Paste Special**.
- 3) Select **DDE Link** (Figure 256). Click **OK**.

Now the link has been created in Writer. When the Calc spreadsheet is updated, the table in Writer is automatically updated.

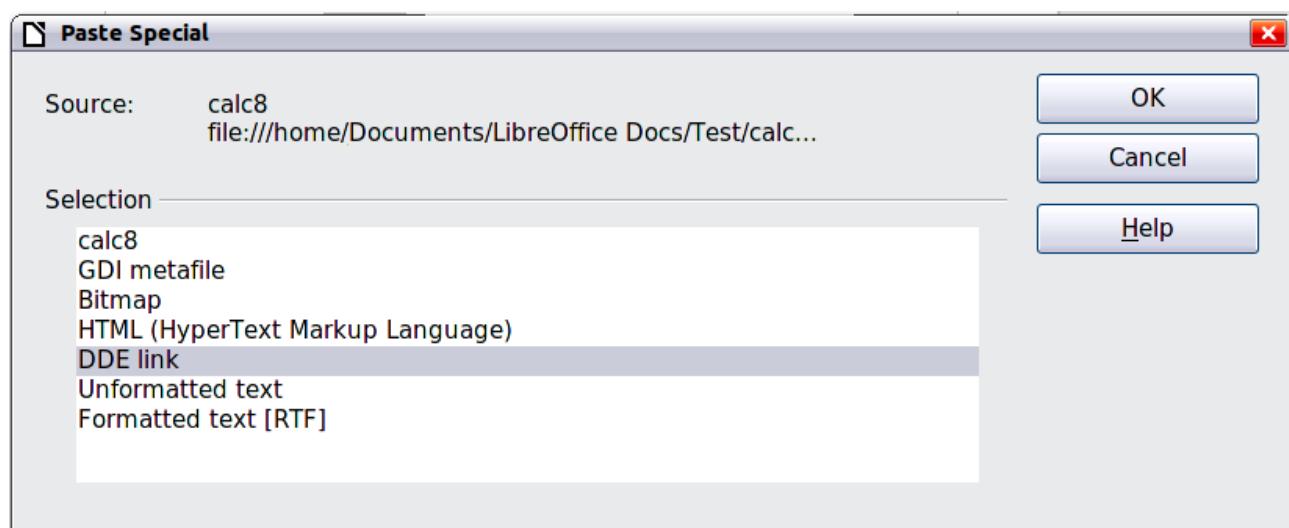
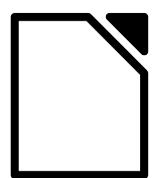


Figure 285: Paste Special dialog in Writer, with DDE link selected



LibreOffice
The Document Foundation

Chapter 11

Sharing and Reviewing Documents

Introduction

This chapter covers methods for editing shared documents: sharing (collaboration), recording changes, adding comments, reviewing changes, merging and comparing documents, and saving and using document versions. Basic editing techniques are discussed in Chapter 2, Entering, Editing, and Formatting Data.

Sharing documents (collaboration)

In LibreOffice Writer, Impress, and Draw, only one user at a time can open any document for editing. In Calc, many users can open the same spreadsheet for writing at the same time.

Each user who wants to collaborate should be sure to enter a name on the **Tools → Options → LibreOffice → User Data** page.

Some menu commands are not available (grayed out) when change tracking or document sharing is activated.

Setting up a spreadsheet for sharing

At any time, you can set up a spreadsheet for sharing with others. With the spreadsheet document open, choose **Tools → Share Document** to activate the collaboration features for this document. A dialog opens where you can enable or disable sharing.

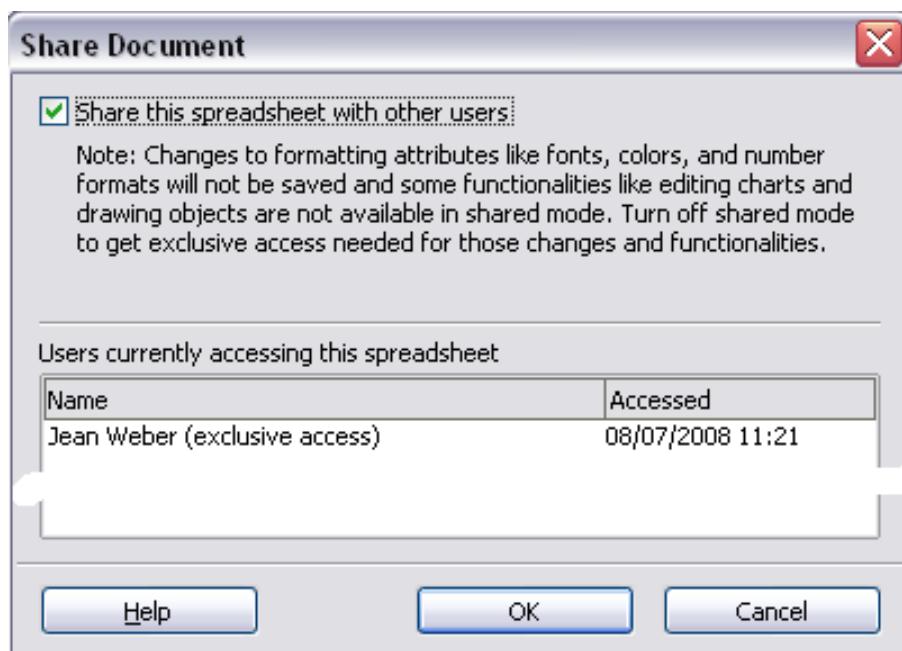


Figure 286: Choosing to share a spreadsheet

To enable sharing, select the box at the top of the dialog, and then click **OK**. A message appears stating that you must save the document to activate shared mode. Click **Yes** to continue. The word (**shared**) is then shown on the title bar after the document's title.

The **Tools → Share Document** command can be used to switch the mode for a document from unshared to shared. However, if you want to use a shared document in unshared mode, you need to save the shared document using another name or path. This creates a copy of the spreadsheet that is not shared.

Opening a shared spreadsheet

When you open a spreadsheet document that is in shared mode, a message appears stating that the document is in shared mode and that some features are not available in this mode. After clicking **OK**, the document is opened in shared mode.

The following features are known to be disabled in a shared spreadsheet document:

Edit → Changes, except for **Merge Document**

Edit → Compare Document

Edit → Sheet → Move/Copy & Delete

Insert → Cells Shift Cells Down & Shift Cells Right

Insert → Sheet from file

Insert → Names

Insert → Comment

Insert → Picture → From File

Insert → Movie and Sound

Insert → Object

Insert → Chart

Insert → Floating Frame

Format → Sheet → Rename, Tab Color

Format → Merge Cells → Merge and Center, Merge Cells, Split Cells

Format → Print Ranges

Tools → Protect Document

Data → Define Range

Data → Sort

Data → Subtotals

Data → Validity

Data → Multiple Operations

Data → Consolidate

Data → Group and Outline (all)

Data → DataPilot

Saving a shared spreadsheet

When you save a shared spreadsheet, one of several situations may occur:

- If the document was not modified and saved by another user since you opened it, the document is saved.
- If the document was modified and saved by another user since you opened it, one of the following events will occur:
 - If the changes do not conflict, the document is saved, the message below appears, and any cells modified by the other user are shown with a red border.

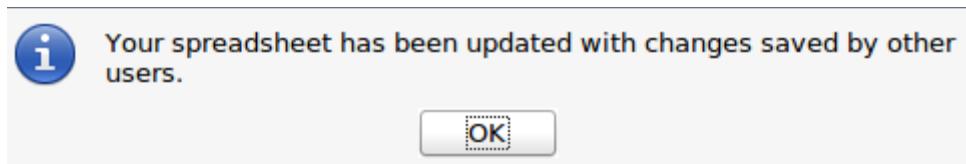


Figure 287: Update message after saving

- If the changes conflict, the Resolve Conflicts dialog is shown. You must decide for each conflict which version to keep, yours or the other person's. When all conflicts are resolved, the document is saved. While you are resolving the conflicts, no other user can save the shared document.



Figure 288: Resolve Conflicts dialog

- If another user is trying to save the shared document and resolve conflicts, you see a message that the shared spreadsheet file is locked due to a merge-in in progress. You can choose to cancel the Save command for now, or retry saving later.

When you successfully save a shared spreadsheet, the document shows the latest version of all changes saved by all users.

Recording changes

You can use several methods to record changes that you or others make to a document.

- You can use change marks to show added material, deleted material, and changes to formatting. Later, you or another person can review the document and accept or reject each change.
- If you are not using file sharing, you can make changes to a copy of the document (stored in a different folder, under a different name, or both), then use Calc to compare the files and show the changes. See page 286.
- You can save versions that are stored as part of the original file. See page 287.

Reviewers can leave comments in the document, either attached to specific changes or standalone.

Preparing a document for review (optional)

When you send a document to someone else to review or edit, you may want to protect it first so that the editor or reviewer does not have to remember to turn on the revision marks. After you have protected the document, any user must enter the correct password in order to turn off protection and accept or reject changes.

- Open the document and make sure that the **Edit → Changes → Record** menu item has a check mark next to it, indicating that change recording is active.
- (Optional) Click **Edit → Changes → Protect Records**. On the Protect Records dialog, type a password (twice) and click **OK**.

Note

It is not necessary to password protect the document while preparing it for review.

Identifying copies of spreadsheets

When not using the document sharing feature, it is important to keep track of the different copies of the document. This can be done either in the file name or in the file title. If you have not provided a file title in the spreadsheet's properties, the spreadsheet's file name is displayed in the title bar. To set the title of the spreadsheet, select **File → Properties → Description**.

Recording changes (tutorial)

For this chapter we will work with a budget proposal for a baseball team.

You are the sponsor of a youth baseball team. The coach has submitted a budget to you for the season and you need to edit the costs and return it to her.

You are concerned that if you just make the changes, then the coach won't see the changes you made. You decide to use Calc with the record changes feature turned on, so that the coach can easily see the change you have made.

Figure 289 shows the budget spreadsheet your coach submitted.

The screenshot shows a LibreOffice Calc spreadsheet window. The title bar includes the LibreOffice logo, 'Default' theme, font 'Arial' at size '10', bold, italic, underline, and various other icons. The active cell is G15. The formula bar shows 'f_{oo} Σ ='. The spreadsheet has a header row with columns A, B, C, D, and E. Below the header, there is a table with 12 rows of data. The table has a total of 6 columns: Item Description, Quantity, Cost, Total, and Comments. The 'Total' column contains the value '\$4,730.00' and the word 'Total'. The 'Comments' column contains notes such as 'Need to update the team look', 'We need to 10 per game', etc. The table is titled 'Baseball Budget Proposal' in bold black text centered above the first data row.

	A	B	C	D	E
1	Baseball Budget Proposal				
2	Item Description	Quantity	Cost	Total	Comments
3	Uniforms	25	\$50.00	\$1,250.00	Need to update the team look
4	Baseballs	250	\$4.00	\$1,000.00	We need to 10 per game
5	Umpire fees	25	\$50.00	\$1,250.00	1 Umpire per game
6	Bats	5	\$35.00	\$175.00	We need bats of various sizes
7	Snacks	25	\$15.00	\$375.00	This is the max cost per game for after game snacks
8	Batting helmets	5	\$40.00	\$200.00	We need a minimum of 5
9	Catching Gear	1	\$300.00	\$300.00	Need to protect the catcher, old gear ugly
10	Spare Gloves	4	\$45.00	\$180.00	Just in case someone forgets their glove
11				\$4,730.00	Total
12					

Figure 289: Baseball budget spreadsheet

Looking over the figures, you see a few places where money could be saved:

- Post-game snacks can be bought by parents.
- New uniforms can wait; only buy 10 to replace damaged ones.
- Buy cheaper baseballs.
- Only buy 2 spare gloves.

To make these changes, use the record changes feature in Calc. To start recording changes:

- 1) Open the Budget Spreadsheet.
- 2) Select **Edit → Changes → Record** from the menu bar.
- 3) Begin editing the document.

A colored border, with a dot in the upper left-hand corner, appears around a cell where changes were made (Figure 290). Other reviewers then quickly know which cells were edited. A deleted column or row is marked by a heavy colored bar.

The screenshot shows a LibreOffice Calc spreadsheet titled "Baseball Budget Proposal". The table has columns for Item Description, Quantity, Cost, Total, and Comments. Cells B3, B4, B7, B10, and B11 have red borders, indicating they have been edited. The formula bar at the top shows "B11".

A	B	C	D	E
1				Baseball Budget Proposal
2	Item Description	Quantity	Cost	Total
3	Uniforms	10	\$50.00	\$500.00
4	Baseballs	250	\$2.00	\$500.00
5	Umpire fees	25	\$50.00	\$1,250.00
6	Bats	5	\$35.00	\$175.00
7	Snacks	0	\$15.00	\$0.00
8	Batting helmets	5	\$40.00	\$200.00
9	Catching Gear	1	\$300.00	\$300.00
10	Spare Gloves	2	\$45.00	\$90.00
11				\$3,015.00 Total
12				

Figure 290: Edited document with red border on changed cells

Tip Some changes, for example cell formatting, are not recorded and marked.

Tip To change the color that indicates changes, select **Tools → Options → LibreOffice Calc → Changes**.

When you finish editing the document, you can send it to your coach.

You may want to explain your rationale for the changes. You can share your insight in two ways: by adding comments to the changes you made, or by adding general comments to the spreadsheet.

Adding comments to changes

Calc automatically adds to any recorded change a comment that describes what was changed (for example, *Cell B4 changed from '9' to '4'*). Reviewers and authors can add their own comments to explain their reasons for the changes.

To add a comment to a change:

- 1) Make the change to the spreadsheet.
- 2) Select the cell with the change.
- 3) Choose **Edit → Changes → Comments**. The dialog shown in Figure 291 appears. The automatically-added comment provided by Calc appears in the title bar of this dialog and cannot be edited.
- 4) Type your own comment and click **OK**.

Tip You can step through your changes one at a time using the left and right arrows on the right hand side of the Comment dialog, and add comments to each change. The title bar for the Comment dialog shows the cell and the change you are commenting on.

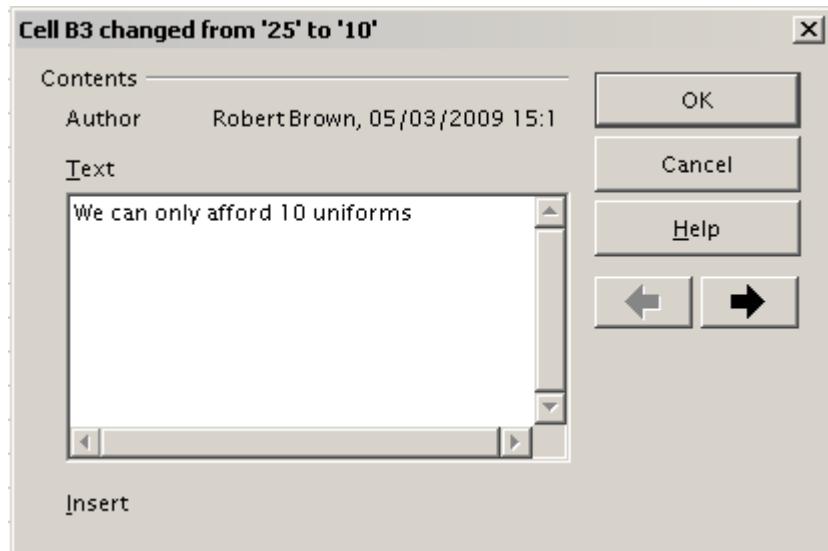


Figure 291: Comment dialog

After you have added a comment to a changed cell, you can see it by hovering the mouse pointer over the cell, as shown in Figure 292.

	A	B	C	D	E
1					
2	Item Description	Quantity			
3	Uniforms	10			
4	Baseballs	250	\$2.00	\$500.00	We need to
5	Umpire fees	25	\$50.00	\$1,250.00	1 Umpire pe
6	Bats	5	\$35.00	\$175.00	We need to

Figure 292: Comment added to cell B3

The comment also appears in the dialog when you are accepting and rejecting changes, as shown in the first line of Figure 288 on page 278.

Editing change comments

- 1) Select the cell with the change comment that you want to edit.
- 2) Select **Edit → Changes → Comments**.
- 3) Edit the comment and click **OK**.

Tip

You can view your comments one at a time using the left and right arrows located on the right hand side of the Comment dialog. You do not need to click **OK** after editing each comment; you can save them all at once when you're done editing.

Adding other comments

Calc provides another type of comments (formerly called “notes”), which authors and reviewers often use to exchange ideas, ask for suggestions, or brainstorm in the document.

To add a comment:

- 1) Select the cell that the comment applies to.

- 2) Select **Insert** → **Comment** or right-click and select **Insert Comment**. (The latter method does not work if the automatic spelling checker is active and the cell contains a misspelled word.) The box shown in Figure 293 appears.
- 3) Type the text of your comment in the box.
- 4) Click outside the box to close it.

Comments
Need to update the team look
We need to 10 per game
1 Umpire per game
We need bats of various sizes
This is the max cost per game for after game snacks
We need a minimum of 5
Need to protect the catcher, old gear ugly
Just in case someone forgets their glove

Figure 293: Inserting a comment

Now the cell to which you added the comment has a colored dot in the upper right-hand corner, as shown in Figure 294. It does not have a colored border, unless the cell was also changed.

We need bats of various sizes
This is the max cost per game for after game snacks
We need a minimum of 5

Figure 294: Colored dot in cell containing a comment

Tip

You can change the colors Calc uses for notes by selecting **Tools** → **Options** → **LibreOffice** → **Appearance**.

To view the comment you just added, hover the mouse pointer over the cell that has a comment; the comment appears, as shown below.

We need to 10 per game
1 Umpire per game
We need bats of various sizes
This is the max cost per game for after game snacks
We need a minimum of 5
Need to protect the catcher, old gear ugly

Why do we need 5 helmets?

Figure 295: Viewing a comment

Editing comments

You can edit and format the text of a comment, just as you do for any other text.

- 1) Right-click on the cell containing the comment marker, and choose **Show comment** from the context menu.
- 2) Select the comment, then double-click on it. The cursor changes to the usual blinking text-entry cursor, and the Formatting toolbar changes to show text attributes.
- 3) When done, click outside the comment to deselect it. To hide the comment again, right-click on the cell and deselect **Show Comment** on the context menu.

Formatting comments

You can change the background color, border style, transparency, and other attributes of a comment.

- 1) Right-click on the cell containing the comment marker, and choose **Show comment** from the context menu.
- 2) Click on the comment itself. The Formatting toolbar changes to show many of the comment formatting options. These are the same as the options for formatting graphics; see Chapter 5, Using Graphics in Calc, for more information.
You can also right-click on the comment to see a menu of choices, some of which lead to dialogs in which you can fine-tune the formatting; these dialogs are also discussed in Chapter 5.
- 3) When done, click outside the comment to deselect it. To hide the comment again, right-click on the cell and deselect **Show Comment** on the context menu.

Finding comments using the Navigator

The small comment markers in the corners of cells can be difficult to see, so Calc provides another way to find them, by using the Navigator. If any comments are in the spreadsheet, the Navigator shows a mark (usually a + or an arrow) next to the word Comments. Click on this mark to display a list of comments. Double-click on the comment you want to jump directly to the cell it is associated with.

Reviewing changes

At this point, we are going to change our perspective from the point of view of the team sponsor to that of the coach, so we can see how to review and accept or reject the changes to the document the coach originally wrote.

You are the coach of a youth baseball team and you submitted a potential budget created in Calc to your team sponsor.

Your sponsor has reviewed the document using the record changes feature of Calc. Now, you want to review those changes and accept or reject the counter proposal.

Because the sponsor recorded changes in Calc, you can easily see what changes were made and decide how to act.

Viewing changes

Calc gives you tremendous control over what changes you see when reviewing a document. To change the available filters, select **Edit** → **Changes** → **Show**. The dialog shown in Figure 295 opens.

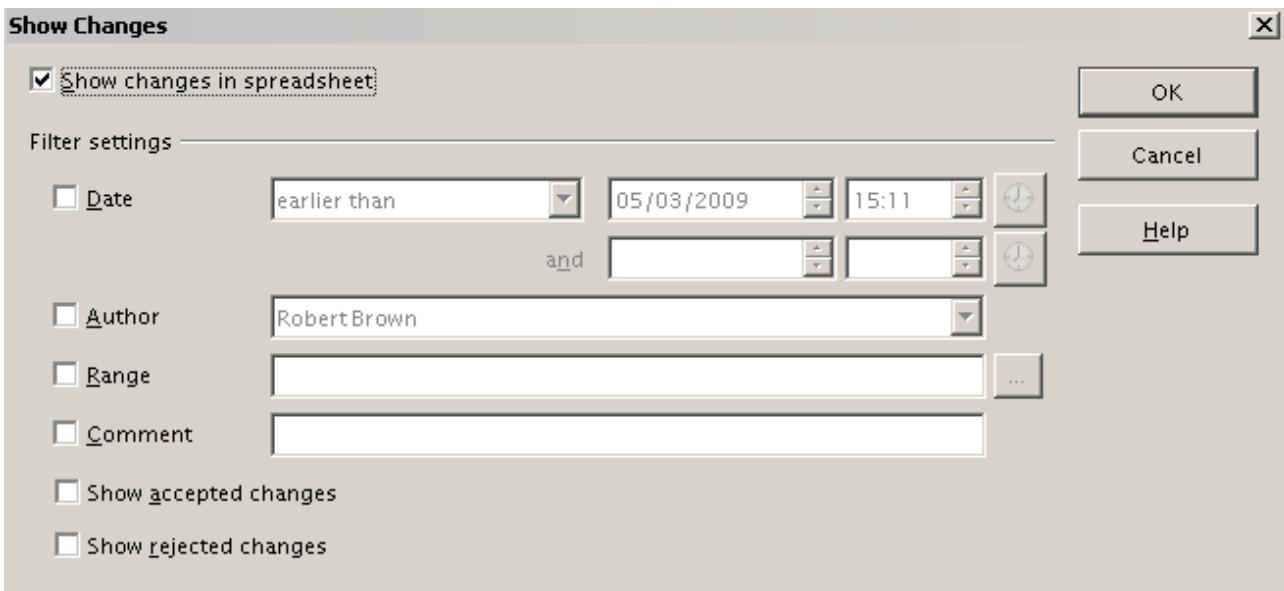


Figure 296: Show changes dialog

Using the different settings, you can control which changes appear on screen. You can filter based on:

- Date – Only changes made in a certain time range are displayed.
- Author – Only changes made by a specific author are displayed. This is especially useful if you have multiple reviewers on the document.
- Range – Only changes made in a specific range of cells are displayed. This is especially useful if you have a large spreadsheet and only want to review a part of it.
- Comment – Searches the content of the comments and only displays changes which have comments that match the search criteria.
- Show accepted changes – Only changes you accepted are displayed.
- Show rejected changes – Only changes you rejected are displayed.

Note

You can also access the filter control in the Accept or Reject Changes dialog shown in Figure 288. Click the *Filter* tab to get a set of options similar to those shown in Figure 294.

Accepting or rejecting changes

When you receive a document back with changes, the beauty of the recording changes system becomes evident. Now, as the original author, you can step through each change and decide how to proceed. To begin this process:

- 1) Open the edited document.
- 2) Select **Edit → Changes → Accept or Reject**. The dialog shown in Figure 288 appears.
- 3) Calc steps through the changes one at a time. You can choose to accept or reject each change as you go through.

The *Comment* column by default contains an explanation of the change that was made. If the reviewer added a comment to the change, it is displayed, followed by the description of the change, as in the first line of Figure 288.

If more than one person has reviewed the document, one reviewer may have modified another reviewer's change. If so, the changes are hierarchically arranged with a plus sign for opening up the hierarchy.

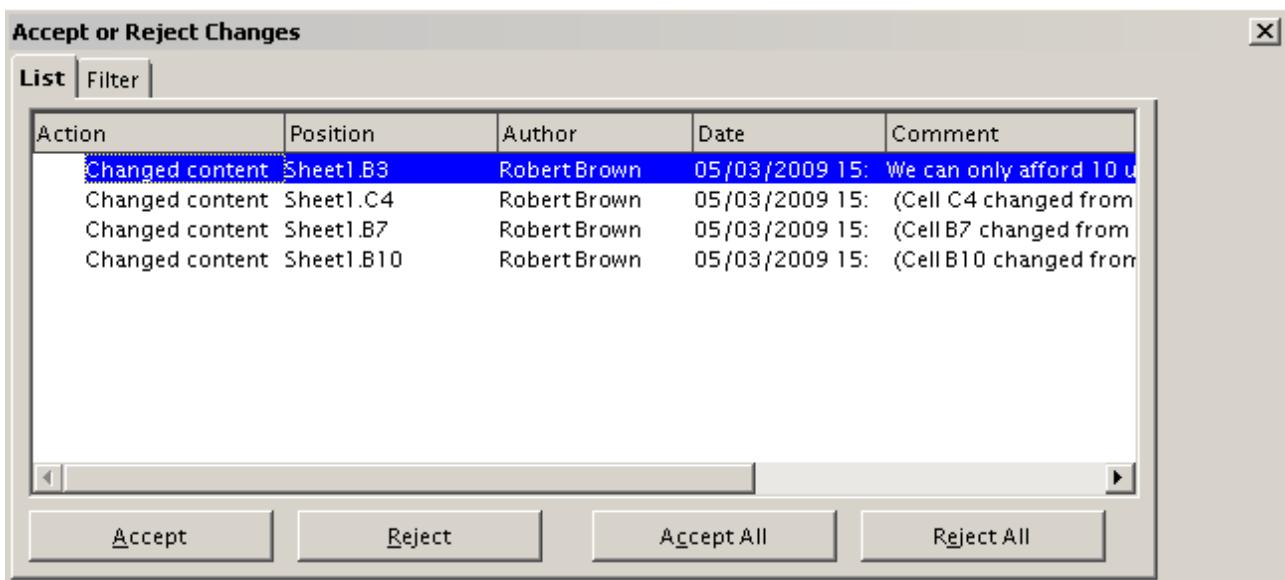


Figure 297: Accept or Reject changes dialog

On the Filter tab of this dialog (not shown here), you can choose how to filter the list of changes: by date, author, cell range, or comments containing specific terms. After selecting the filter criteria, switch back to the List tab to see the results.

Merging documents

You submitted your budget proposal to your sponsor, but you sent it to one of your assistant coaches as well. Both of them returned their revised budget to you at the same time.

You could review each document and the changes separately, but to save time, you want to see both of their revisions simultaneously.

To do this, you can use Calc's merge document feature.

The processes discussed to this point are effective when you have one reviewer at a time. Sometimes, however, multiple reviewers all return edited versions of a document at the same time. In this case, it may be quicker to review all of these changes at once, rather than one review at a time. For this purpose, you can merge documents in Calc.

To merge documents, all of the edited documents need to have recorded changes in them.

- 1) Open the original document.
- 2) Select **Edit → Changes → Merge Document**.
- 3) A file selection dialog opens. Select a file you want to merge and click **OK**.
- 4) After the documents merge, the Accept or Reject Changes dialog opens, as in Figure 287, showing changes by more than one reviewer. If you want to merge more documents, close the dialog and then repeat steps 2 and 3.

Now all of the changes are combined into one document and you can accept or reject the changes. Changes from different authors appear in different colors in the document, as shown in Figure 286. In this example, all of the changes from Robert are blue and the changes from Mia are red.

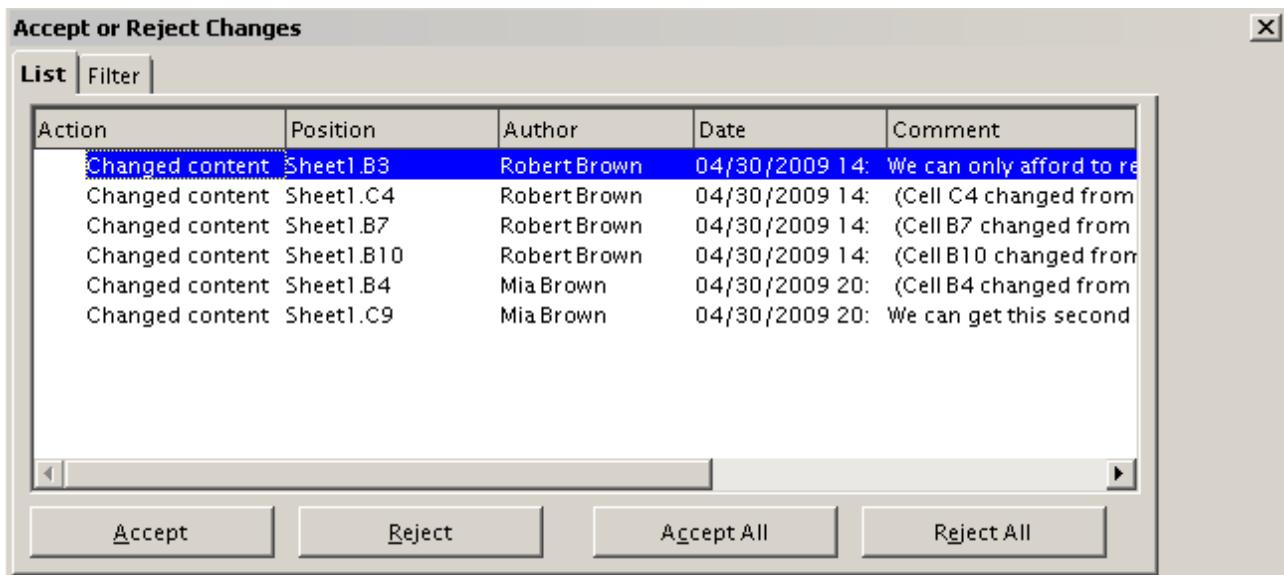


Figure 298: Accept or Reject for merged documents

Baseball Budget Proposal				
Item Description	Quantity	Cost	Total	Comments
Uniforms	10	\$50.00	\$500.00	Need to update the team look
Baseballs	275	\$2.00	\$550.00	We need to 10 per game
Umpire fees	25	\$50.00	\$1,250.00	1 Umpire per game
Bats	5	\$35.00	\$175.00	We need bats of various sizes
Snacks	0	\$15.00	\$0.00	This is the max cost per game for after game snacks
Batting helmets	5	\$40.00	\$200.00	We need a minimum of 5
Catching Gear	1	\$175.00	\$175.00	Need to protect the catcher, old gear ugly
Spare Gloves	2	\$45.00	\$90.00	Just in case someone forgets their glove
		\$2,940.00	Total	

Figure 299: Merged documents with different author colors

Comparing documents

Sometimes when sharing documents, reviewers may forget to record the changes they make. This is not a problem with Calc, because Calc can find the changes by comparing documents.

In order to compare documents you need to have the original document and the one that is edited. To compare them:

- 1) Open the edited document that you want to compare with the original document.
- 2) Select **Edit → Compare Document**.
- 3) An open document dialog appears. Select the original document and click **Insert**.

Calc finds and marks the changes as follows:

- All data that occurs in the edited document but not in the original is identified as inserted.
- All data that is in your original document but is not in the edited document is identified as deleted.
- All data that is changed, is marked as changed.

From this point you can go through and accept or reject changes as you could normally.

Saving versions

Most documents go through many drafts. It is often useful to save new versions of a document. You can do this by saving a copy of the document (under a different name) after each revision, or by using Calc's version feature.

Caution



If you do a **Save As...** of a document with different versions stored in it, the old versions are not saved in the new file.

To use version management in Calc:

- 1) Choose **File → Versions**. The Versions dialog opens.

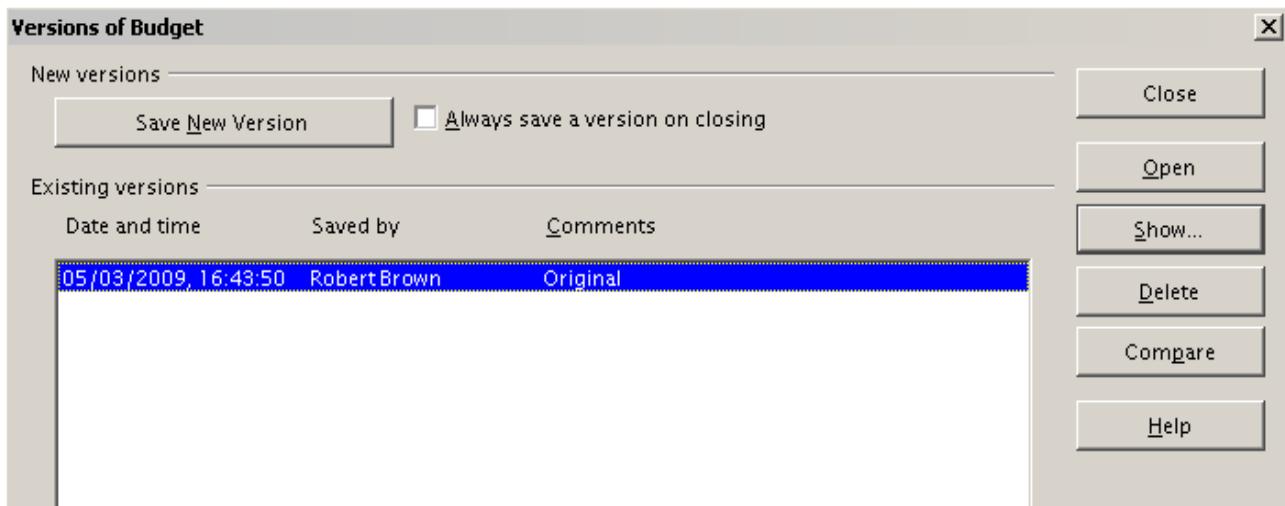


Figure 300: Version management dialog

- 2) Click the **Save New Version** button to save a new version.
- 3) A dialog opens where you can enter comments about this version.

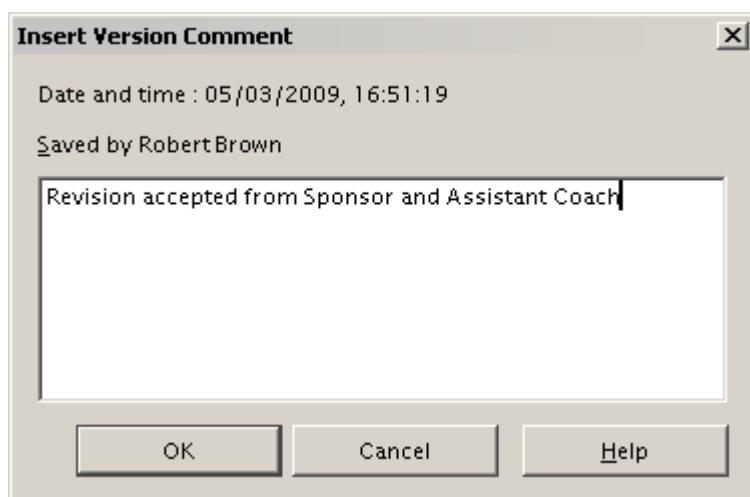


Figure 301: Version comment dialog

- 4) After you enter your comment and click **OK**, the new version is included in the version list.

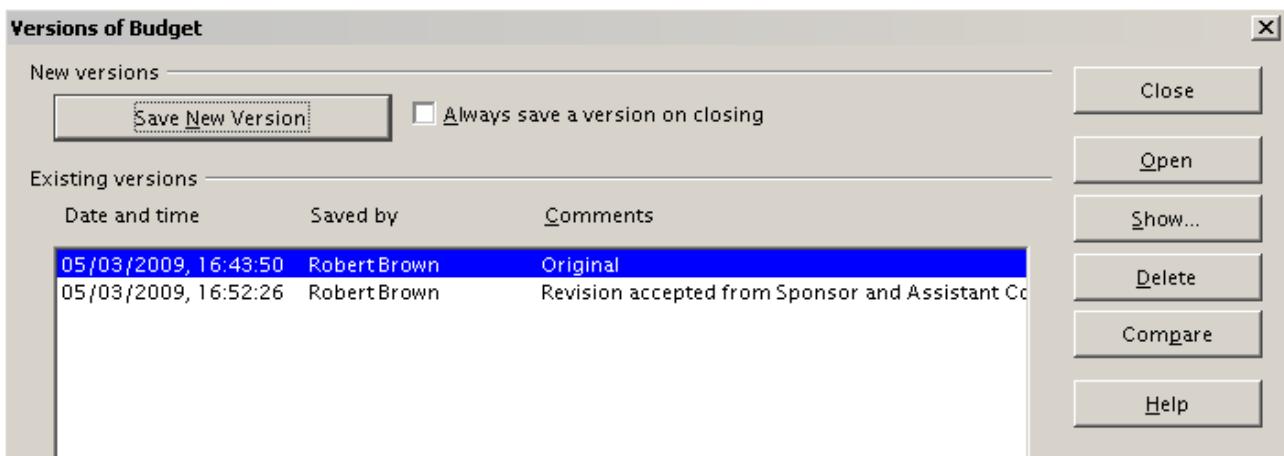


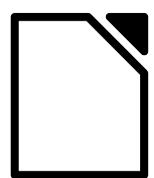
Figure 302: Updated version list

Now when you save the file, both versions are saved in the same file. From this point you can:

- Open an old version – Select the version and click the **Open** button and a read-only copy of a previous version opens.
- Compare all versions – Clicking the **Compare** button performs an action similar to merging documents together. An Accept or Reject Changes dialog opens showing all of the changes through the different versions.
- Review the comments – Select a version and click the **Show** button to display the full comments made by yourself or other reviewers.

Note

The new file is bigger in size, as if two spreadsheets were saved together.



LibreOffice
The Document Foundation

Chapter 12 *Calc Macros*

Automating repetitive tasks

Introduction

A macro is a saved sequence of commands or keystrokes that are stored for later use. An example of a simple macro is one that “types” your address. The LibreOffice macro language is very flexible, allowing automation of both simple and complex tasks. Macros are especially useful to repeat a task the same way over and over again. This chapter briefly discusses common problems related to macro programming using Calc.

Using the macro recorder

Chapter 13 of the *Getting Started* guide, *Getting Started with Macros*, provides a basis for understanding the general macro capabilities in LibreOffice using the macro recorder. An example is shown here without the explanations in the *Getting Started* guide. The following steps create a macro that performs paste special with multiply.

- 1) Open a new spreadsheet.
- 2) Enter numbers into a sheet.

	A	B	C
1	1	8	9
2	2	7	10
3	3	6	11

Figure 303: Enter numbers

- 3) Select cell A3, which contains the number 3, and copy the value to the clipboard.
- 4) Select the range A1:C3.
- 5) Use **Tools → Macros → Record Macro** to start the macro recorder. The Record Macro dialog is displayed with a stop recording button.

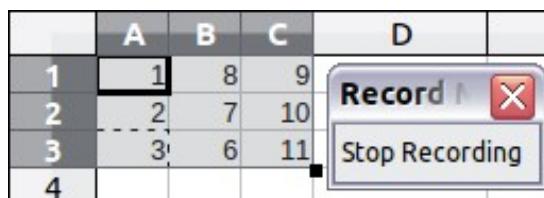


Figure 304: Stop recording button

- 6) Use **Edit → Paste Special** to open the Paste Special dialog (Figure 303).
- 7) Set the operation to **Multiply** and click **OK**. The cells are now multiplied by 3 (Figure 306).
- 8) Click **Stop Recording** to stop the macro recorder. The LibreOffice Basic Macros dialog (Figure 307) opens.

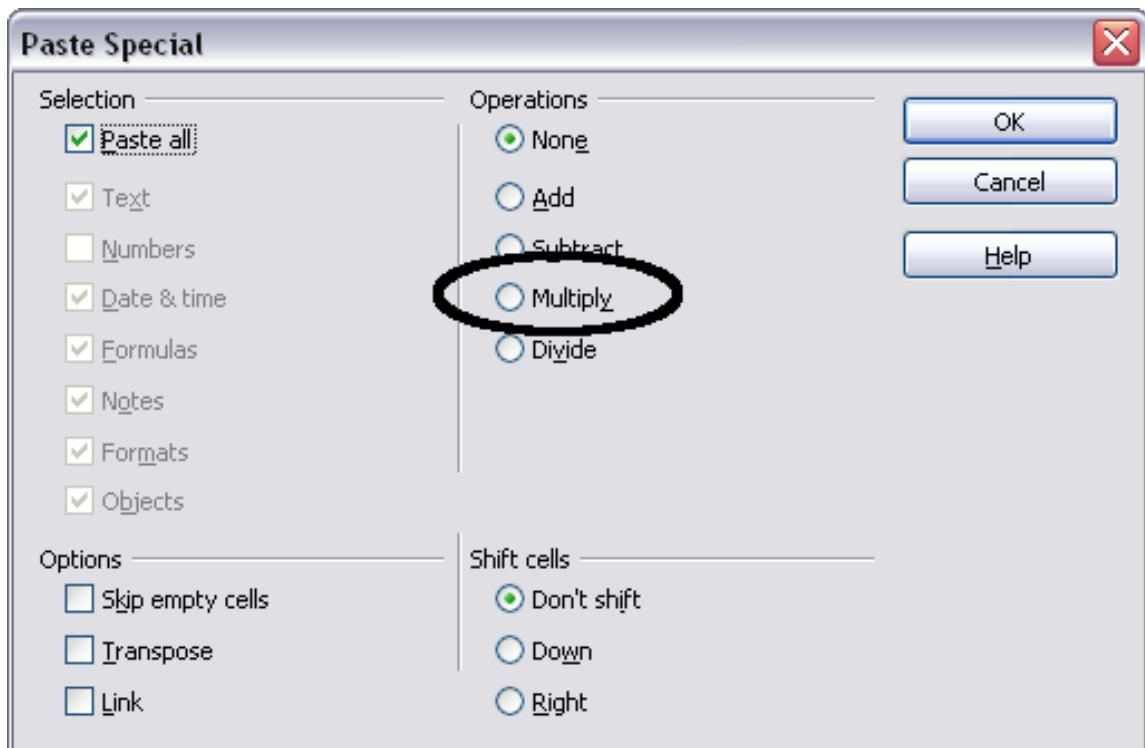
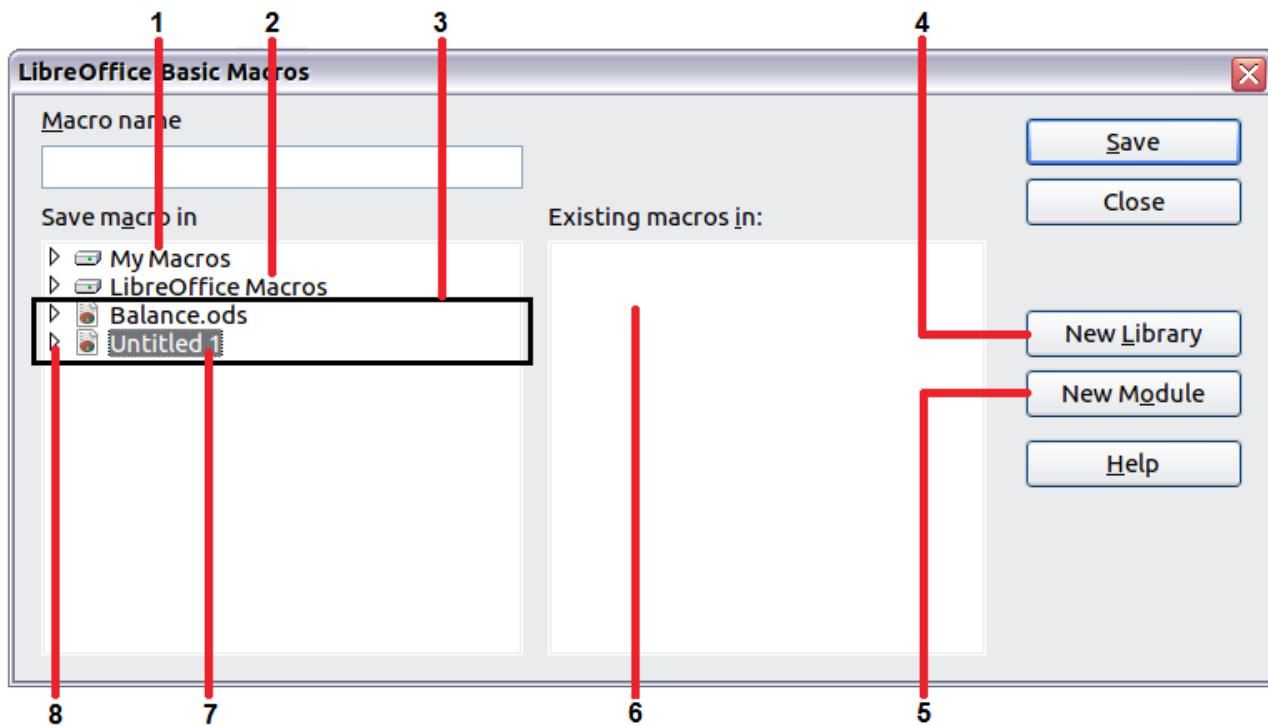


Figure 305: Paste Special dialog

	A	B	C	D	
1	3	24	27		
2	6	21	30		
3	9	18	33		
4					

Figure 306: Cells multiplied by 3

- 9) Select the current document (see Figure 307). For this example, the current Calc document is *Untitled 1*. Existing documents show a library named Standard. This library is not created until the document is saved or the library is needed, so at this point your new document does not contain a library. You can create a new library to contain the macro, but this is not necessary.



1 My Macros

2 LibreOffice Macros

3 Open documents

4 Create new library

5 Create new module in library

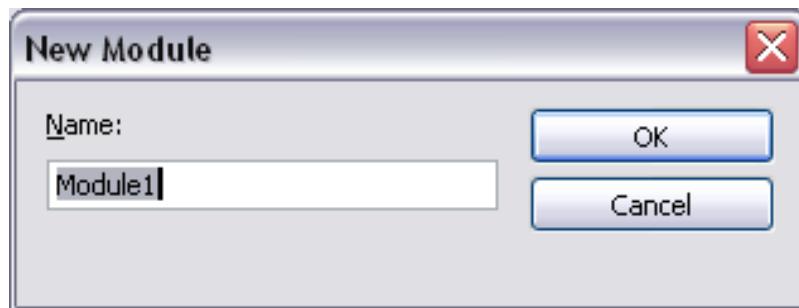
6 Macros in selected library

7 Current document

8 Expand/collapse list

Figure 307: Parts of the LibreOffice Basic Macros dialog

- 10) Click **New Module**. If no libraries exist, then the Standard library is automatically created and used. In the New Module dialog, type a name for the new module or leave the name as Module1.



- 11) Click **OK** to create a new module named Module1. Select the newly created Module1, type **PasteMultiply** in the Macro name box at the upper left, and click **Save**. (See Figure 308.)

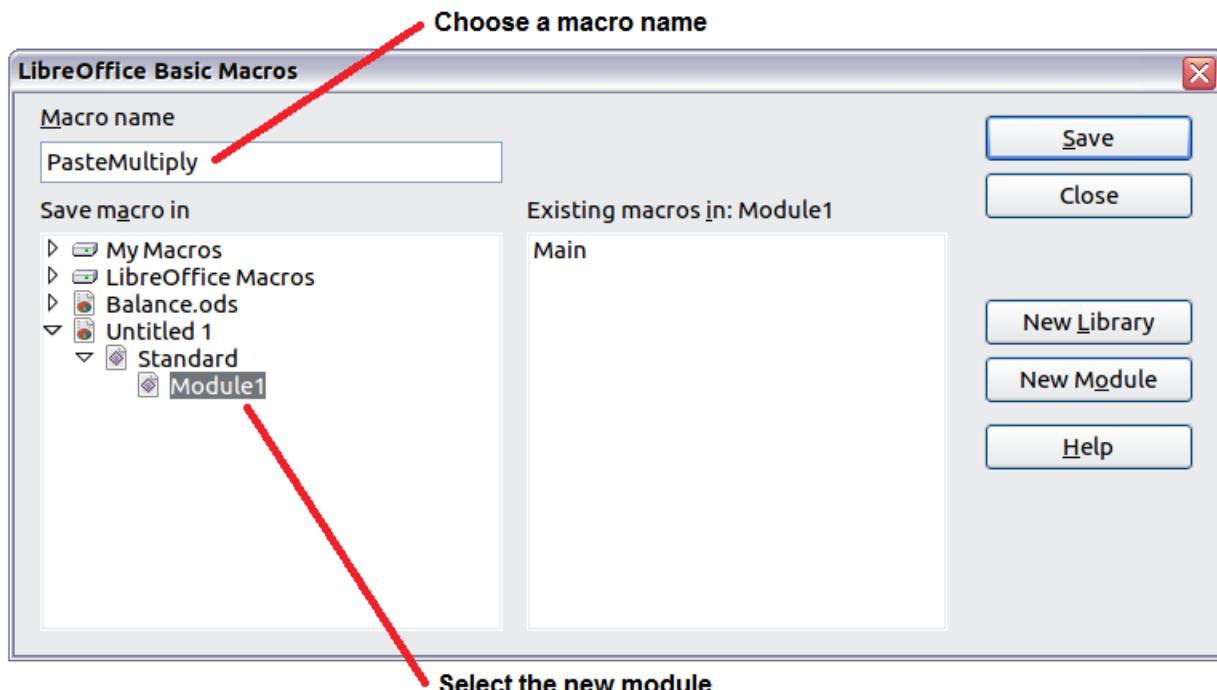


Figure 308: Select the module and name the macro

The created macro is saved in Module1 of the Standard library in the *Untitled 1* document. Listing 1 shows the contents of the macro.

Listing 1. Paste special with multiply.

```

sub PasteMultiply
    rem -----
    rem define variables
    dim document as object
    dim dispatcher as object
    rem -----
    rem get access to the document
    document = ThisComponent.CurrentController.Frame
    dispatcher = createUnoService("com.sun.star.frame.DispatchHelper")

    rem -----
    dim args1(5) as new com.sun.star.beans.PropertyValue
    args1(0).Name = "Flags"
    args1(0).Value = "A"
    args1(1).Name = "FormulaCommand"
    args1(1).Value = 3
    args1(2).Name = "SkipEmptyCells"
    args1(2).Value = false
    args1(3).Name = "Transpose"
    args1(3).Value = false
    args1(4).Name = "AsLink"
    args1(4).Value = false
    args1(5).Name = "MoveMode"
    args1(5).Value = 4

    dispatcher.executeDispatch(document, ".uno:InsertContents", "", 0,
    args1())
end sub

```

More detail on recording macros is provided in Chapter 13, Getting Started with Macros, in the *Getting Started* guide; we recommend you read it if you have not already done so. More detail is also provided in the following sections, but not as related to recording macros.

Write your own functions

Calc can call macros as Calc functions. Use the following steps to create a simple macro:

- 1) Create a new Calc document named **CalcTestMacros.ods**.
- 2) Use **Tools → Macros → Organize Macros → LibreOffice Basic** to open the LibreOffice Basic Macros dialog. The *Macro from* box lists available macro library containers including currently open LibreOffice documents. *My Macros* contains macros that you write or add to LibreOffice. *LibreOffice Macros* contains macros included with LibreOffice and should not be changed.

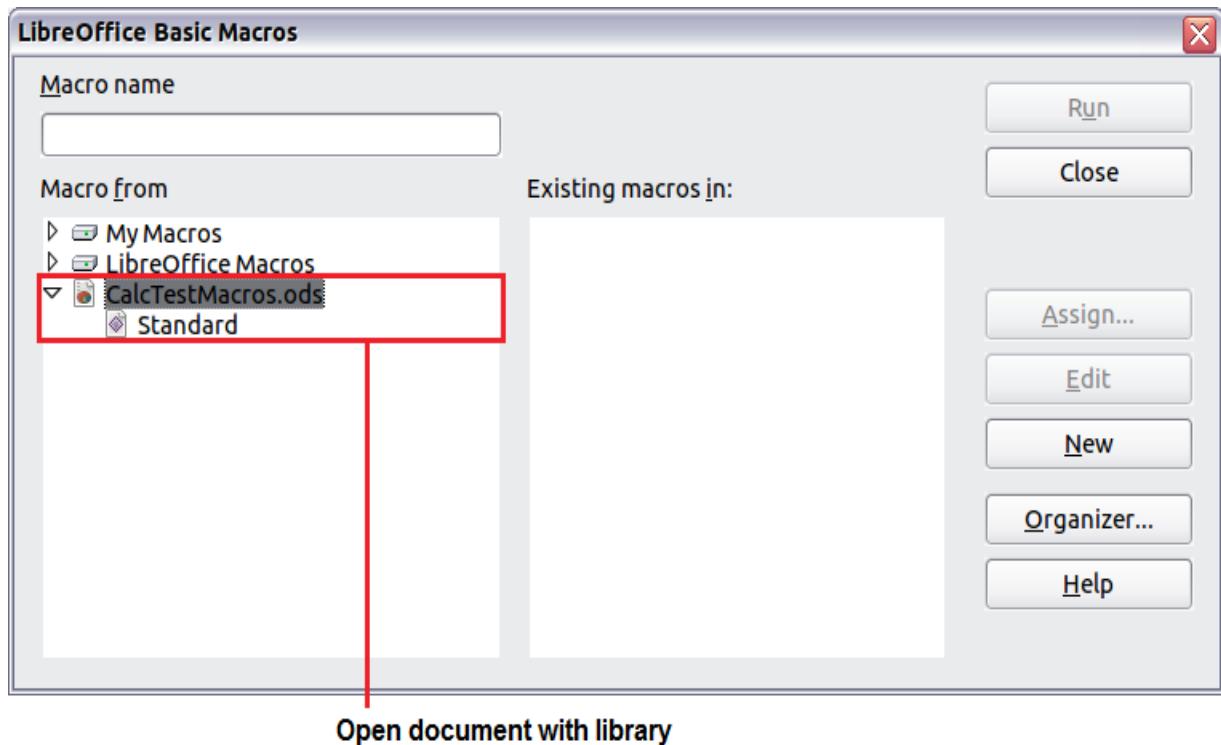


Figure 309: LibreOffice Basic Macros dialog

- 3) Click **Organizer** to open the LibreOffice Basic Macro Organizer dialog (Figure 310). On the Libraries tab, select the document to contain the macro.

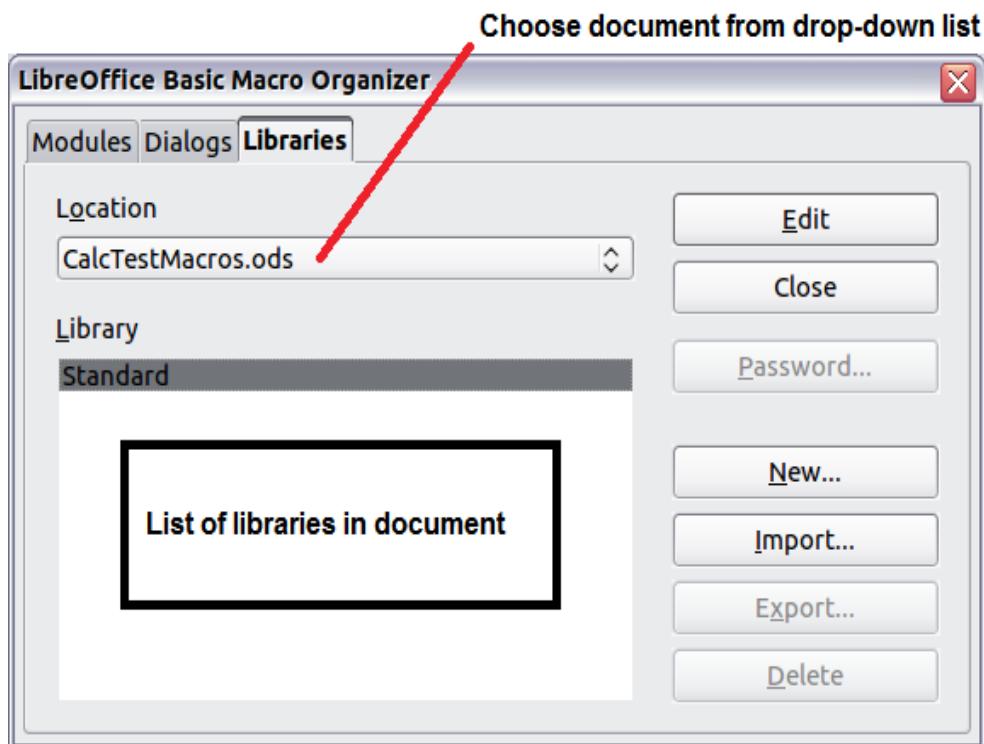


Figure 310: LibreOffice Basic Macro Organizer

- 4) Click **New** to open the New Library dialog.

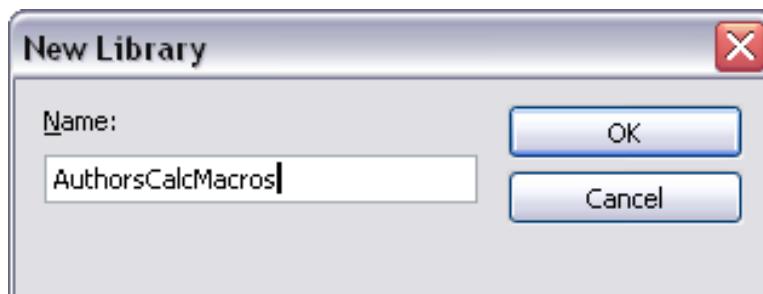


Figure 311: New Library dialog

- 5) Enter a descriptive library name (such as AuthorsCalcMacros) and click **OK** to create the library. The new library name is shown the library list, but the dialog may show only a portion of the name.

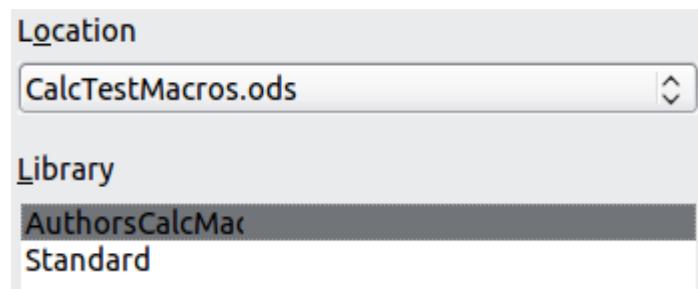


Figure 312: The library is shown in the organizer

- 6) Select AuthorsCalcMacros and click **Edit** to edit the library. Calc automatically creates a module named Module1 and a macro named Main.

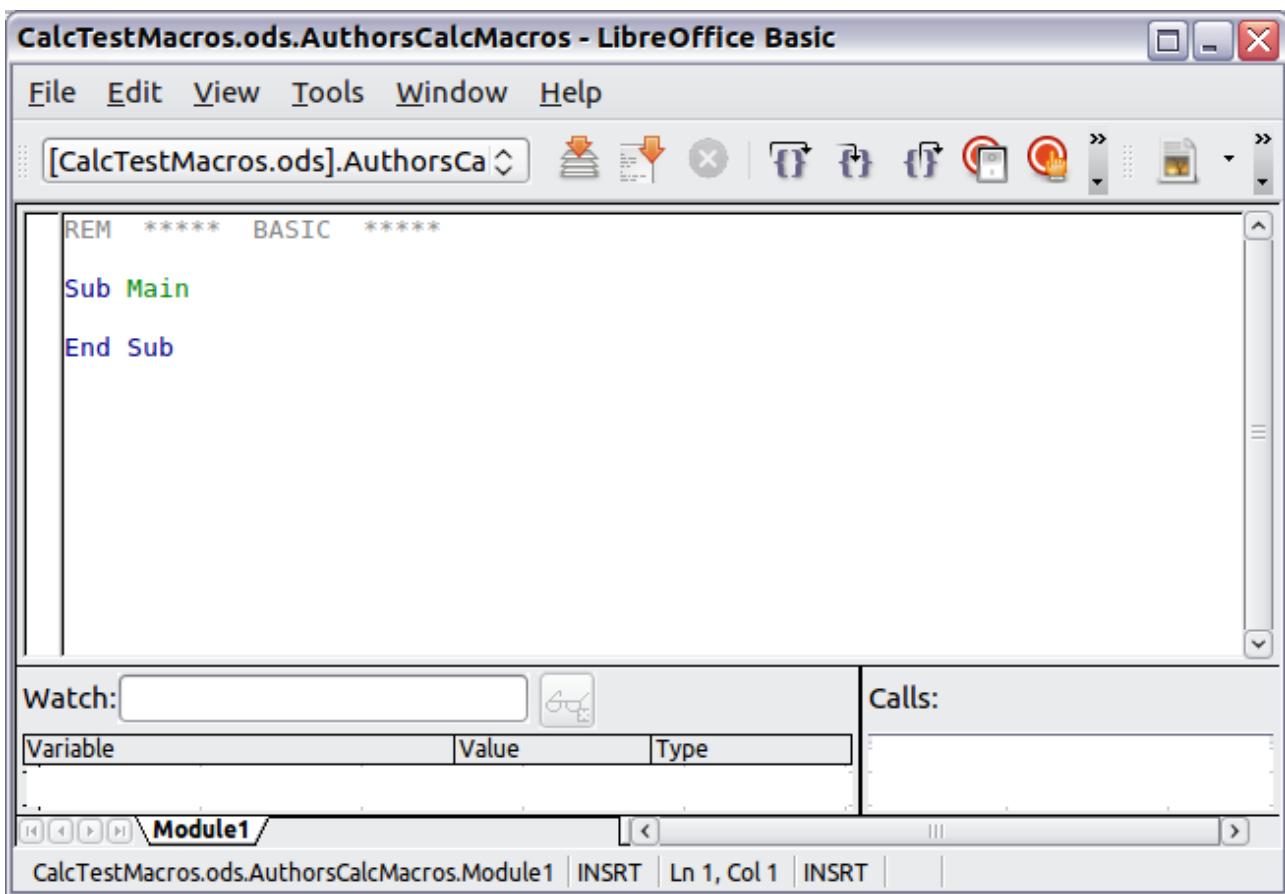


Figure 313: Basic Integrated Development Environment (IDE)

- 7) Modify the code so that it is the same as that shown in Listing 2. The important addition is the creation of the **NumberFive** function, which returns the number five. The **Option Explicit** statement forces all variables to be declared before they are used. If Option Explicit is omitted, variables are automatically defined at first use as type Variant.
- 8) Save the modified Module1.

Listing 2. Function that returns five.

```

REM ***** BASIC *****
Option Explicit

Sub Main
End Sub

Function NumberFive()
    NumberFive = 5
End Function

```

Using a macro as a function

Using the newly created Calc document **CalcTestMacros.ods**, enter the formula **=NumberFive()** (see Figure 314). Calc finds the macro and calls it.

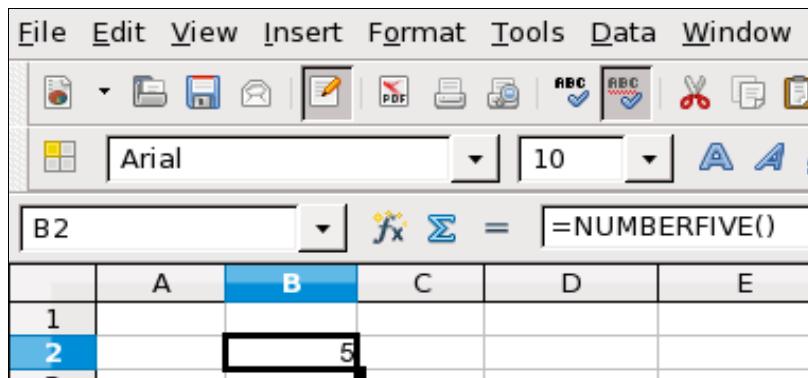


Figure 314: Use the NumberFive() Macro as a Calc function

Tip

Function names are not case sensitive. In Figure 314, you can enter `=NumberFive()` and Calc clearly shows `=NUMBERFIVE()`.

Save the Calc document, close it, and open it again. Depending on your settings in **Tools** → **Options** → **LibreOffice** → **Security** → **Macro Security**, Calc will display the warning shown in Figure 313 or the one shown in Figure 312. You will need to click **Enable Macros**, or Calc will not allow any macros to be run inside the document. If you do not expect a document to contain a macro, it is safer to click **Disable Macros** in case the macro is a virus.

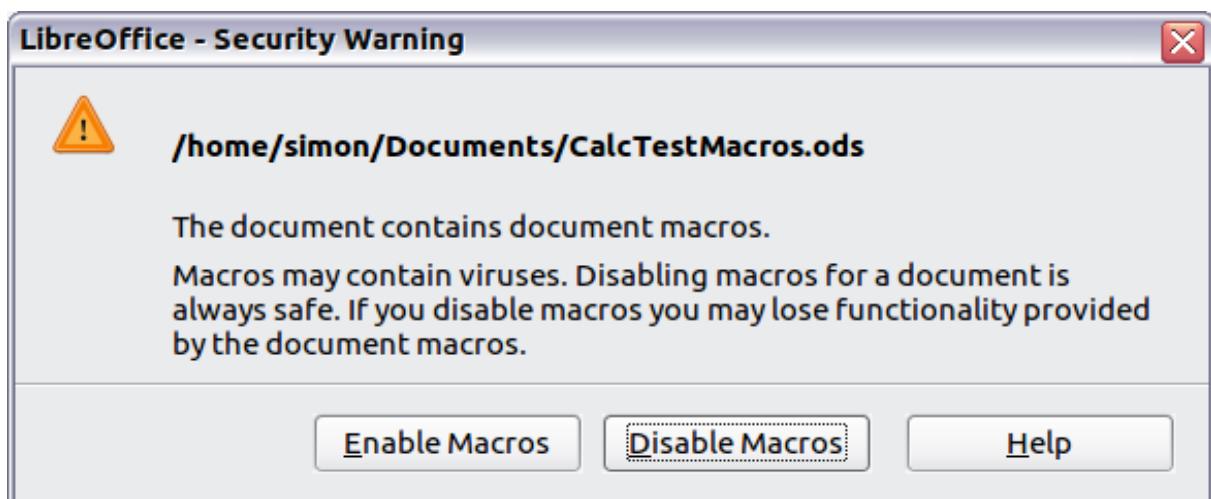


Figure 315: LibreOffice warns you that a document contains macros

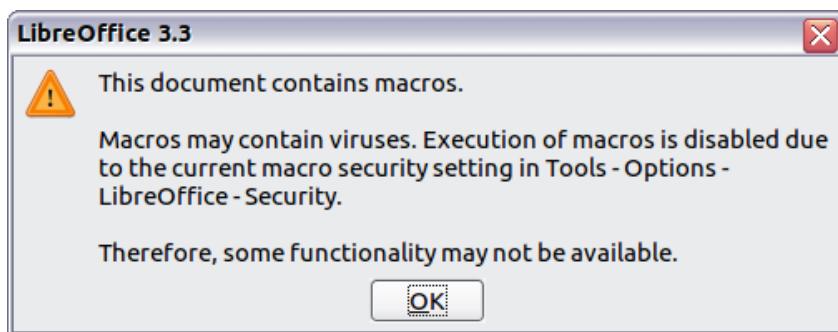


Figure 316: Warning if macros are disabled

If you choose to disable macros, then when the document loads, Calc can no longer find the function.

	fx	Σ	=	=numberfive()
B	C	D	E	
#NAME?				

Figure 317: The function is gone

When a document is created and saved, it automatically contains a library named Standard. The Standard library is automatically loaded when the document is opened. No other library is automatically loaded.

Calc does not contain a function named NumberFive(), so it checks all opened and visible macro libraries for the function. Libraries in *LibreOffice Macros*, *My Macros*, and the Calc document are checked for an appropriately named function (see Figure 309). The NumberFive() function is stored in the AuthorsCalcMacros library, which is not automatically loaded when the document is opened.

Use **Tools → Macros → Organize Macros → LibreOffice Basic** to open the LibreOffice Basic Macros dialog (see Figure 305). Expand CalcTestMacros and find AuthorsCalcMacros. The icon for a loaded library is a different color from the icon for a library that is not loaded.

Click the expansion symbol (usually a plus or a triangle) next to AuthorsCalcMacros to load the library. The icon changes color to indicate that the library is now loaded. Click **Close** to close the dialog.

Unfortunately, the cells containing =NumberFive() are in error. Calc does not recalculate cells in error unless you edit them or somehow change them. The usual solution is to store macros used as functions in the Standard library. If the macro is large or if there are many macros, a stub with the desired name is stored in the Standard library. The stub macro loads the library containing the implementation and then calls the implementation.

- 1) Use **Tools → Macros → Organize Macros → LibreOffice Basic** to open the LibreOffice Basic Macros dialog. Select the NumberFive macro and click **Edit** to open the macro for editing.

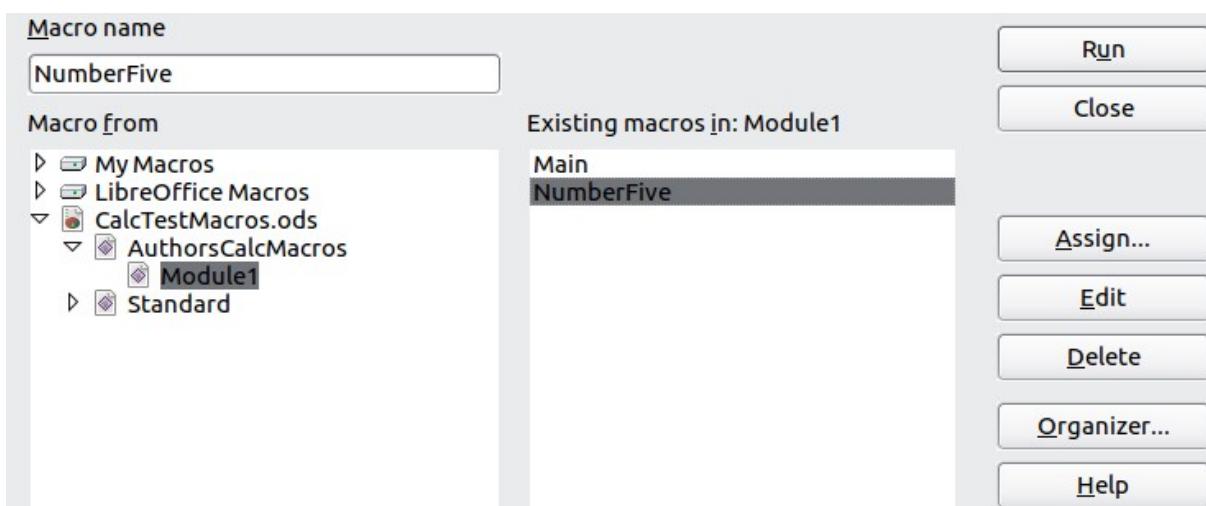


Figure 318: Select a macro and click **Edit**

- 2) Change the name of NumberFive to NumberFive_Implementation (Listing 3).

Listing 3. Change the name of NumberFive to NumberFive_Implementation

```
Function NumberFive_Implementation()
    NumberFive_Implementation() = 5
End Function
```

- 3) In the Basic IDE (see Figure 311), hover the mouse cursor over the toolbar buttons to display the tool tips. Click the **Select Macro** button to open the LibreOffice Basic Macros dialog (see Figure 305).
- 4) Select the Standard library in the CalcTestMacros document and click **New** to create a new module. Enter a meaningful name such as CalcFunctions and click **OK**. LibreOffice automatically creates a macro named Main and opens the module for editing.
- 5) Create a macro in the Standard library that calls the implementation function (see Listing 4). The new macro loads the AuthorsCalcMacros library if it is not already loaded, and then calls the implementation function.
- 6) Save, close, and reopen the Calc document. This time, the NumberFive() function works.

Listing 4. Change the name of NumberFive to NumberFive_Implementation.

```
Function NumberFive()
If NOT BasicLibraries.isLibraryLoaded("AuthorsCalcMacros") Then
    BasicLibraries.LoadLibrary("AuthorsCalcMacros")
End If
    NumberFive = NumberFive_Implementation()
End Function
```

Passing arguments to a macro

To illustrate a function that accepts arguments, we will write a macro that calculates the sum of its arguments that are positive —it will ignore arguments that are less than zero (see Listing 5).

Listing 5. PositiveSum calculates the sum of the positive arguments.

```
Function PositiveSum(Optional x)
    Dim TheSum As Double
    Dim iRow As Integer
    Dim iCol As Integer

    TheSum = 0.0
    If NOT IsMissing(x) Then
        If NOT IsArray(x) Then
            If x > 0 Then TheSum = x
        Else
            For iRow = LBound(x, 1) To UBound(x, 1)
                For iCol = LBound(x, 2) To UBound(x, 2)
                    If x(iRow, iCol) > 0 Then TheSum = TheSum + x(iRow, iCol)
                Next
            Next
        End If
    End If
    PositiveSum = TheSum
End Function
```

The macro in Listing 5 demonstrates some important techniques:

- 1) The argument **x** is optional. When an argument is not optional and the function is called without it, LibreOffice prints a warning message every time the macro is called. If Calc calls the function many times, then the error is displayed many times.

- 2) **IsMissing** checks that an argument was passed before the argument is used.
- 3) **IsArray** checks to see if the argument is a single value, or an array. For example, **=PositiveSum(7)** or **=PositiveSum(A4)**. In the first case, the number 7 is passed as an argument, and in the second case, the value of cell A4 is passed to the function.
- 4) If a range is passed to the function, it is passed as a two-dimensional array of values; for example, **=PositiveSum(A2:B5)**. **LBound** and **UBound** are used to determine the array bounds that are used. Although the lower bound is one, it is considered safer to use **LBound** in case it changes in the future.

Tip

The macro in Listing 5 is careful and checks to see if the argument is an array or a single argument. The macro does not verify that each value is numeric. You may be as careful as you like. The more things you check, the more robust the macro is, and the slower it runs.

Passing one argument is as easy as passing two: add another argument to the function definition (see Listing 6). When calling a function with two arguments, separate the arguments with a semicolon; for example, **=TestMax(3; -4)**.

Listing 6. TestMax accepts two arguments and returns the larger of the two.

```
Function TestMax(x, y)
  If x >= y Then
    TestMax = x
  Else
    TestMax = y
  End If
End Function
```

Arguments are passed as values

Arguments passed to a macro from Calc are always values. It is not possible to know what cells, if any, are used. For example, **=PositiveSum(A3)** passes the value of cell A3, and PositiveSum has no way of knowing that cell A3 was used. If you must know which cells are referenced rather than the values in the cells, pass the range as a string, parse the string, and obtain the values in the referenced cells.

Writing macros that act like built-in functions

Although Calc finds and calls macros as normal functions, they do not really behave as built-in functions. For example, macros do not appear in the function lists. It is possible to write functions that behave as regular functions by writing an Add-In. However, this is an advanced topic that is not covered here.

Accessing cells directly

You can access the LibreOffice internal objects directly to manipulate a Calc document. For example, the macro in Listing 7 adds the values in cell A2 from every sheet in the current document. **ThisComponent** is set by StarBasic when the macro starts to reference the current document. A Calc document contains sheets: **ThisComponent.getSheets()**. Use **getCellByPosition(col, row)** to return a cell at a specific row and column.

Listing 7. Add cell A2 in every sheet.

```
Function SumCellsAllSheets()
    Dim TheSum As Double
    Dim i As integer
    Dim oSheets
    Dim oSheet
    Dim oCell

    oSheets = ThisComponent.getSheets()
    For i = 0 To oSheets.getCount() - 1
        oSheet = oSheets.getByIndex(i)
        oCell = oSheet.getCellByPosition(0, 1) ' GetCell A2
        TheSum = TheSum + oCell.getValue()
    Next
    SumCellsAllSheets = TheSum
End Function
```

Tip A cell object supports the methods **getValue()**, **getString()**, and **getFormula()** to get the numerical value, the string value, or the formula used in a cell. Use the corresponding set functions to set appropriate values.

Use **oSheet.getCellRangeByName("A2")** to return a range of cells by name. If a single cell is referenced, then a cell object is returned. If a cell range is given, then an entire range of cells is returned (see Listing 8). Notice that a cell range returns data as an array of arrays, which is more cumbersome than treating it as an array with two dimensions as is done in Listing 5.

Listing 8. Add cell A2:C5 in every sheet

```
Function SumCellsAllSheets()
    Dim TheSum As Double
    Dim iRow As Integer, iCol As Integer, i As Integer
    Dim oSheets, oSheet, oCells
    Dim oRow(), oRows()

    oSheets = ThisComponent.getSheets()
    For i = 0 To oSheets.getCount() - 1
        oSheet = oSheets.getByIndex(i)
        oCells = oSheet.getCellRangeByName("A2:C5")
        REM getDataArray() returns the data as variant so strings
        REM are also returned.
        REM getData() returns data data as type Double, so only
        REM numbers are returned.
        oRows() = oCells.getData()
        For iRow = LBound(oRows()) To UBound(oRows())
            oRow() = oRows(iRow)
            For iCol = LBound(oRow()) To UBound(oRow())
                TheSum = TheSum + oRow(iCol)
            Next
        Next
    Next
    SumCellsAllSheets = TheSum
End Function
```

Tip When a macro is called as a Calc function, the macro cannot modify any value in the

Sorting

Consider sorting the data in Figure 304. First, sort on column B descending and then column A ascending.

	A	B	C
1	1	5	One
2	4	1	Two
3	3	1	Three
4	7	8	Four
5	4	2	Five

Becomes

	A	B	C
1	7	8	Four
2	1	5	One
3	4	2	Five
4	3	1	Three
5	4	1	Two

Figure 319: Sort column B descending and column A ascending

The example in Listing 9, however, demonstrates how to sort on two columns.

Listing 9. Sort cells A1:C5 on Sheet 1.

```
Sub SortRange
    Dim oSheet           ' Calc sheet containing data to sort.
    Dim oCellRange        ' Data range to sort.

    REM An array of sort fields determines the columns that are
    REM sorted. This is an array with two elements, 0 and 1.
    REM To sort on only one column, use:
    REM Dim oSortFields(0) As New com.sun.star.util.SortField
    Dim oSortFields(1) As New com.sun.star.util.SortField

    REM The sort descriptor is an array of properties.
    REM The primary property contains the sort fields.
    Dim oSortDesc(0) As New com.sun.star.beans.PropertyValue

    REM Get the sheet named "Sheet1"
    oSheet = ThisComponent.Sheets.getByName("Sheet1")

    REM Get the cell range to sort
    oCellRange = oSheet.getCellRangeByName("A1:C5")

    REM Select the range to sort.
    REM The only purpose would be to emphasize the sorted data.
    'ThisComponent.getCurrentController.select(oCellRange)

    REM The columns are numbered starting with 0, so
    REM column A is 0, column B is 1, etc.
    REM Sort column B (column 1) descending.
    oSortFields(0).Field = 1
    oSortFields(0).SortAscending = FALSE

    REM If column B has two cells with the same value,
    REM then use column A ascending to decide the order.
```

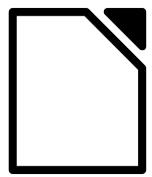
```
oSortFields(1).Field = 0
oSortFields(1).SortAscending = True

REM Setup the sort descriptor.
oSortDesc(0).Name = "SortFields"
oSortDesc(0).Value = oSortFields()

REM Sort the range.
oCellRange.Sort(oSortDesc())
End Sub
```

Conclusion

This chapter provides a brief overview on how to create libraries and modules, using the macro recorder, using macros as Calc functions, and writing your own macros without the macro recorder. Each topic deserves at least one chapter, and writing your own macros for Calc could easily fill an entire book. In other words, this is just the beginning of what you can learn!



LibreOffice
The Document Foundation

Chapter 13

Calc as a Simple Database

A guide for users and macro programmers

Introduction

A Calc document is a very capable database, providing sufficient functionality to satisfy the needs of many users. This chapter presents the capabilities of a Calc document that make it suitable as a database tool. Where applicable, the functionality is explained using both the GUI (Graphical User Interface) and macros.

Note

Although this document was initially created for macro programmers, the content should be accessible to all users. If you do not use macros, then skip those portions that deal with macros. On the other hand, if you want to learn more about macros, be certain to check out Andrew Pitonyak's book *OpenOffice.org Macros Explained*.

In a database, a record is a group of related data items treated as a single unit of information. Each item in the record is called a field. A table consists of records. Each record in a table has the same structure. A table can be visualized as a series of rows and columns. Each row in the table corresponds to a single record and each column corresponds to the fields. A spreadsheet in a Calc document is similar in structure to a database table. Each cell corresponds to a single field in a database record. For many people, Calc implements sufficient database functionality that no other database program or functionality is required.

While teaching, a spreadsheet might be used as a grading program. Each row represents a single student. The columns represent the grades received on homework, labs, and tests (see Table 23). The strong calculation capability provided in a spreadsheet makes this an excellent choice.

Table 12. Simple grading spreadsheet

	A	B	C	D	E	F	G
1	Name	Test 1	Test 2	Quiz 1	Quiz 2	Average	Grade
2	Andy	95	93	93	92	93.25	
3	Betty	87	92	65	73	79.25	
4	Bob	95	93	93	92	93.25	
5	Brandy	45	65	92	85	71.75	
6	Frank	95	93	85	92	91.25	
7	Fred	87	92	65	73	79.25	
8	Ilsub	70	85	97	79	82.75	
9	James	45	65	97	85	73	
10	Lisa	100	97	100	93	97.5	
11	Michelle	100	97	100	65	90.5	
12	Ravi	87	92	86	93	89.5	
13	Sal	45	65	100	92	75.5	
14	Ted	100	97	100	85	95.5	
15	Tom	70	85	93	65	78.25	
16	Whil	70	85	93	97	86.25	

Tip

Although the choice to associate a row to a record rather than a column is arbitrary, it is almost universal. In other words, you are not likely to hear someone refer to a column of data as a single database record.

Associating a range with a name

In a Calc document, a range refers to a contiguous group of cells containing at least one cell. You can associate a meaningful name to a range, which allows you to refer to the range using the meaningful name. You can create either a *database range*, which has some database-like functionality, or a *named range*, which does not. A name is usually associated with a range for one of three reasons:

- 1) Associating a range with a name enhances readability by using a meaningful name.
- 2) If a range is referenced by name in multiple locations, you can point the name to another location and all references point to the new location.
- 3) Ranges associated to a name are shown in the Navigator, which is available by pressing the *F5* key or clicking on the  icon. The Navigator allows for quick navigation to the associated ranges.

Named range

The most common usage of a named range is, as its name implies, to associate a range of cells to a meaningful name. For example, create a range named **Scores**, and then use the following equation: **=SUM(Scores)**. To create a named range, select the range to define. Use **Insert → Names → Define** to open the Define Names dialog. Use the Define Names dialog to add and modify one named range at a time.

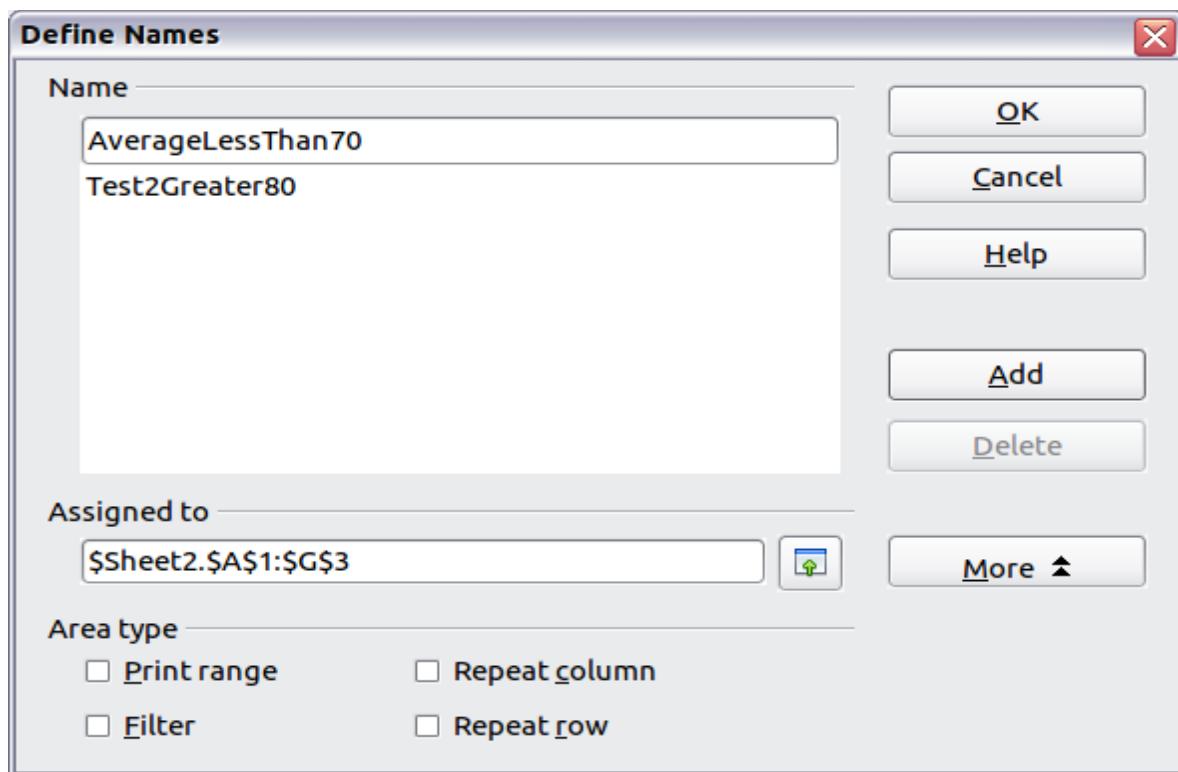


Figure 320. Define a named range.

In a macro, a named range is accessed, created, and deleted using the `NamedRanges` property of a Calc document. Use the methods `hasByName(name)` and `getByName(name)` to verify and retrieve a named range. The method `getElementNames()` returns an array containing the names of all named ranges. The `NamedRanges` object supports the method `addNewByName`, which accepts four arguments; the name, content, position, and type. The macro in Listing 10 creates a named range, if it does not exist, that references a range of cells.

Listing 10. Create a named range that references \$Sheet1.\$B\$3:\$D\$6.

```
Sub AddNamedRange()
    Dim oRange      ' The created range.
    Dim oRanges     ' All named ranges.
    Dim sName$      ' Name of the named range to create.
    Dim oCell       ' Cell object.
    Dim s$

    sName$ = "MyNRange"
    oRanges = ThisComponent.NamedRanges
    If NOT oRanges.hasByName(sName$) Then
        REM Obtain the cell address by obtaining the cell
        REM and then extracting the address from the cell.
        Dim oCellAddress As new com.sun.star.table.CellAddress
        oCellAddress.Sheet = 0      'The first sheet.
        oCellAddress.Column = 1    'Column B.
        oCellAddress.Row = 2       'Row 3.

        REM The first argument is the range name.
        REM The second argument is the formula or expression to use.
        REM The second argument is usually a string that
        REM defines a range.
        REM The third argument specifies the base address for
        REM relative cell references.
        REM The fourth argument is a set of flags that define
        REM how the range is used, but most ranges use 0.
        REM The fourth argument uses values from the
        REM NamedRangeFlag constants (see Table 13).
        s$ = "$Sheet1.$B$3:$D$6"
        oRanges.addNewByName(sName$, s$, oCellAddress, 0)
    End If
    REM Get a range using the created named range.
    oRange = ThisComponent.NamedRanges.getByName(sName$)

    REM Print the string contained in cell $Sheet1.$B$3
    oCell = oRange.getReferredCells().getCellByPosition(0,0)
    Print oCell.getString()
End Sub
```

The method addNewByName() accepts four arguments; the name, content, position, and type. The fourth argument to the method addNewByName() is a combination of flags that specify how the named range will be used (see Table 13). The most common value is 0, which is not a defined constant value.

Table 13. com.sun.star.sheet.NamedRangeFlag constants.

Value	Name	Description
1	FILTER_CRITERIA	The range contains filter criteria.
2	PRINT_AREA	The range can be used as a print range.
4	COLUMN_HEADER	The range can be used as column headers for printing.
8	ROW_HEADER	The range can be used as row headers for printing.

The third argument, a cell address, acts as the base address for cells referenced in a relative way. If the cell range is not specified as an absolute address, the referenced range will be different based on where in the spreadsheet the range is used. The relative behavior is illustrated in Listing 11, which also illustrates another usage of a named range—defining an equation. The macro in Listing 11 creates the named range **AddLeft**, which refers to the equation **A3+B3** with C3 as the reference cell. The cells A3 and B3 are the two cells directly to the left of C3, so, the equation **=AddLeft()** calculates the sum of the two cells directly to the left of the cell that contains the equation. Changing the reference cell to C4, which is below A3 and B3, causes the AddLeft equation to calculate the sum of the two cells that are to the left on the previous row.

Listing 11. Create the AddLeft named range.

```

Sub AddNamedFunction()
    Dim oSheet           'Sheet that contains the named range.
    Dim oCellAddress     'Address for relative references.
    Dim oRanges          'The NamedRanges property.
    Dim oRange           'Single cell range.
    Dim sName As String  'Name of the equation to create.

    sName = "AddLeft"
    oRanges = ThisComponent.NamedRanges
    If NOT oRanges.hasByName(sName) Then
        oSheet = ThisComponent.getSheets().getByIndex(0)
        oRange = oSheet.getCellRangeByName("C3")
        oCellAddress = oRange.getCellAddress()
        oRanges.addNewByName(sName, "A3+B3", oCellAddress, 0)
    End If
End Sub

```

Tip

Listing 11 illustrates two capabilities that are not widely known. A named range can define a function. Also, the third argument acts as the base address for cells referenced in a relative way.

Select the range containing the headers and the data and then use **Insert → Names → Create** to open the Create Names dialog (see Figure 321), which allows you to simultaneously create multiple named ranges based on the top row, bottom row, right column or left column. If you choose to create ranges based on the top row, one named range is created for each column header—the header is not included in the named range. Although the header is not included in the range, the text in the header is used to name the range.

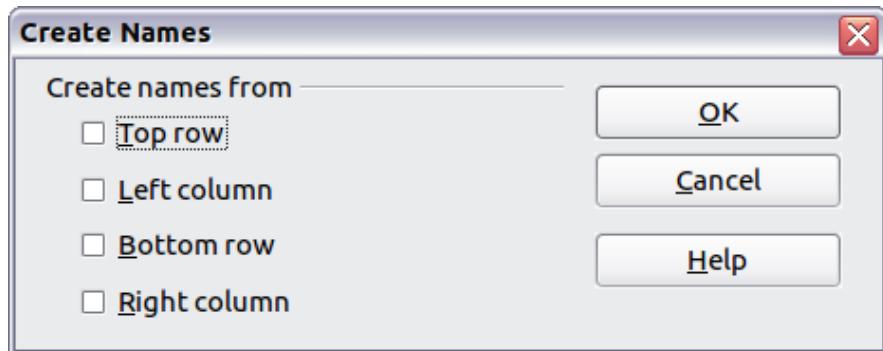


Figure 321. Define a named range.

The macro in Listing 12 creates three named ranges based on the top row of a named range.

Listing 12. Create many named ranges.

```
Sub AddManyNamedRanges()
    Dim oSheet      'Sheet that contains the named range.
    Dim oAddress    'Range address.
    Dim oRanges     'The NamedRanges property.
    Dim oRange       'Single cell range.

    oRanges = ThisComponent.NamedRanges
    oSheet = ThisComponent.getSheets().getByIndex(0)
    oRange = oSheet.getCellRangeByName("A1:C20")
    oAddress = oRange.getRangeAddress()
    oRanges.addNewFromTitles(oAddress, _
                           com.sun.star.sheet.Border.TOP)
End Sub
```

The constants in Table 14 determine the location of the headers when multiple ranges are created using the method addNewFromTitles().

Table 14. com.sun.star.sheet.Border constants.

Value	Name	Description
0	TOP	Select the top border.
1	BOTTOM	Select the bottom border.
2	RIGHT	Select the right border.
3	LEFT	Select the left border.

Caution



It is possible to create multiple named ranges with the same name. Creating multiple ranges with a single command increases the likelihood that multiple ranges will be created with the same name—avoid this if possible.

Database range

Although a database range can be used as a regular named range, a database range also defines a range of cells in a spreadsheet to be used as a database. Each row in a range corresponds to a

record and each cell corresponds to a field. You can sort, group, search, and perform calculations on the range as if it were a database.

A database range provides behavior that is useful when performing database related activities. For example, you can mark the first row as headings. To create, modify, or delete a database range, use **Data → Define Range** to open the Define Data Range dialog (see Figure 322). When you first define a range, the Modify button shown in the example is labeled New.

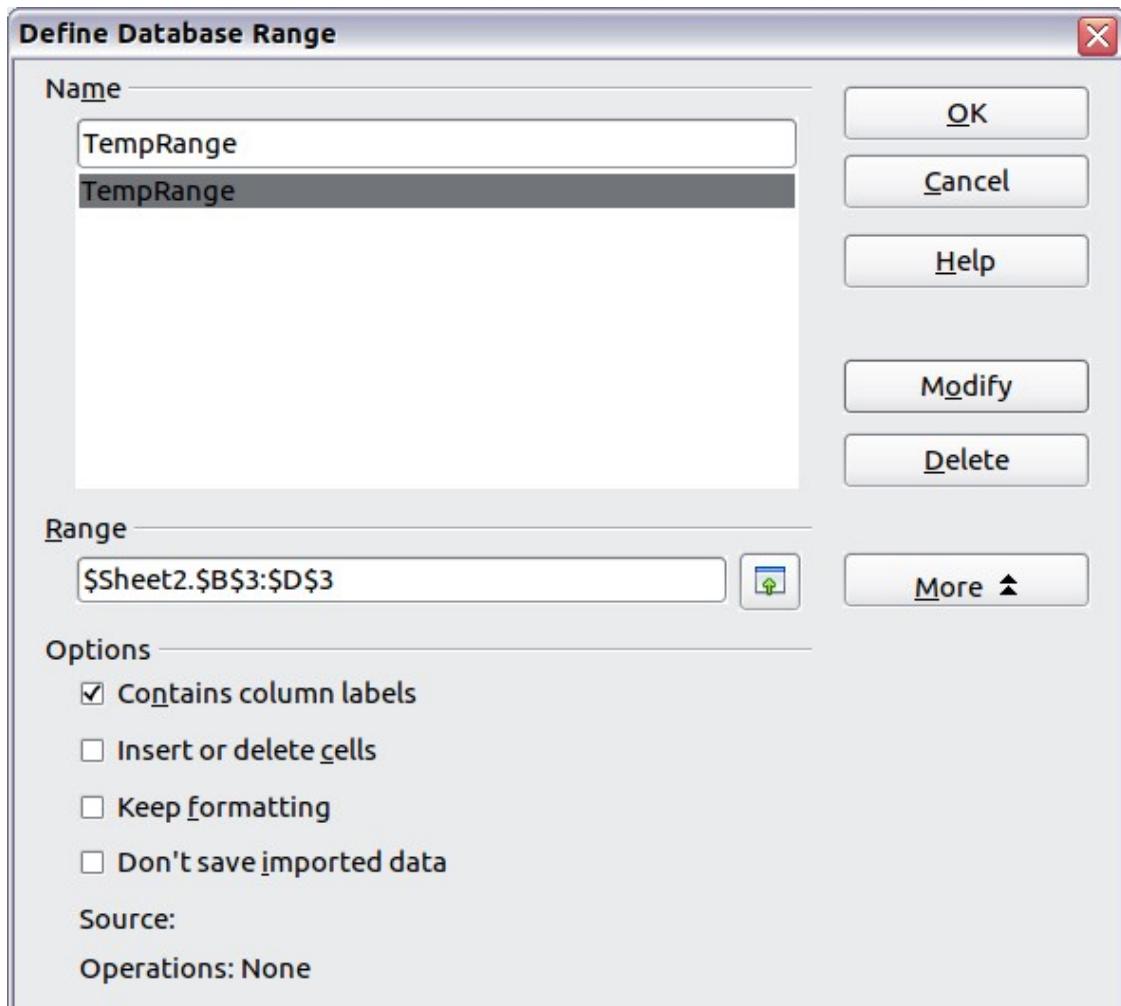


Figure 322. Define a database range.

In a macro, a database range is accessed, created, and deleted from the `DatabaseRanges` property. The macro in Listing 13 creates a database range named `MyName` and sets the range to be used as an auto filter.

Listing 13. Create a database range and an auto filter.

```
Sub AddNewDatabaseRange()
    Dim oRange 'DatabaseRange object.
    Dim oAddr 'Cell address range for the database range.
    Dim oSheet 'First sheet, which will contain the range.
    Dim oDoc 'Reference ThisComponent with a shorter name.

    oDoc = ThisComponent
    If NOT oDoc.DatabaseRanges.hasByName("MyName") Then
        oSheet = ThisComponent.getSheets().getByIndex(0)
        oRange = oSheet.getCellRangeByName("A1:F10")
```

```

oAddr = oRange.getRangeAddress()
oDoc.DatabaseRanges.addNewByName("MyName", oAddr)
End If
oRange = oDoc.DatabaseRanges.getByName("MyName")
oRange.AutoFilter = True
End Sub

```

Sorting

The sorting mechanism in a Calc document rearranges the data in the sheet. The first step in sorting data is to select the data that you want to sort. To sort the data in Table 23, select the cells from A1 to G16—if you include the column headers, indicate this in the sort dialog (see Figure 324). Use **Data → Sort** to open the Sort dialog (see Figure 323). You can sort by up to three columns or rows at a time.

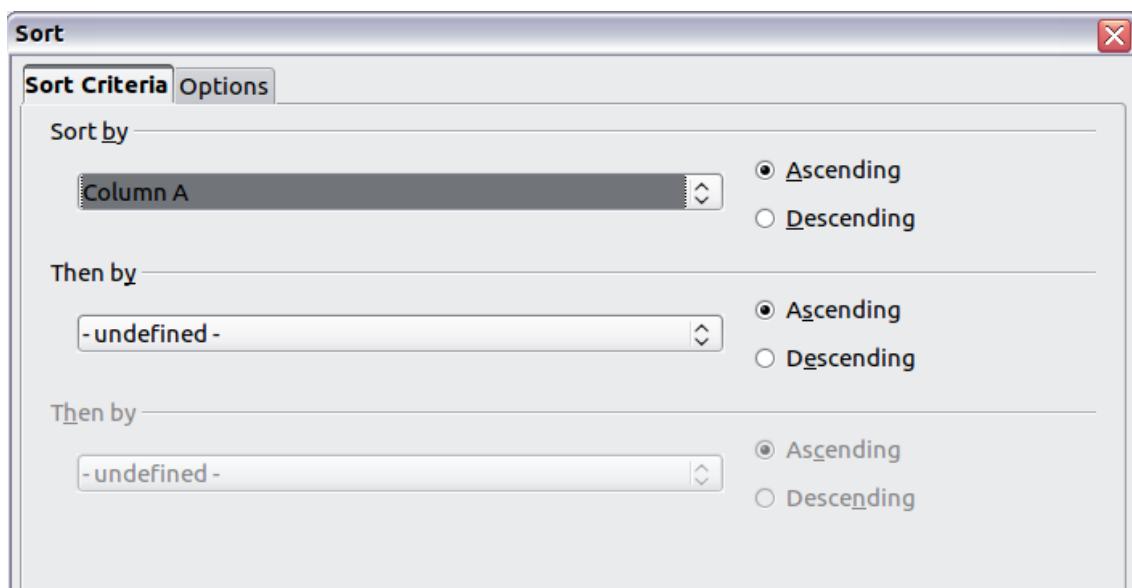


Figure 323. Sort by the Name column.

Click on the Options tab (see Figure 324) to set the sort options. Check the **Range contains column labels** checkbox to prevent column headers from being sorted with the rest of the data. The Sort by list box in Figure 323 displays the columns using the column headers if the **Range contains column labels** checkbox in Figure 324 is checked. If the **Range contains column labels** checkbox is not checked, however, then the columns are identified by their column name; Column A, for example.

Normally, sorting the data causes the existing data to be replaced by the newly sorted data. The **Copy sort results to** checkbox, however, causes the selected data to be left unchanged and a copy of the sorted data is copied to the specified location. You can either directly enter a target address (Sheet3.A1, for example) or select a predefined range.

Check the **Custom sort order** checkbox to sort based on a predefined list of values. To set your own predefined lists, use **Tools → Options → LibreOffice Calc → Sort Lists** and then enter your own sort lists. Predefined sort lists are useful for sorting lists of data that should not be sorted alphabetically or numerically. For example, sorting days based on their name.

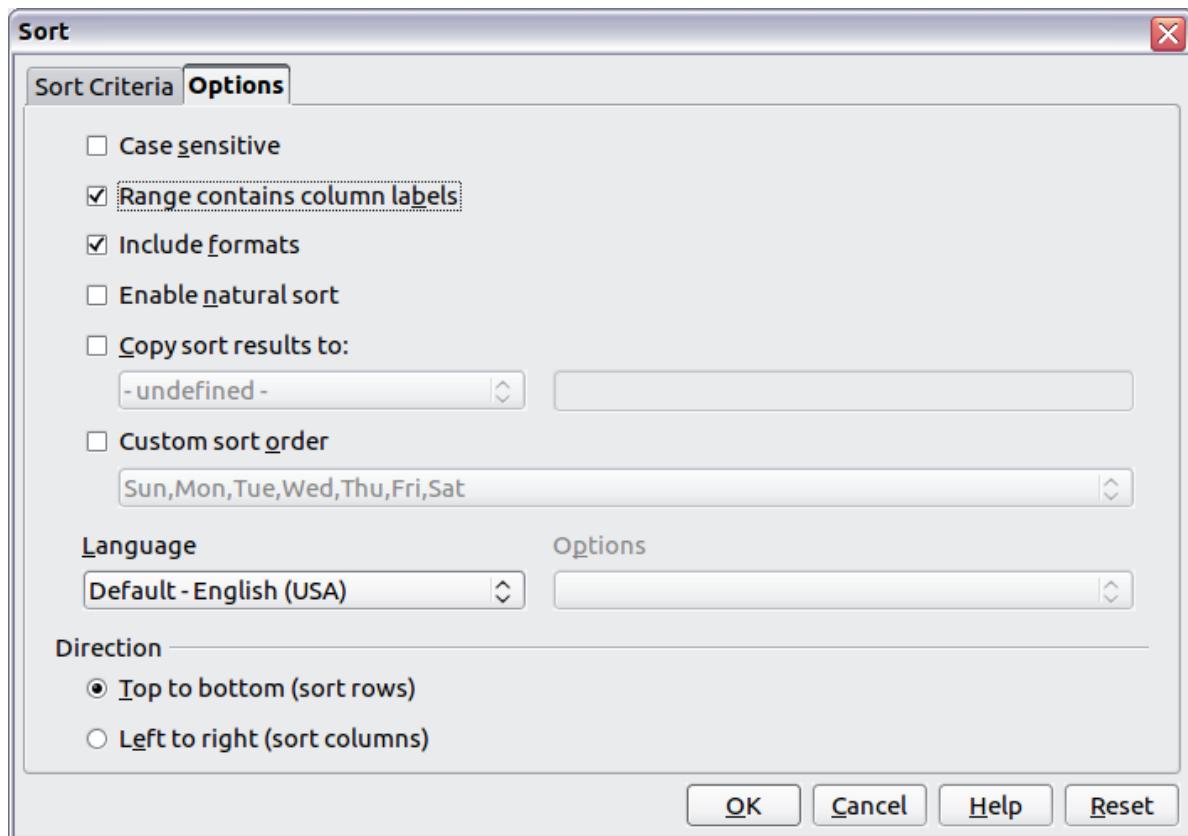


Figure 324. Set sort options.

Caution



When a cell is moved during a sort operation, external references to that cell are not updated. If a cell that contains a relative reference to another cell is moved, the reference is relative to the new position when sorting is finished. Know the behavior of references during sorting and do not be alarmed; this is almost always what you want—because the reference is to the right or left in the same row. Also, we have not found a spreadsheet program that exhibits a different behavior for references while sorting.

Filters

Use filters to limit the visible rows in a spreadsheet. Generic filters, common to all sorts of data manipulations, are automatically provided by the auto filter capability. You can also define your own filters.

Caution



After applying a filter, some rows are visible and some rows are not. If you select multiple rows in one operation, you will also select the invisible rows contained between the selected visible rows. Operations, such as delete, act on all of the selected rows. To avoid this problem, you must individually select each of the filtered rows using the control key.

Auto filters

Use auto filters to quickly create easily accessible filters found to be commonly used in many different types of applications. After creating an auto filter for a specific column, a combo box is added to the column. The combo box provides quick access to each of the auto filter types.

- The All auto filter causes all rows to be visible.
- The Standard auto filter opens the Standard Filter dialog and is the same as the standard filter.
- The Top 10 auto filter displays the ten rows with the largest value. If the value 70 is in the top ten values, then all rows containing the value 70 in the filtered column are displayed. In other words, more than ten rows may be displayed.
- An auto filter entry is created for each unique entry in the column.

To create an auto filter, first select the columns to filter. For example, using the data in Table 23, select data in columns B and C. If you do not select the title rows, Calc asks if the title row or the current row should be used. Although you can place the auto filter in any row, only the rows below the auto filter are filtered. Use **Data → Filter → AutoFilter** to insert the auto filter combo box in the appropriate cell. Finally, use the drop-down arrow to choose an appropriate auto filter (see Figure 325).

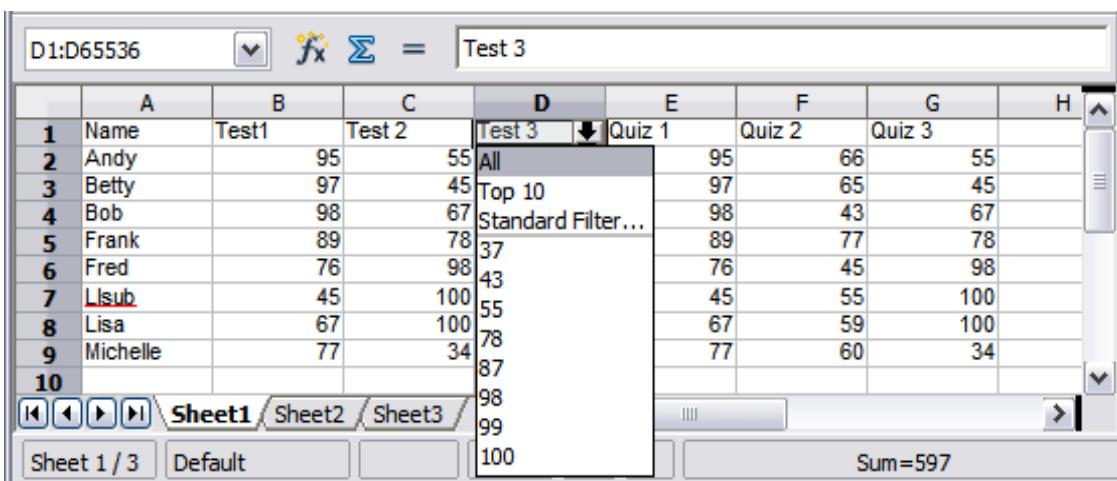


Figure 325: Use an auto filter with column C

Remove an auto filter by repeating the steps to create the auto filter—in other words, the menu option acts as a toggle to turn the auto filter on and off. When an auto filter is removed, the combo box is removed from the cell. The macro in Listing 13 demonstrates creating an auto filter for a range.

Standard filters

Use **Data → Filter → Standard Filter** to open Standard Filter dialog (see Figure 326) and limit the view based on 1 to 3 filter conditions. Use **Data → Filter → Remove Filter** to turn off the filter.

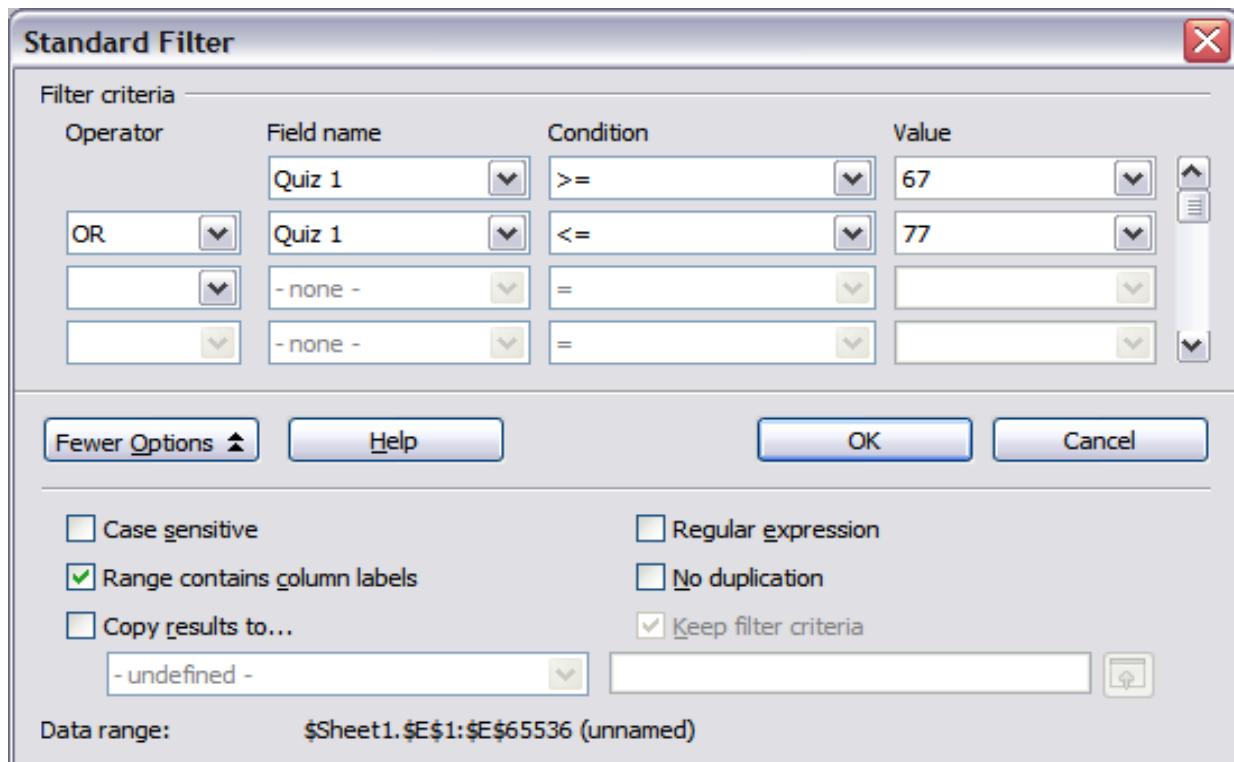


Figure 326: Use the standard filter

The macro in Listing 14 creates a simple filter for the first sheet.

Listing 14. Create a simple sheet filter.

```

Sub SimpleSheetFilter()
    Dim oSheet      ' Sheet that will contain the filter.
    Dim oFilterDesc ' Filter descriptor.
    Dim oFields(0) As New com.sun.star.sheet.TableFilterField

    oSheet = ThisComponent.getSheets().getByIndex(0)

    REM If argument is True, creates an empty filter
    REM descriptor. If argument is False, create a
    REM descriptor with the previous settings.
    oFilterDesc = oSheet.createFilterDescriptor(True)

    With oFields(0)
        REM You could use the Connection property to indicate
        REM how to connect to the previous field. This is
        REM the first field, so this is not required.
        '.Connection = com.sun.star.sheet.FilterConnection.AND
        '.Connection = com.sun.star.sheet.FilterConnection.OR

        REM The Field property is the zero based column
        REM number to filter. If you have the cell, you
        REM can use .Field = oCell.CellAddress.Column.
        .Field = 5
    End With
End Sub

```

```

REM Compare using a numeric or a string?
.IsNumeric = True

REM The NumericValue property is used
REM because .IsNumeric = True from above.
.NumericValue = 80

REM If IsNumeric was False, then the
REM StringValue property would be used.
REM .StringValue = "what ever"

REM Valid operators include EMPTY, NOT_EMPTY, EQUAL,
REM NOT_EQUAL, GREATER, GREATER_EQUAL, LESS,
REM LESS_EQUAL, TOP_VALUES, TOP_PERCENT,
REM BOTTOM_VALUES, and BOTTOM_PERCENT
.Operator = com.sun.star.sheet.FilterOperator.GREATER_EQUAL
End With

REM The filter descriptor supports the following
REM properties: IsCaseSensitive, SkipDuplicates,
REM UseRegularExpressions,
REM SaveOutputPosition, Orientation, ContainsHeader,
REM CopyOutputData, OutputPosition, and MaxFieldCount.
oFilterDesc.setFilterFields(oFields())
oFilterDesc.ContainsHeader = True
oSsheet.filter(oFilterDesc)
End Sub

```

When a filter is applied to a sheet, it replaces any existing filter for the sheet. Setting an empty filter in a sheet will therefore remove all filters for that sheet (see Listing 15).

Listing 15. Remove the current sheet filter.

```

Sub RemoveSheetFilter()
    Dim oSheet          ' Sheet to filter.
    Dim oFilterDesc     ' Filter descriptor.

    oSheet = ThisComponent.getSheets().getByIndex(0)
    oFilterDesc = oSheet.createFilterDescriptor(True)
    oSheet.filter(oFilterDesc)
End Sub

```

Listing 16 demonstrates a more advanced filter that filters two columns and uses regular expressions. Some unexpected behavior occurred while working with Listing 16. Although you can create a filter descriptor using any sheet cell range, the filter applies to the entire sheet.

Listing 16. A simple sheet filter using two columns.

```

Sub SimpleSheetFilter_2()
    Dim oSheet          ' Sheet to filter.
    Dim oRange          ' Range to be filtered.

```

```

Dim oFilterDesc      ' Filter descriptor.
Dim oFields(1) As New com.sun.star.sheet.TableFilterField

oSheet = ThisComponent.getSheets().getByIndex(0)
oRange = oSheet.getCellRangeByName("E12:G19")

REM If argument is True, creates an
REM empty filter descriptor.
oFilterDesc = oRange.createFilterDescriptor(True)

REM Setup a field to view cells with content that
REM start with the letter b.
With oFields(0)
    .Field = 0                      ' Filter column A.
    .IsNumeric = False              ' Use a string, not a number.
    .StringValue = "b.*"            ' Everything starting with b.
    .Operator = com.sun.star.sheet.FilterOperator.EQUAL
End With
REM Setup a field that requires both conditions and
REM this new condition requires a value greater or
REM equal to 70.
With oFields(1)
    .Connection = com.sun.star.sheet.FilterConnection.AND
    .Field = 5                      ' Filter column F.
    .IsNumeric = True               ' Use a number
    .NumericValue = 70              ' Values greater than 70
    .Operator = com.sun.star.sheet.FilterOperator.GREATER_EQUAL
End With

oFilterDesc.setFilterFields(oFields())
oFilterDesc.ContainsHeader = False
oFilterDesc.UseRegularExpressions = True
oSheet.filter(oFilterDesc)
End Sub

```

Advanced filters

An advanced filter supports up to eight filter conditions, as opposed to the three supported by the simple filter. The criteria for an advanced filter is stored in a sheet. The first step in creating an advanced filter is entering the filter criteria into the spreadsheet.

- 1) Select an empty space in the Calc document. The empty space may reside in any sheet in any location in the Calc document.
- 2) Duplicate the column headings from the area to be filtered into the area that will contain the filter criteria.
- 3) Enter the filter criteria underneath the column headings (see Table 24). The criterion in each column of a row is connected with AND. The criteria from each row are connected with OR.

Table 15. Example advanced filter criteria

Name	Test 1	Test 2	Quiz 1	Quiz 2	Average	Grade
= "Andy"		>80			<80	

Tip	Define named ranges to reference your advanced filter criteria and any destination ranges for filtered data (see Figure 320). Each appropriately configured named range is available in drop down list boxes in the Advanced Filter dialog (see Figure 327).
------------	--

After creating one or more sets of filter criteria, apply an advanced filter as follows:

- 1) Select the sheet ranges that contain the data to filter.
- 2) Use **Data → Filter → Advanced Filter** to open the Advanced Filter dialog (see Figure 327).
- 3) Select the range containing the filter criteria and any other relevant options.
- 4) Click **OK**.

Applying an advanced filter using a macro is simple (see Listing 17). The cell range containing the filter criteria is used to create a filter descriptor, which is then used to filter the range containing the data.

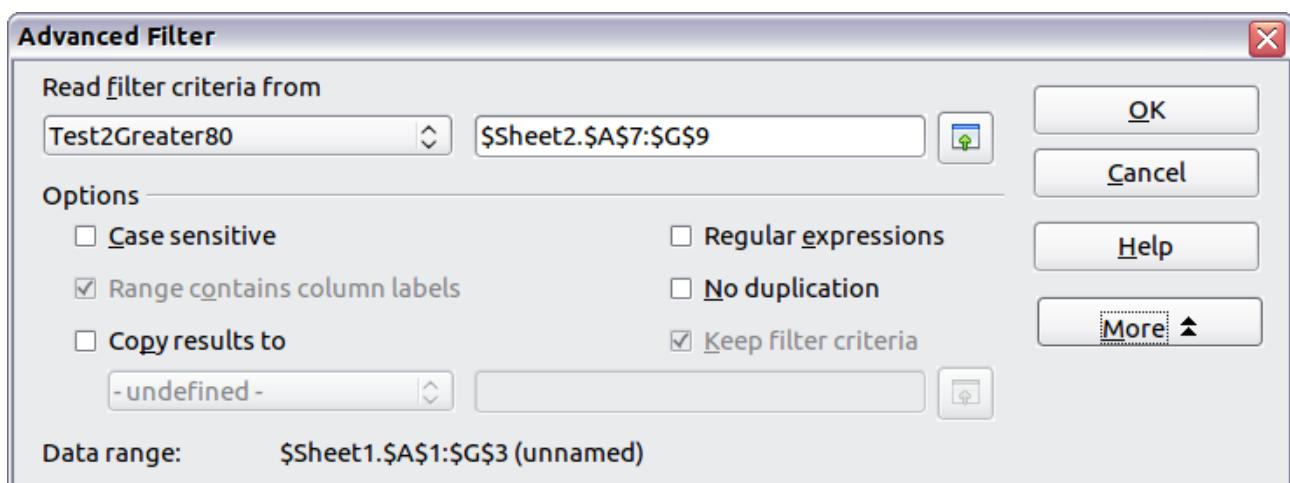


Figure 327. Apply an advanced filter using a previously defined named range.

Listing 17. Use an advanced filter.

```

Sub UseAnAdvancedFilter()
    Dim oSheet      'A sheet from the Calc document.
    Dim oRanges     'The NamedRanges property.
    Dim oCritRange  'Range that contains the filter criteria.
    Dim oDataRange   'Range that contains the data to filter.
    Dim oFiltDesc   'Filter descriptor.

    REM Range that contains the filter criteria
    oSheet = ThisComponent.getSheets().getByIndex(1)
    oCritRange = oSheet.getCellRangeByName("A1:G3")

    REM You can also obtain the range containing the

```

```

REM filter criteria from a named range.
REM oRanges = ThisComponent.NamedRanges
REM oRange = oRanges.getByName("AverageLess80")
REM oCritRange = oRange.getReferredCells()

REM The data that you want to filter
oSheet = ThisComponent.getSheets().getByIndex(0)
oDataRange = oSheet.getCellRangeByName("A1:G16")

oFiltDesc = oCritRange.createFilterDescriptorByObject(oDataRange)
oDataRange.filter(oFiltDesc)

```

End Sub

Change properties on the filter descriptor to change the behavior of the filter (see Table 16).

The filter created in Listing 17 filters the data in place. Modify the OutputPosition property to specify a different output position (see Listing 18). The filter descriptor must be modified before the filter is applied.

Table 16. Advanced filter properties.

Property	Comment
ContainsHeader	Boolean (true or false) that specifies if the first row (or column) contains headers which should not be filtered.
CopyOutputData	Boolean that specifies if the filtered data should be copied to another position in the document.
IsCaseSensitive	Boolean that specifies if the case of letters is important when comparing entries.
Orientation	Specifies if columns (com.sun.star.table.TableOrientation.COLUMNS) or rows (com.sun.star.table.TableOrientation.ROWS) are filtered.
OutputPosition	If if CopyOutputData is True , specifies the position where filtered data are to be copied.
SaveOutputPosition	Boolean that specifies if the OutputPosition position is saved for future calls.
SkipDuplicates	Boolean that specifies if duplicate entries are left out of the result.
UseRegularExpressions	Boolean that specifies if the filter strings are interpreted as regular expressions.

Listing 18. Copy filtered results to a different location.

```

REM Copy the output data rather than filter in place.
oFiltDesc.CopyOutputData = True

REM Create a CellAddress and set it for Sheet3,
REM Column B, Row 4 (remember, start counting with 0)
Dim x As New com.sun.star.table.CellAddress
x.Sheet = 2
x.Column = 1

```

```
x.Row = 3  
oFiltDesc.OutputPosition = x
```

(Advanced material.) The OutputPosition property returns a copy of a struct. Because a copy is returned, it is not possible to set the individual values directly. For example, oFiltDesc.OutputPosition.Row = 2 does not work (because you set the Row on the copy to 2, but do not change the original).

Manipulating filtered data

Filtered data copied to a new location may be selected, modified, and deleted at will. Data that is not copied, however, requires special attention because rows that do not match the filter criteria are simply hidden. LibreOffice behaves differently depending on how the cells became hidden and what operation is done.

Cells may be hidden using an outline, data filter, or the hide command. When data is moved by dragging or using cut and paste, all of the cells are moved—including the hidden cells. When copying data, however, filtered data includes only the visible cells and data hidden using an outline or the hide command copies all of the data.

Calc functions similar to database functions

Although every Calc function can be used for database manipulation, the functions in Table 17 are more commonly used as such. Some functions' names differ only by the letter appended at the end; AVERAGE and AVERAGEA, for example. Functions that do not end with the letter A operate only on numeric values and cells that contain text or are empty are ignored. The corresponding function whose name ends with the letter A, treats text values as a number with the value of zero; blank cells are still ignored.

Table 17. Functions frequently used as database functions.

Function	Description
AVERAGE	Return the average. Ignore empty cells and cells that contain text.
AVERAGEA	Return the average. The value of text is 0 and empty cells are ignored.
COUNT	Count the number of numeric entries; text entries are ignored.
COUNTA	Count the number of non-empty entries.
COUNTBLANK	Return the number of empty cells.
COUNTIF	Return the number of cells that meet the search criteria.
HLOOKUP	Search for a specific value across the columns in the first row of an array. Return the value from a different row in the same column.
INDEX	Return the content of a cell, specified by row and column number or an optional range name.
INDIRECT	Return the reference specified by a text string.
LOOKUP	Return the contents of a cell either from a one-row or one-column range or from an array.
MATCH	Search an array and return the relative position of the found item.
MAX	Return the maximum numeric value in a list of arguments.

Function	Description
MAXA	Return the maximum numeric value in a list of arguments. The value of text is 0.
MIN	Return the minimum numeric value in a list of arguments.
MINA	Return the minimum numeric value in a list of arguments. The value of text is 0.
MEDIAN	Return the median of a set of numbers.
MODE	Return the most common value in a data set. If there are several values with the same frequency, it returns the smallest value. An error occurs when a value doesn't appear twice.
OFFSET	Return the value of a cell offset by a certain number of rows and columns from a given reference point.
PRODUCT	Return the product of the cells.
STDEV	Estimate the standard deviation based on a sample.
STDEVA	Estimate the standard deviation based on a sample. The value of text is 0.
STDEVP	Calculate the standard deviation based on the entire population.
STDEVPA	Calculate the standard deviation based on the entire population.
SUBTOTAL	Calculate a specified function based on a subset created using AutoFilters.
SUM	Return the sum of the cells.
SUMIF	Calculate the sum for the cells that meet the search criteria.
VAR	Estimate the variance based on a sample.
VARA	Estimate the variance based on a sample. The value of text is 0.
VARP	Estimate the variance based on the entire population.
VARPA	Estimate the variance based on the entire population. The value of a text is 0.
VLOOKUP	Search for a specific value across the rows in the first column of an array. Returns the value from a different column in the same row.

Most of the functions in Table 17 require no explanation, either because they are well understood (SUM, for example) or because if you need to use them then you know what they are (STDEV, for example). Unfortunately, some of the more useful functions are infrequently used because they are not well understood.

Count and sum cells that match conditions: COUNTIF and SUMIF

The COUNTIF and SUMIF functions calculate their values based on search criteria. The search criteria can be a number, expression, text string, or even a regular expression. The search criteria can be contained in a referenced cell or it can be included directly in the function call.

The COUNTIF function counts the number of cells in a range that match specified criteria. The first argument to COUNTIF specifies the range to search and second argument is the search criteria. Table 18 illustrates different search criteria using the COUNTIF function referencing the data shown in Table 23.

The first two arguments for SUMIF serve the same purpose as the arguments for COUNTIF; the range that contains the cells to search and the search criteria. The third and final argument for SUMIF specifies the range to sum. For each cell in the search range that matches the search criteria, the corresponding cell in the sum range is added into the sum.

Table 18. Examples of search criteria for the COUNTIF and SUMIF functions.

Criteria Type	Function	Result	Description
Number	=COUNTIF(B1:C16; 95)	3	Finds numeric values of 95.
Text	=COUNTIF(B1:C16; "95")	3	Finds numeric or text values of 95.
Expression	=COUNTIF(B1:C16; ">95")	6	Finds numeric values greater than 95.
Expression	=COUNTIF(B1:C16; 2*45+5)	3	Finds only numeric values of 95.
Regular expression	=COUNTIF(B1:C16; "9.*")	12	Finds numbers or text that start with 9.
Reference a cell	=COUNTIF(B1:C16; B3)	3	Finds a number or number and text depending on the data type in cell B3.
Regular expression	=SUMIF(A1:A16; "B.*"; B1:B16)	227	Sum Column B for names in Col. A starting with the letter B.

Ignore filtered cells using SUBTOTAL

The SUBTOTAL function applies a function (see Table 19) to a range of data, but it ignores cells hidden by a filter and cells that already contain a SUBTOTAL. For example, **=SUBTOTAL(2, "B2:B16")** counts the number of cells in B2:B16 that are not hidden by a filter.

Table 19. Function index for the SUBTOTAL function.

Function index	Function
1	AVERAGE
2	COUNT
3	COUNTA
4	MAX
5	MIN
6	PRODUCT
7	STDEV
8	STDEVP
9	SUM
10	VAR
11	VARP

Tip

Do not forget that the SUBTOTAL function ignores cells that use the SUBTOTAL function. Say you have a spreadsheet that tracks investments. The retirement investments are grouped together with a subtotal. The same is true of regular investments. You can use a single subtotal that includes the entire range without worrying about the subtotal cells.

Using formulas to find data

Calc offers numerous methods to find data in a sheet. For example, **Edit → Find & Replace** moves the display cursor based on simple and advanced searching. Use **Data → Filter** to limit what is displayed rather than simply moving the cursor. Calc also offers lookup functions used in formulas, for example a formula to look up a student's grade based on their test score.

Search a block of data using VLOOKUP

Use VLOOKUP to search the first column (columns are vertical) of a block of data and return the value from another column in the same row. For example, search the first column for the name "Fred" and then return the value in the cell two columns to the right. VLOOKUP supports two forms:

```
VLOOKUP(search_value; search_range; return_column_index)  
VLOOKUP(search_value; search_range; return_column_index; sort_order)
```

The first argument, **search_value**, identifies the value to find. The search value can be text, a number, or a regular expression. For example, **Fred** searches for the text Fred, **4** searches for the number 4, and **F*** is the regular expression for finding something that starts with the letter F.

The second argument, **search_range**, identifies the cells to search; only the first column is searched. For example, **B3:G10** searches the same sheet containing the VLOOKUP formula and **Sheet2.B3:G10** searches the range B3:G10 on the sheet named Sheet2.

The **return_column_index** identifies the column to return; a value of 1 returns the first column in the range. The statement **=VLOOKUP("Bob"; A1:G9; 1)** finds the first row in A1:G9 containing the text **Bob**, and returns the value in the first column. The first column is the searched column, so the text **Bob** is returned. If the column index is 2, then the value in the cell to the right of Bob is returned: column B.

The final column, **sort_order**, is optional. The default value for **sort_order** is 1, which specifies that the first column is sorted in ascending order; a value of 0 specifies that the data is not sorted. A non-sorted list is searched by sequentially checking every cell in the first column for an exact match. If an exact match is not found, the text **#N/A** is returned.

A more efficient search routine is used if the data is sorted in ascending order. If one exact match exists, the returned value is the same as for a non-sorted list; but it is faster. If a match does not exist, the largest value in the column that is less than or equal to the search value is returned. For example, searching for 7 in (3, 5, 10) returns 5 because 7 is between 5 and 10. Searching for 27 returns 10, and searching for 2 returns **#N/A** because there is no match and no value less than 2.

Use VLOOKUP when:

- The data is arranged in rows and you want to return data from the same row. For example, student names with test and quiz scores to the right of the student's name.
- Searching the first column of a range of data.

Search a block of data using HLOOKUP

Use HLOOKUP to search the first row (rows are horizontal) of a block of data and return the value from a row in the same column. HLOOKUP supports the same form and arguments as VLOOKUP:

```
HLOOKUP(search_value; search_range; return_row_index)
HLOOKUP(search_value; search_range; return_row_index; sort_order)
```

Use HLOOKUP when:

- The data is arranged in columns and you want to return data from the same column. For example, student names with test and quiz scores underneath the student's name.
- Searching the first row of a range of data.

Search a row or column using LOOKUP

LOOKUP is similar to HLOOKUP and VLOOKUP. The search range for the LOOKUP function is a single sorted row or column. LOOKUP has two forms:

```
LOOKUP(search_value; search_range)
LOOKUP(search_value; search_range; return_range)
```

The search value is the same as HLOOKUP and VLOOKUP. The search range, however, must be a single row or a single column; for example, A7:A12 (values in column A) or C5:Q5 (values in row 5). If the return_range is omitted, the matched value is returned. Using LOOKUP without a return range is the same as using HLOOKUP or VLOOKUP with a column index of 1.

The return range must be a single row or column containing the same number of elements as the search range. If the search value is found in the fourth cell in the search range, then the value in the fourth cell in the return range is returned. The return range can have a different orientation than the search range. In other words, the search range can be a row and the return range may be a column.

Use LOOKUP when:

- The search data is sorted in ascending order.
- The search data is not stored in the same row, column, or orientation as the return data.

Use MATCH to find the index of a value in a range

Use MATCH to search a single row or column and return the position that matches the search value. Use MATCH to find the index of a value in a range. The supported forms for MATCH are as follows:

```
=MATCH(search_value; search_range)
=MATCH(search_value; search_range; search_type)
```

The search value and search range are the same as for LOOKUP. The final argument, search type, controls how the search is performed. A search type of 1, sorted in ascending order, is the default. A search type of -1 indicates that the list is sorted in descending order. A search type of 0 indicates that the list is not sorted. Regular expressions can only be used on an unsorted list.

Use MATCH when:

- You need an index into the range rather than the value.
- The search data is in descending order and the data is large enough that the data must be searched assuming that it is sorted; because it is faster to sort a sorted list.

Examples

Consider the data in Table 23. Each student's information is stored in a single row. Write a formula to return the average grade for Fred. The problem can be restated as Search column A in the range A1:G16 for Fred and return the value in column F (column F is the sixth column). The obvious solution is `=VLOOKUP("Fred"; A2:G16; 6)`. Equally obvious is `=LOOKUP("Fred"; A2:A16; F2:F16)`.

It is common for the first row in a range to contain column headers. All of the search functions check the first row to see if there is a match and then ignore it if it does not contain a match, in case the first row is a header.

What if the column heading **Average** is known, but not the column containing the average? Find the column containing Average rather than hard coding the value 6. A slight modification using MATCH to find the column yields

=VLOOKUP("Fred"; A2:G16; MATCH("Average"; A1:G1; 0)); notice that the heading is not sorted. As an exercise, use HLOOKUP to find Average and then MATCH to find the row containing Fred.

As a final example, write a formula to assign grades based on a student's average score. Assume that a score less than 51 is an F, less than 61 is an E, less than 71 is a D, less than 81 is a C, less than 91 is a B, and 91 to 100 is an A. Assume that the values in Table 20 are in Sheet2.

Table 20. Associate scores to a grade.

	A	B
1	Score	Grade
2	0	F
3	51	E
4	61	D
5	71	C
6	81	B
7	91	A

The formula =VLOOKUP(83; \$Sheet2.\$A\$2:\$B\$7; 2) is an obvious solution. Dollar signs are used so that the formula can be copied and pasted to a different location and it will still reference the same values in Table 20.

ADDRESS returns a string with a cell's address

Use ADDRESS to return a text representation of a cell address based on the row, column, and sheet; ADDRESS is frequently used with MATCH. The supported forms for ADDRESS are as follows:

```
ADDRESS(row; column)
ADDRESS(row; column; abs)
ADDRESS(row; column; abs; sheet)
```

The row and column are integer values where ADDRESS(1; 1) returns \$A\$1. The abs argument specifies which portion is considered absolute and which portion is considered relative (see Table 21); an absolute address is specified using the \$ character. The sheet is included as part of the address only if the sheet argument is used. The sheet argument is treated as a string. Using ADDRESS(MATCH("Bob";A1:A5 ; 0); 2) with the data in Table 20 returns \$B\$2.

Tip

Calc supports numerous powerful functions that are not discussed here. For example, the ROW, COLUMN, ROWS, and COLUMNS statements are not discussed; a curious person would investigate these functions.

Table 21. Values supported by the *abs* argument to ADDRESS.

Value	Description
1	Use absolute addressing. This is the default value if the argument is missing or an invalid value is used. ADDRESS(2; 5; 1) returns \$E\$2.
2	Use an absolute row reference and a relative column reference. ADDRESS(2; 5; 2; "Blah") returns Blah.E\$2.
3	Use a relative row reference and an absolute column reference. ADDRESS(2; 5; 3) returns \$E2.
4	Use relative addressing. ADDRESS(2; 5; 4) returns E2.

INDIRECT converts a string to a cell or range

Use INDIRECT to convert a string representation of a cell or range address to a reference to the cell or range. Table 22 contains examples accessing data as shown in Table 20.

Table 22. Examples using INDIRECT.

Example	Comment
INDIRECT("A2")	Returns cell A2, which contains Bob .
INDIRECT(G1)	If Cell G1 contains the text A2, then this returns Bob .
SUM(INDIRECT("B1:B5"))	Returns the sum of the range B1:B5, which is 194 .
INDIRECT(ADDRESS(2; 1))	Returns the contents of cell \$A\$2, which is Bob .

OFFSET returns a cell or range offset from another

Use OFFSET to return a cell or range offset by a specified number of rows and columns from a given reference point. The first argument, specifies the reference point. The second and third arguments specify the number of rows and columns to move from the reference point; in other words, where the new range starts. The OFFSET function has the following syntax:

```
OFFSET(reference; rows; columns)
OFFSET(reference; rows; columns; height)
OFFSET(reference; rows; columns; height; width)
```

Tip

If the width or height is included, the OFFSET function returns a range. If both the width and height are missing, a cell reference is returned.

If the height or width are missing, they default to 1. If the height is present, then a range reference is returned rather than a cell reference. Using values from Table 23, Listing 19 uses OFFSET to obtain the quiz scores for the student named Bob.

Listing 19. Complex example of OFFSET.

```
=SUM(OFFSET(INDIRECT(ADDRESS(MATCH("Bob";A1:A16; 0); 4)); 0; 0; 1; 2))
```

In its entirety, Listing 19 is complex and difficult to understand. Table 12 isolates each function in Listing 19, providing an easy to understand explanation of how the example works.

Table 23. Breakdown of Listing 19.

Function	Description
MATCH("Bob";A1:A16; 0)	Return 4 because Bob is the fourth entry in column A.
ADDRESS(4; 4)	Return \$D\$4.
INDIRECT("\$D\$4")	Convert \$D\$4 into a reference to the cell D4.
OFFSET(\$D\$4; 0; 0; 1; 2)	Return the range D4:E4.
SUM(D4:E4)	Return the sum of Bob's quiz scores.

Although Listing 19 works as intended, it breaks easily and unexpectedly. Consider, for example, what happens if the range is changed to A2:A16. MATCH returns an offset into the provided range, so **MATCH ("Bob";A2:A16 ; 0)** returns 3 rather than 4. **ADDRESS(3; 4)** returns \$D\$3 rather than \$D\$4 and Betty's quiz scores are returned instead of Bob's. Listing 20 uses a slightly different method to obtain Bob's quiz scores.

Listing 20. Better use of OFFSET.

```
=SUM(OFFSET(A1; MATCH("Bob"; A1:A16; 0)-1; 3; 1; 2))
```

Table 15 contains a description of each function used in Listing 20. To help convince yourself that Listing 20 is better than Listing 19, replace A1 with A2 in both Listing 20 and Table 15 and notice that you still obtain Bob's quiz scores.

Table 24. Breakdown of Listing 20.

Function	Description
MATCH("Bob";A1:A16; 0)-1	Return 3 because Bob is the fourth entry in column A.
OFFSET(A1; 3; 3; 1; 2)	Return the range D4:E4.
SUM(D4:E4)	Return the sum of Bob's quiz scores.

Tip

The first argument to OFFSET can be a range so you can use a defined range name.

INDEX returns cells inside a specified range

INDEX returns the cells specified by a row and column number. The row and column number are relative to the upper left corner of the specified reference range. For example, using

=INDEX(B2:D3; 1; 1) returns the cell B2. Table 25 lists shows the syntax for using the INDEX function.

Table 25. Syntax for INDEX.

Syntax	Description
INDEX(reference)	Return the entire range.
INDEX(reference; row)	Return the specified row in the range.
INDEX(reference; row; column)	Return the cell specified by row and column. A row and column of 1 returns the cell in the upper left corner of the range.
INDEX(reference; row; column; range)	A reference range can contain multiple ranges. The range argument specifies which range to use.

The INDEX function can return an entire range, a row, or a single column (see Table 25). The ability to index based on the start of the reference range provides some interesting uses. Using the values shown in Table 23, Listing 21 finds and returns Bob's quiz scores. Table 26 contains a listing of each function used in Listing 21.

Listing 21. Return Bob's quiz scores.

```
=SUM(OFFSET(INDEX(A2:G16; MATCH("Bob"; A2:A16; 0)); 0; 3; 1; 2))
```

Table 26. Breakdown of Listing 21.

Function	Description
MATCH("Bob";A2:A16; 0)	Return 3 because Bob is the third entry in column A2:A16.
INDEX(A2:A16; 3)	Return A4:G4—the row containing Bob's quiz scores.
OFFSET(A4:G4; 0; 3; 1; 2)	Return the range D4:E4.
SUM(D4:E4)	Return the sum of Bob's quiz scores.

Tip

A simple range contains one contiguous rectangular region of cells. It is possible to define a multi-range that contains multiple simple ranges. If the reference consists of multiple ranges, you must enclose the reference or range name in parentheses.

If reference argument to the INDEX function is a multi-range, then the range argument specifies which simple range to use (see Table 27).

Table 27. Using INDEX with a multi-range.

Function	Returns
=INDEX(B2:G2; 1; 2)	93
=INDEX(B5:G5; 1; 2)	65
=INDEX((B2:G2;B5:G5); 1; 2)	93
=INDEX((B2:G2;B5:G5); 1; 2; 1)	93
=INDEX((B2:G2;B5:G5); 1; 2; 2)	65

Database-specific functions

Although every Calc function can be used for database manipulation, the functions in Table 28 are specifically designed for use as a database. The descriptions in Table 28 use the following terms interchangeably: row and record, cell and field, and database and all rows.

Table 28. Database functions in a Calc document.

Function	Description
DAVERAGE	Return the average of all fields that matches the search criteria.
DCOUNT	Count the number of records containing numeric data that match the search criteria.
DCOUNTA	Count the number of records containing text data that match the search criteria.
DGET	Return the contents of a field that matches the search criteria.
DMAX	Return the maximum content of a field that matches the search criteria.
DMIN	Return the minimum content of a field that matches the search criteria.
DPRODUCT	Return the product of the fields that matches the search criteria.
DSTDEV	Calculate the standard deviation using the fields that match the search criteria. The fields are treated as a sample.
DSTDEVP	Calculate the standard deviation using the fields that match the search criteria. The fields are treated as the entire population.
DSUM	Return the sum of all fields that matches the search criteria.
DVAR	Calculate the variance using the fields that match the search criteria. The fields are treated as a sample.
DVARP	Calculates the variance using the fields that match the search criteria. The fields are treated as the entire population.

The syntax for the database functions are identical.

`DCOUNT(database; database field; search criteria)`

The database argument is the cell range that defines the database. The cell range should contain the column labels (see Listing 22). The following examples, assume that the data from Table 23 is placed in Sheet 1 and the filter criteria in Table 24 is placed in Sheet 2.

Listing 22. The database argument includes the headers.

`=DCOUNT(A1:G16; "Test 2"; Sheet2.A1:G3)`

The database field specifies the column on which the function operates after the search criteria is applied and the data rows are selected. The database field can be specified using the column header name or as an integer. If the column is specified as an integer, 0 specifies the entire data range, 1 specifies the first column, 2 specifies the second column, and so on. Listing 23 calculates the average test score for the rows that match the search criteria.

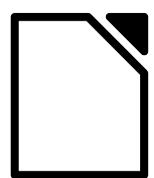
Listing 23. "Test 2" is column 3.

`=DAVERAGE(A1:G16; "Test 2"; Sheet2.A1:G3)
=DAVERAGE(A1:G16; 3; Sheet2.A1:G3)`

The search criteria is the cell range containing search criteria. The search criteria is identical to the advanced filters; criteria in the same row is connected by AND and criteria in different rows is connected by OR.

Conclusion

A Calc document provides sufficient database functionality to satisfy the needs of most people. The infrequently used database functions, such as OFFSET and INDEX, are worth the time to learn and they can save yourself time in the long run.



LibreOffice
The Document Foundation

Chapter 14

Setting up and Customizing

Calc

Introduction

This chapter describes some common customizations that you may wish to do. In addition to selecting options from those provided, you can customize menus, toolbars, and keyboard shortcuts, add new menus and toolbars, and assign macros to events. However, you cannot customize context (right-click) menus.

Other customizations are made easy by extensions that you can install from the LibreOffice website or from other providers.

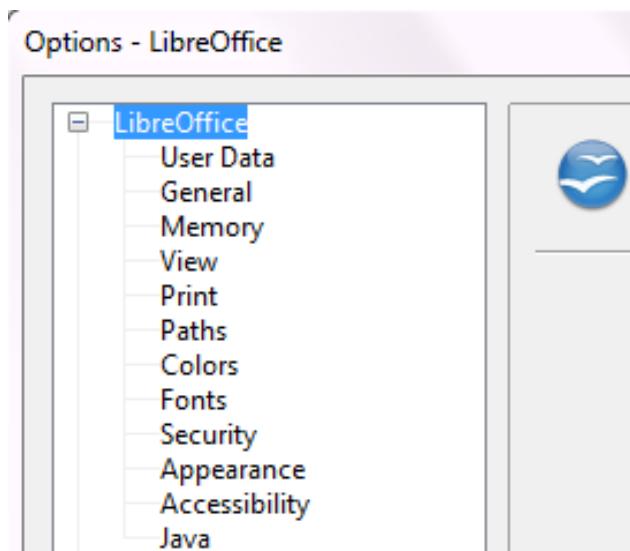
Note

Customizations to menus and toolbars can be saved in a template. To do so, first save them in a document and then save the document as a template as described in Chapter 4, Using Styles and Templates in Calc.

Choosing options that affect all of LibreOffice

This section covers some of the settings that apply to all the components of LibreOffice. Other general options are discussed in Chapter 2, Setting Up LibreOffice, in the *Getting Started* guide.

- 1) Choose **Tools** → **Options**. The list on the left-hand side varies depending on which LibreOffice component is open.
- 2) Click the + sign to the left of *LibreOffice* on the left-hand side. A list of subsections drops down.



Note

The **Back** button has the same effect on all pages of the Options dialog. It resets the options to the values that were in place when you opened LibreOffice.

User Data options

Calc uses the first and last name stored in the *LibreOffice – User Data* page to fill in the *Created* and *Modified* fields in the document properties, and the optional *Author* field often used in the footer of a printed spreadsheet. Fill in the form on this page.

Print options

Set the print options to suit your default printer and your most common printing method. You can change these settings at any time, either through this dialog or during the printing process (by clicking the **Options** button on the Print dialog).

In the Options dialog, click **LibreOffice** → **Print**.

See Chapter 6, Printing, Exporting, and E-mailing, for more about the options on this page.

Color options

On the *LibreOffice – Colors* page, you can specify colors to use in LibreOffice documents. You can select a color from a color table, edit an existing color, and define new colors. These colors are stored in your color palette and are then available in all components of LibreOffice.

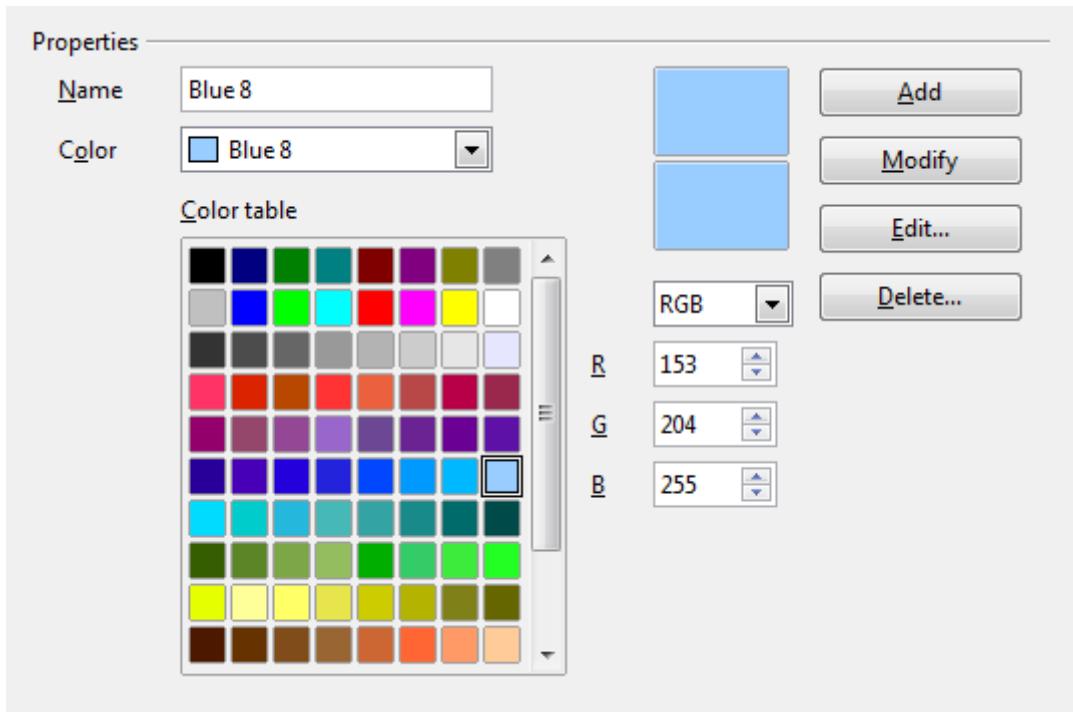


Figure 328: Defining colors to use in color palettes in LibreOffice

To modify a color:

- 1) Select the color to modify from the list or the color table.
- 2) Enter the new values that define the color. If necessary, change the settings from RGB (Red, Green, Blue) to CMYK (Cyan, Magenta, Yellow, Black) or vice versa. The changed color appears in the lower of the two color preview boxes at the top.
- 3) Modify the **Name** as required.
- 4) Click the **Modify** button. The newly defined color is now listed in the Color table.

Alternatively, click the **Edit** button to open the Color dialog, shown in Figure 329. Here you can select a color from one of the color windows in the upper area, or you can enter values in the lower area using your choice of RGB, CMYK, or HSB (Hue, Saturation and Brightness) values.

The upper right color window is linked directly with the color input fields in the lower area; as you choose a color in the upper window, the numbers change accordingly. The two color fields at the lower right show the value of the selected color on the left and the currently set value from the color value fields on the right.

Modify the color components as required and click **OK** to exit the dialog. The newly defined color now appears in the lower of the color preview boxes shown in Figure 328. Type a name for this color in the **Name** box, then click the **Add** button. A small box showing the new color is added to the Color table.

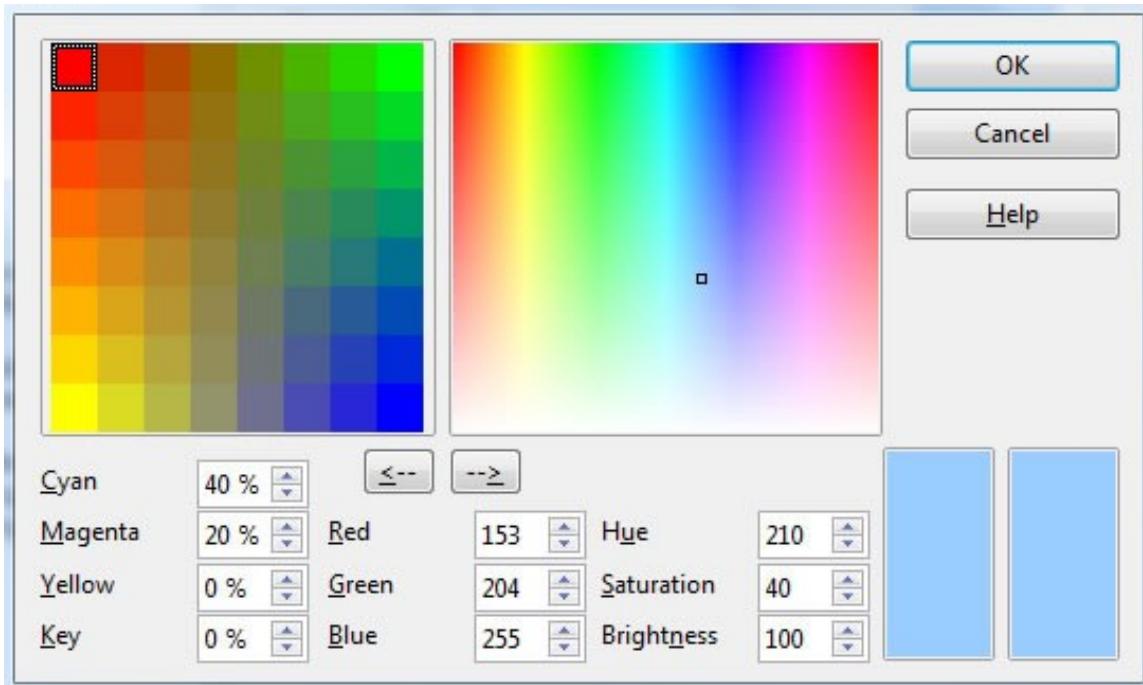


Figure 329: Editing colors

Another way to define or alter colors is through the Colors page of the Area dialog, where you can also save and load palettes, a feature that is not possible here. In Calc, draw a temporary draw object and use the context menu of this object to open the Area dialog. If you load a palette in one component of LibreOffice, it is only active in that component; the other components keep their own palettes.

Security options

Use the *LibreOffice – Security* page to choose security options for saving documents and for opening documents that contain macros.

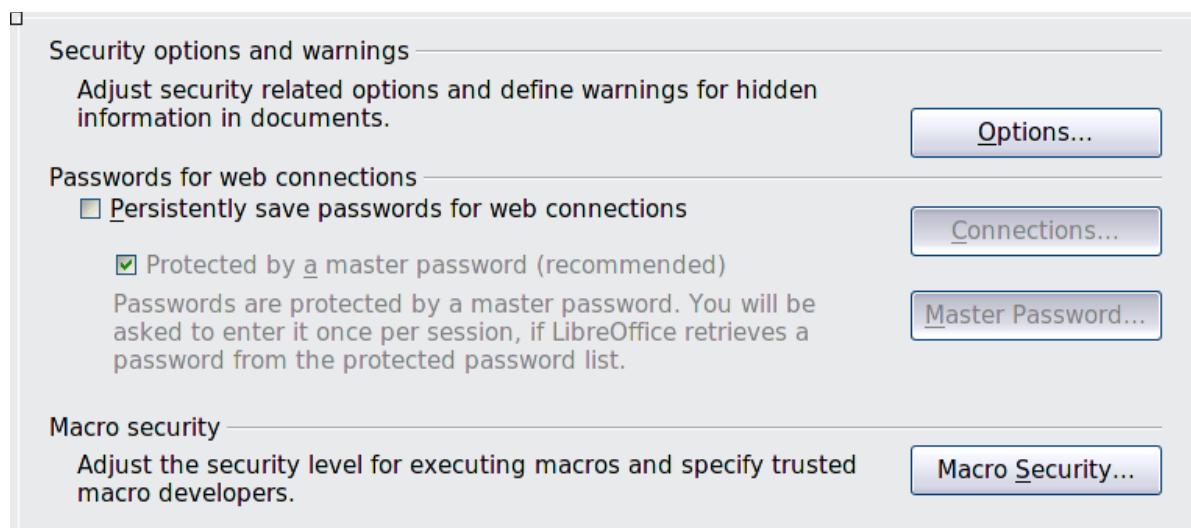


Figure 330: Choosing security options for opening and saving documents

Security options and warnings

If you record changes, save multiple versions, or include hidden information or notes in your documents, and you do not want some of the recipients to see that information, you can set warnings to remind you to remove this information, or you can have LibreOffice remove some information automatically. Note that (unless removed) much of this information is retained in a file whether the file is in LibreOffice's default OpenDocument format, or has been saved to other formats, including PDF.

Click the **Options** button to open a separate dialog with specific choices (Figure 331).

Macro security

Click the **Macro Security** button to open the Macro Security dialog (not shown here), where you can adjust the security level for executing macros and specify trusted sources.

Security options and warnings

The following options are on the Security options and warnings dialog (Figure 338).

Remove personal information on saving

Select this option to always remove user data from the file properties when saving the file. To manually remove personal information from specific documents, deselect this option and then use the **Delete** button under **File → Properties → General**.

Ctrl-click required to follow hyperlinks

The default behavior in most components of LibreOffice is to *Ctrl+click* on a hyperlink to open the linked document, but you can choose to open hyperlinks using a single click. However, Calc opens hyperlinks using a single click, regardless of the selection for this option.

The other options on this dialog should be self-explanatory.

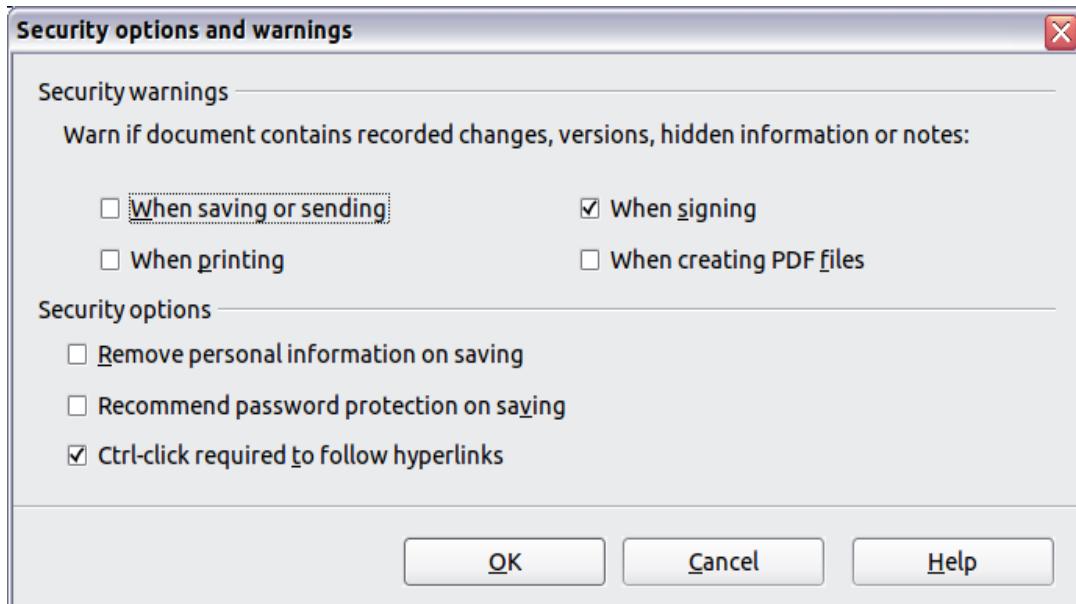


Figure 331: Security options and warnings dialog

Appearance options

On the *LibreOffice – Appearance* page, you can specify which items are visible and the colors used to display various items.

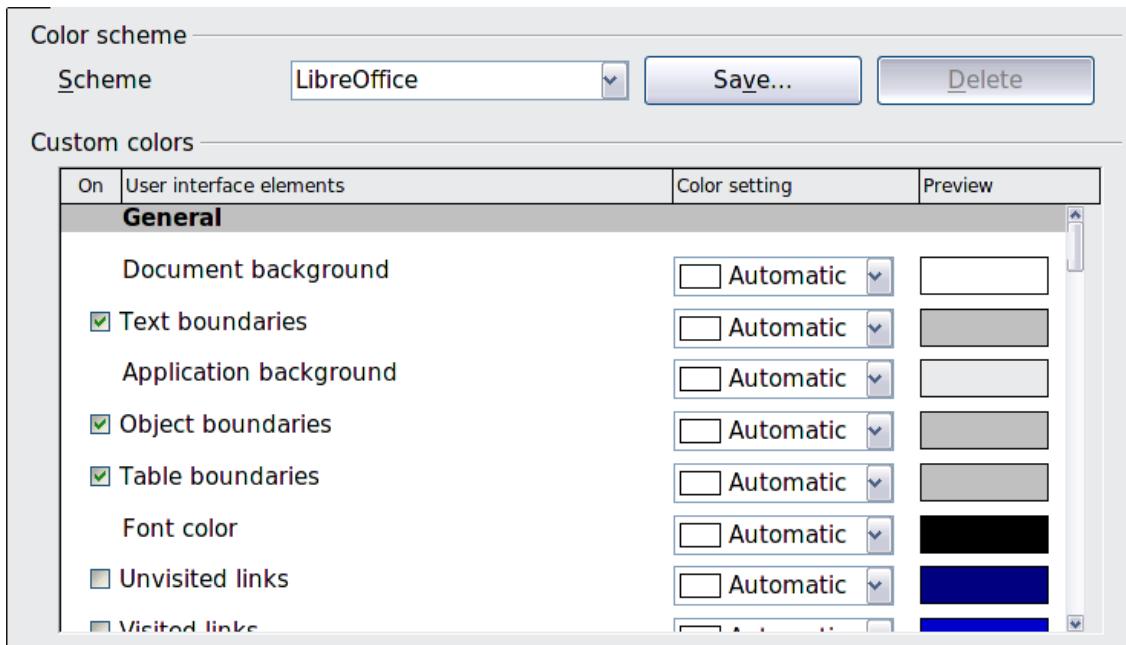


Figure 332: Changing the color of grid points in Calc

Scroll down in the page until you find **Spreadsheet**. To change the default color for grid points, click the down-arrow by the color and select a new color from the drop-down list.

If you wish to save your color changes as a color scheme, click **Save**, type a name in the **Scheme** box; then click **OK**.

Choosing options for loading and saving documents

You can set the Load/Save options to suit the way you work. This chapter describes only a few of the options, those more relevant to working with Calc. See Chapter 2, Setting Up LibreOffice, in the *Getting Started* guide for a description of the other options.

If the Options dialog is not already open, click **Tools → Options**. Click the + sign to the left of **Load/Save** to display the list of load/save options pages.

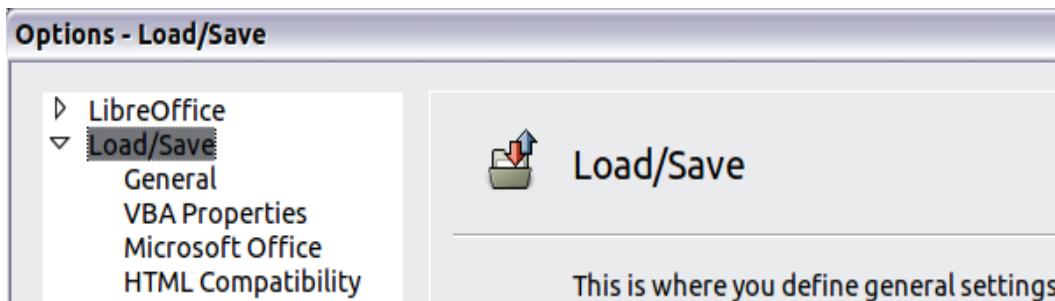


Figure 333: Load/Save options

General Load/Save options

Most of the choices on the *Load/Save – General* page are familiar to users of other office suites. Those specific to LibreOffice are in the *Default file format and ODF settings* section.

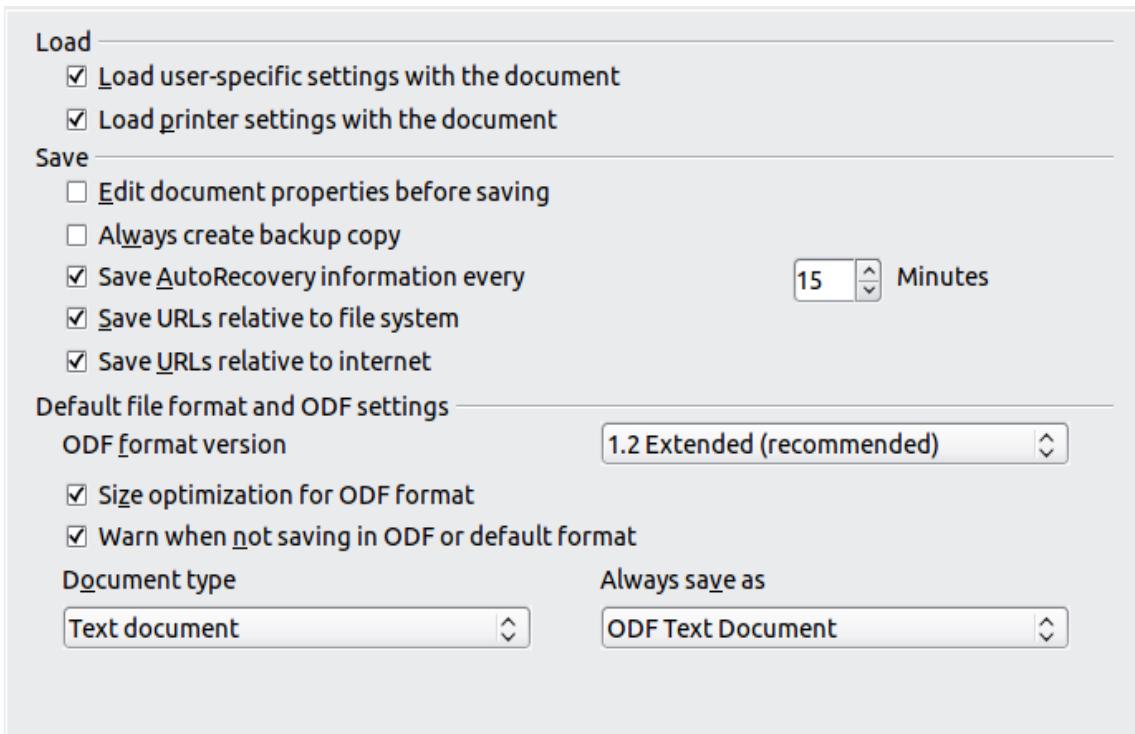


Figure 334: Choosing Load and Save options

ODF format version

LibreOffice by default saves documents in OpenDocument Format (ODF) version 1.2 Extended. While this allows for improved functionality, there may be backwards compatibility issues. When a file saved in ODF 1.2 Extended is opened in an earlier version of LibreOffice (using ODF 1.0/1.1), some of the advanced features may be lost. Two notable examples are cross-references to headings and the formatting of numbered lists. If you plan to share documents with people who are still using older versions of LibreOffice, save the document using ODF version 1.0/1.1.

Size optimization for ODF format

LibreOffice documents are XML files. When you select this option, LibreOffice writes the XML data without indents and line breaks. If you want to be able to read the XML files in a text editor in a structured form, deselect this option.

Document type

If you routinely share documents with users of Microsoft Excel, you might want to change the **Always save as** attribute for spreadsheets to one of the Excel formats. Current versions of Microsoft Excel can open ODF files, so this may no longer be needed.

Note

LibreOffice can open and save files in the .xlsx format produced by Microsoft Office 2007 and 2010.

VBA Properties Load/Save options

On the *Load/Save – VBA Properties* page, you can choose whether to keep any macros in Microsoft Office documents that are opened in LibreOffice.

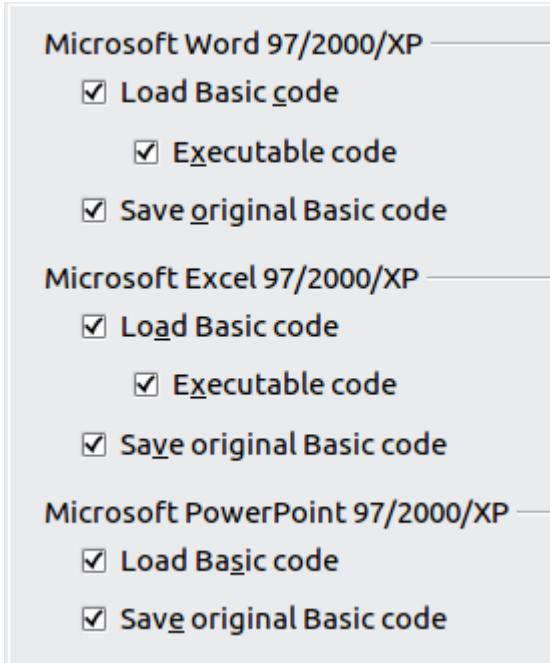


Figure 335: Choosing Load/Save VBA Properties

- If you choose **Save original Basic code**, the macros will not work in LibreOffice but are retained if you save the file into Microsoft Office format.
- If you choose **Load Basic code to edit**, the changed code is saved in an LibreOffice document but is not retained if you save into an Microsoft Office format.
- If you are importing a Microsoft Excel file containing VBA code, you can select the option **Executable code**. Whereas normally the code is preserved but rendered inactive (if you inspect it with the StarBasic IDE you will notice that it is all commented), with this option the code is ready to be executed.

Microsoft Office Load/Save options

On the *Load/Save – Microsoft Office* page, you can choose what to do when importing and exporting Microsoft Office OLE objects (linked or embedded objects or documents such as spreadsheets or equations).

Select the [L] options to convert Microsoft OLE objects into the corresponding LibreOffice OLE objects when a Microsoft document is loaded into LibreOffice (mnemonic: “L” for “load”).

Select the [S] options to convert LibreOffice OLE objects into the corresponding Microsoft OLE objects when a document is saved in a Microsoft format (mnemonic: “S” for “save”).

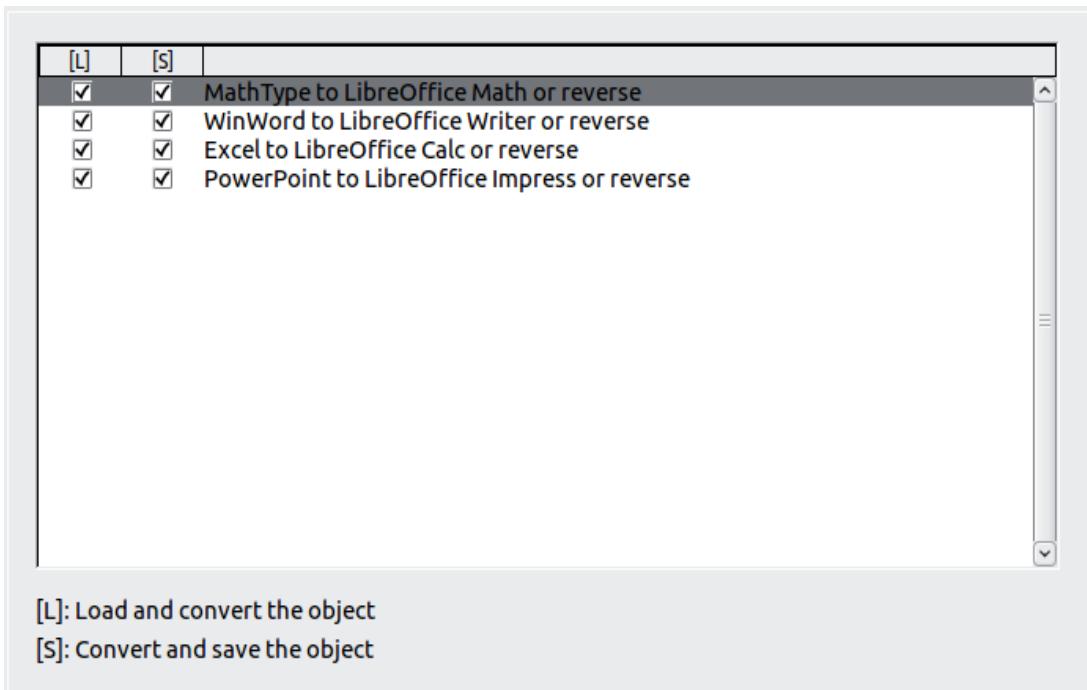


Figure 336: Choosing Load/Save Microsoft Office options

HTML compatibility Load/Save options

Choices made on the *Load/Save – HTML Compatibility* page (Figure 337) affect HTML pages imported into LibreOffice and those exported from LibreOffice. See *HTML documents; importing/exporting* in the Help for more information.

The main items of interest for Calc users are in the *Export* section: *LibreOffice Basic* and *Display warning*.

Export - LibreOffice Basic

Select this option to include LibreOffice Basic macros (scripts) when exporting to HTML format. You must activate this option *before* you create the LibreOffice Basic macro; otherwise the script will not be inserted. LibreOffice Basic macros must be located in the header of the HTML document. Once you have created the macro in the LibreOffice Basic IDE, it appears in the source text of the HTML document in the header.

If you want the macro to run automatically when the HTML document is opened, choose **Tools** → **Customize** → **Events**. See Chapter 12, Calc Macros, for more information.

Export - Display warning

When the **LibreOffice Basic** option (see above) is *not* selected, the **Display warning** option becomes available. If the **Display warning** option is selected, then when exporting to HTML a warning is shown that LibreOffice Basic macros will be lost.

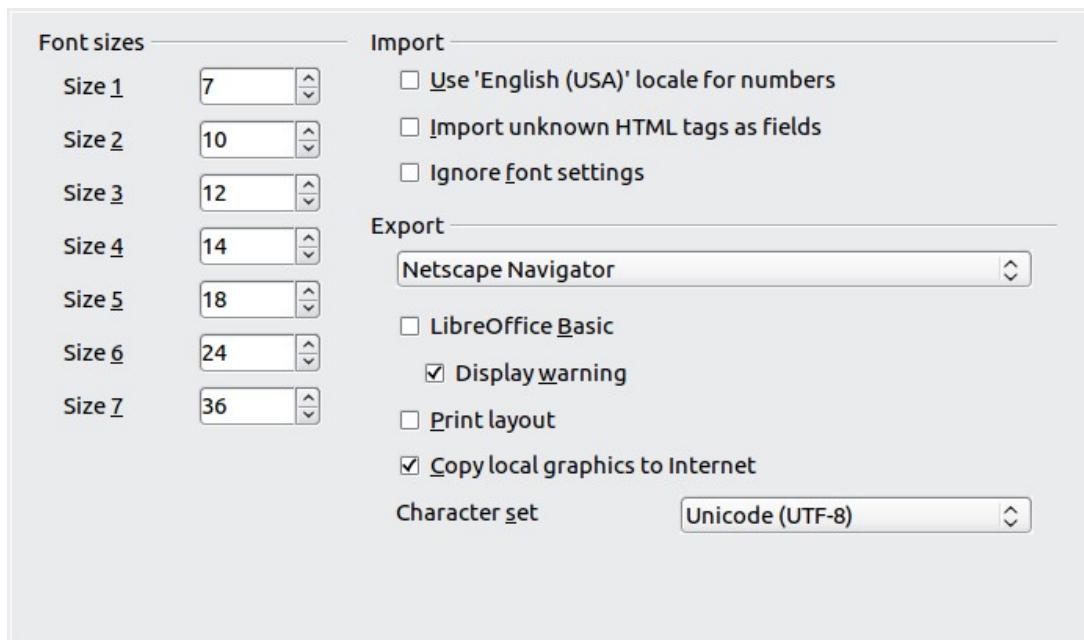
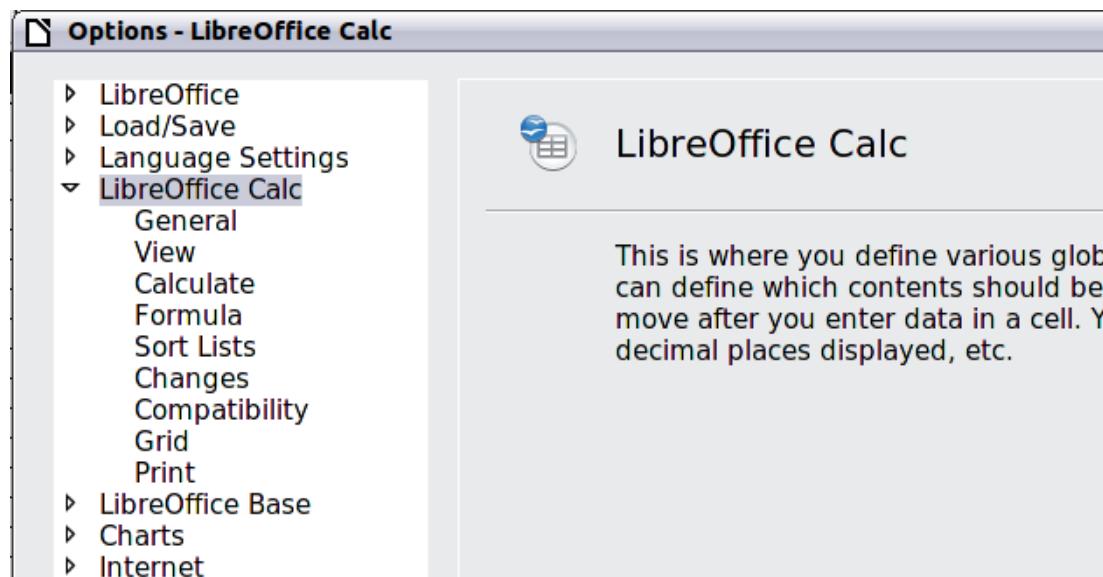


Figure 337: Choosing HTML compatibility options

Choosing options for Calc

In the Options dialog, click the + sign to the left of *LibreOffice Calc* on the left-hand side. A list of subsections drops down.



General options for Calc

In the Options dialog, choose **LibreOffice Calc → General**.

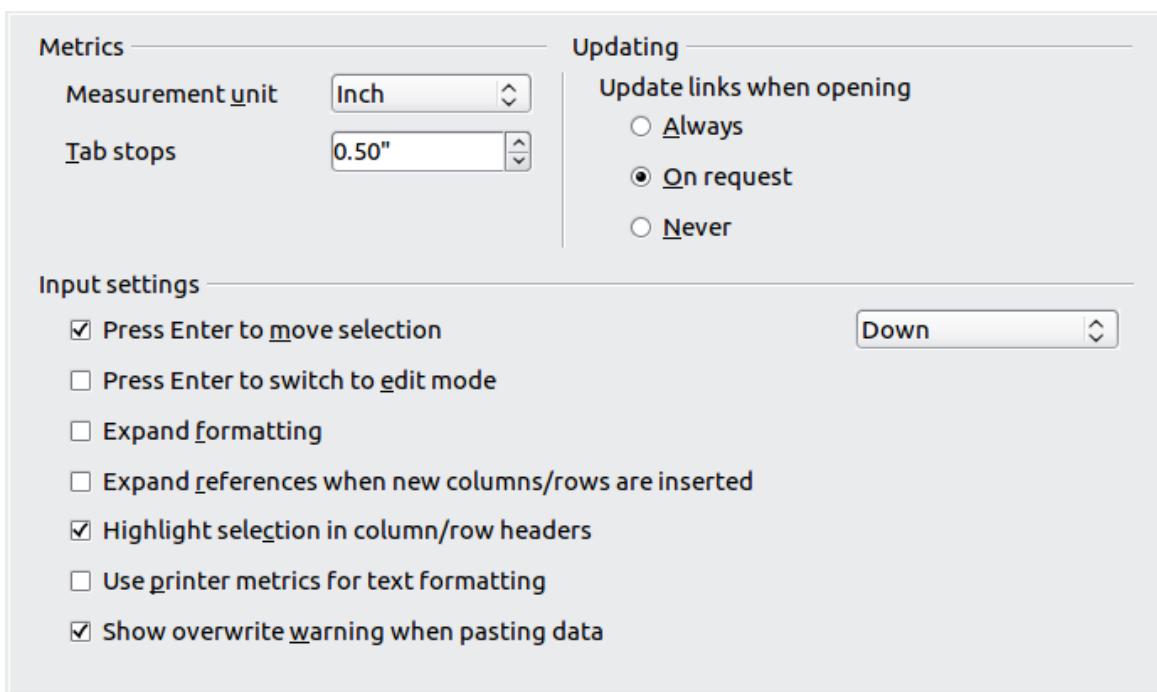


Figure 338: Selecting general options for Calc

Metrics section

Choose the unit of measurement used in spreadsheets and the default tab stops distance.

Updating section

Choose whether to update links when opening a document always, only on request, or never. Regardless of this setting, you can manually update links at any time. You might want to avoid updating links when opening documents if they often contain many charts or linked graphics that would slow down loading.

Input settings section

Press Enter to move selection

Specifies that pressing *Enter* moves the cursor to another cell. If this option is selected, you can also choose the direction the cursor moves: up, down, left, or right. If this option is **not** selected, pressing *Enter* completes data entry for a cell but does not move the cursor.

Press Enter to switch to edit mode

Specifies that pressing *Enter* puts the selected cell into edit mode.

Expand formatting

Specifies whether to automatically apply the formatting attributes of an inserted cell to empty adjacent cells. If, for example, an inserted cell has the bold attribute, this attribute will also apply to empty adjacent cells. However, cells that already have a special format will not be modified by this function. To see the affected range, press *Ctrl*/** (multiplication sign on the number pad). The format will also apply to all new values inserted within this range.

Expand references when new columns/rows are inserted

Specifies whether to expand references when inserting columns or rows adjacent to the reference range. This is only possible if the reference range, where the column or row is inserted, originally spanned at least two cells in the desired direction.

Example: If the range A1:B1 is referenced in a formula and you insert a new column after column B, the reference is expanded to A1:C1. If the range A1:B1 is referenced and a new row is inserted under row 1, the reference is not expanded, since there is only a single cell in the vertical direction.

If you insert rows or columns in the middle of a reference area, the reference is always expanded.

Highlight selection in column/row headings

Specifies whether to highlight column and row headers in the selected columns or rows.

Use printer metrics for text formatting

Specifies that printer metrics are applied for printing and also for formatting the display on the screen. If this option is not selected, a printer-independent layout is used for screen display and printing.

Show overwrite warning when pasting data

Specifies that, when you paste cells from the clipboard to a cell range that is not empty, a warning appears.

View options for Calc

In the Options dialog, choose **LibreOffice Calc → View**.

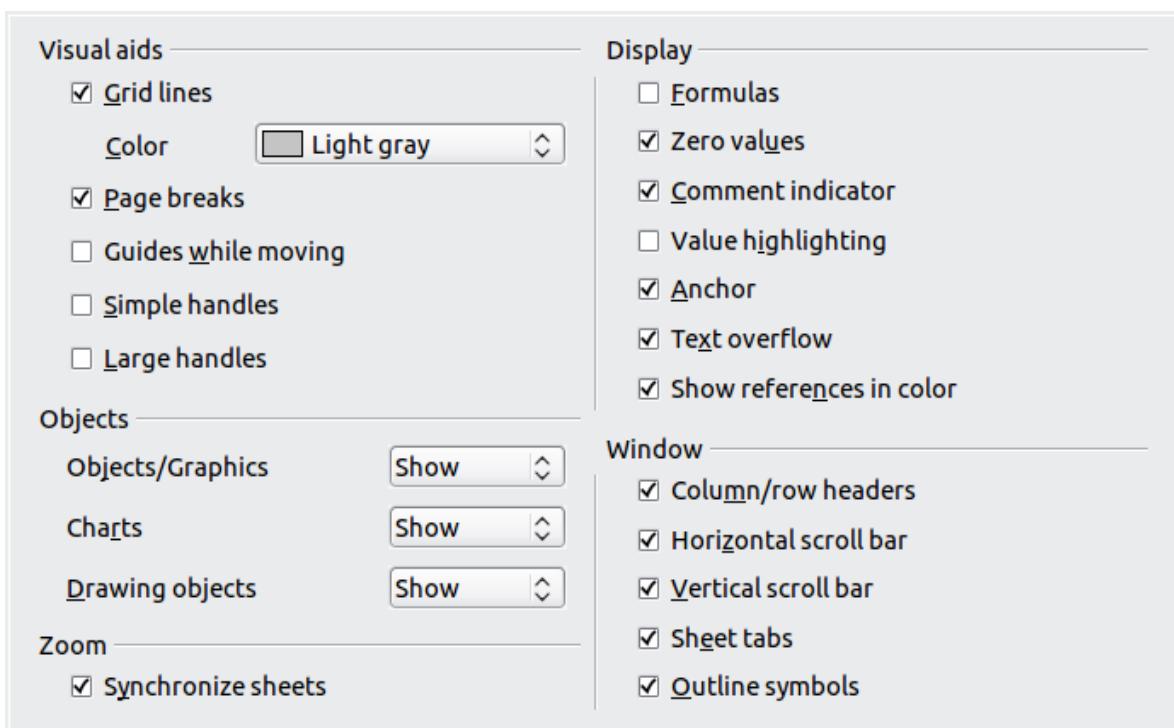


Figure 339: Selecting view options for Calc

Visual aids section

Specifies which lines are displayed.

Grid lines

Specifies whether to display grid lines between the cells when viewed onscreen. If this option is selected, you can also specify the color for the grid lines in the current document. The color choice overrides the selection made in **Tools → Options → LibreOffice → Appearance → Spreadsheet → Grid lines**.

For printing, choose **Format → Page → Sheet** and mark the **Grid** option.

Page breaks

Specifies whether to view the page breaks within a defined print area.

Guides while moving

Specifies whether to view guides when moving drawings, frames, graphics and other objects. These guides help you align objects.

Simple handles

Specifies whether to display the handles (the eight points on a selection box) as simple squares without a 3D effect.

Large handles

Specifies that larger than normal handles (the eight points on a selection box) are displayed.

Display section

Select various options for the screen display.

Formulas

Specifies whether to show formulas instead of results in the cells.

Zero values

Specifies whether to show numbers with the value 0.

Comment indicator

Specifies that a small rectangle is shown in the top right corner of the cell when a comment exists for that cell. The text of the comment is shown when you hover the pointer over the cell, if tips are enabled under **Tools → Options → LibreOffice → General**.

To display a comment permanently, right-click on the cell and select **Show comment** from the context menu.

Value highlighting

Select this option to highlight all values in the sheet. Text is highlighted in black; numbers in blue; and formulas, logical values, dates, and so on, in green.

When this command is active, any colors assigned in the document are not displayed.

Anchor

Specifies whether the anchor icon is displayed when an inserted object, such as a graphic, is selected.

Text overflow

If a cell contains text that is wider than the width of the cell, the text is displayed over empty neighboring cells in the same row. If there is no empty neighboring cell, a small triangle at the cell border indicates that the text continues.

Show references in color

Specifies that each reference is highlighted in color in the formula. The cell range is also enclosed by a colored border as soon as the cell containing the reference is selected for editing.

Objects section

Specifies whether to display or hide objects in three object groups: objects and graphics; charts; and drawing objects.

Window section

Specifies whether some elements are visible onscreen: column/row headers, horizontal scrollbar, vertical scrollbar, sheet tabs, and outline symbols.

If the **Sheet tabs** option is not selected, you can only switch between the sheets by using the Navigator.

Note that there is a slider between the horizontal scrollbar and the sheet tabs that may be set to one end.

Zoom section

Select the **Synchronize sheets** option to apply any selected zoom factor to all sheets in the spreadsheet. If this option is not selected, separate zoom factors can be applied to individual sheets.

Calculate options

In the Options dialog, choose **LibreOffice Calc → Calculate**.

Use this page to define the calculation settings for spreadsheets.

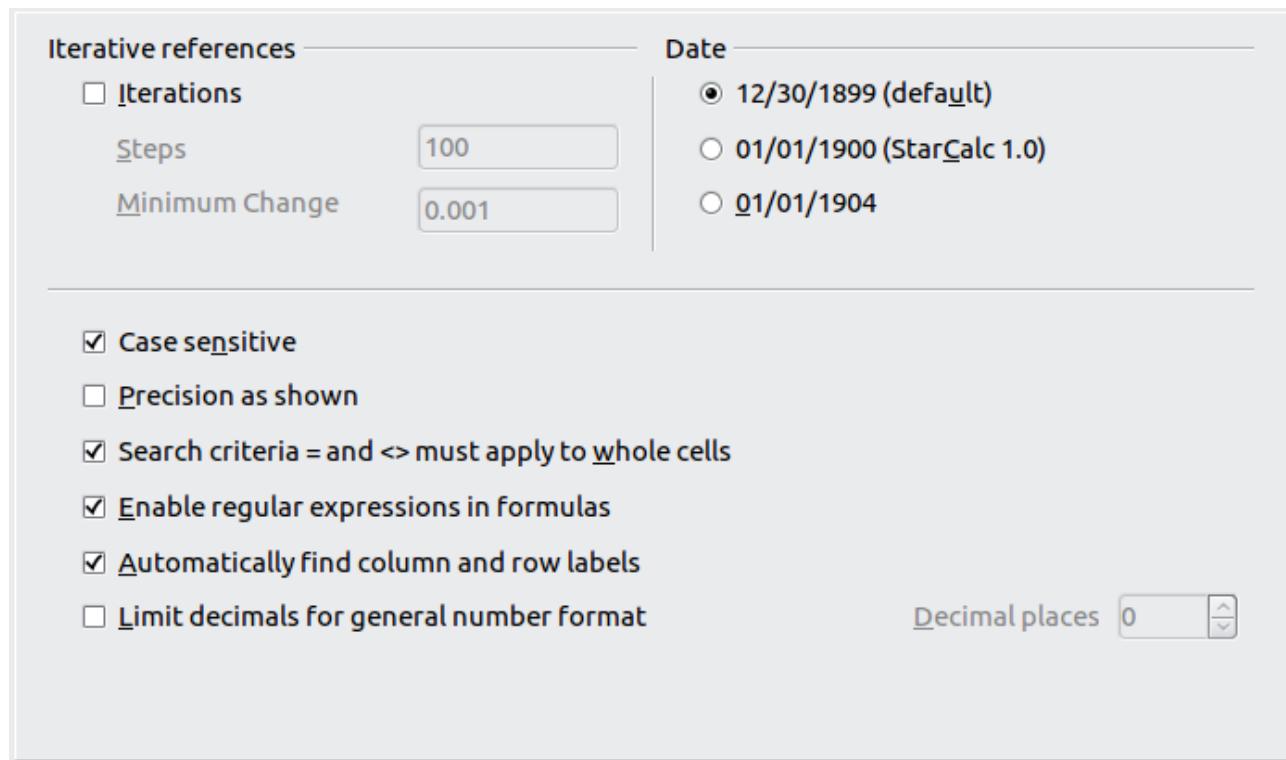


Figure 340: Calc calculation options

Iterative references section

Iterative references are formulas that are continuously repeated until the problem is solved. In this section you can choose the number of approximation steps carried out during iterative calculations and the degree of precision of the answer.

Iterations

Select this option to enable iterations. If this option is not selected, an iterative reference causes an error message.

Steps

Sets the maximum number of iteration steps.

Minimum Change

Specifies the difference between two consecutive iteration step results. If the result of the iteration is lower than the minimum change value, then the iteration will stop.

Date section

Select the start date for the internal conversion from days to numbers.

12/30/1899 (default)

Sets 12/30/1899 as day zero.

01/01/1900 (StarCalc 1.0)

Sets 1/1/1900 as day zero. Use this setting for StarCalc 1.0 spreadsheets containing date entries.

01/01/1904

Sets 1/1/1904 as day zero. Use this setting for spreadsheets that are imported in a foreign format.

Other options

Specify a variety of options relevant to spreadsheet calculation.

Case sensitive

Specifies whether to distinguish between upper and lower case in texts when comparing cell contents. The EXACT text function is always case-sensitive, independent of the settings in this dialog.

Decimal places

Defines the number of decimals to be displayed for numbers with the Standard number format. The numbers are displayed as rounded numbers, but are not saved as rounded numbers.

Precision as shown

Specifies whether to make calculations using the rounded values displayed in the sheet. Charts will be shown with the displayed values. If this option is **not** selected, the displayed numbers are rounded, but they are calculated internally using the non-rounded number.

Search criteria = and <> must apply to whole cells

Specifies that the search criteria you set for the Calc database functions must match the whole cell exactly. When this option is selected, Calc behaves exactly like Microsoft Excel when searching cells in the database functions.

This search:	Has this result:
win	Finds <i>win</i> , but not <i>win95</i> , <i>os2win</i> , or <i>upwind</i>
win.*	Finds <i>win</i> and <i>win95</i> , but not <i>os2win</i> or <i>upwind</i>
.*win	Finds <i>win</i> and <i>os2win</i> , but not <i>win95</i> or <i>upwind</i>
.*win.*	Finds <i>win</i> , <i>win95</i> , <i>os2win</i> , and <i>upwind</i>

If this option is **not** selected, the *win* search pattern acts like *.*win.** —the search pattern can be at any position within the cell when searching with the Calc database functions.

Enable regular expressions in formulas

Specifies that regular expressions are enabled when searching and also for character string comparisons. This relates to the database functions, and to VLOOKUP, HLOOKUP and SEARCH.

Automatically find column and row labels

Specifies that you can use the text in any cell as a label for the column below the text or the row to the right of the text. The text must consist of at least one word and must not contain any operators.

Example: Cell E5 contains the text *Europe*. Below, in cell E6, is the value 100 and in cell E7 the value 200. If the **Automatically find column and row labels** option is selected, you can write the following formula in cell A1: =SUM(Europe).

Sort Lists options

In the Options dialog, choose **LibreOffice Calc → Sort Lists**. Sort lists are used for more than sorting, for example filling a series of cells during data entry. In addition to the supplied lists, you can define and edit your own lists, as described in “Defining a fill series” in Chapter 2, Entering, Editing, and Formatting Data.

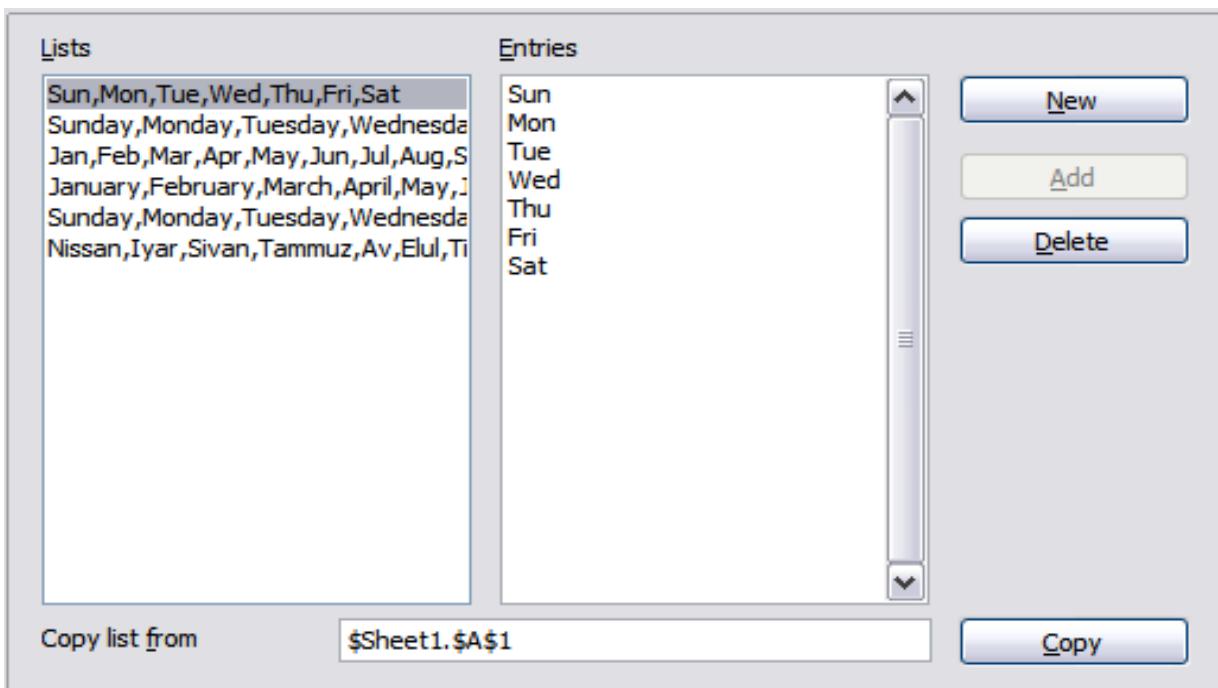


Figure 341: Defining sorting lists in Calc

Changes options

In the Options dialog, choose **LibreOffice Calc → Changes**.

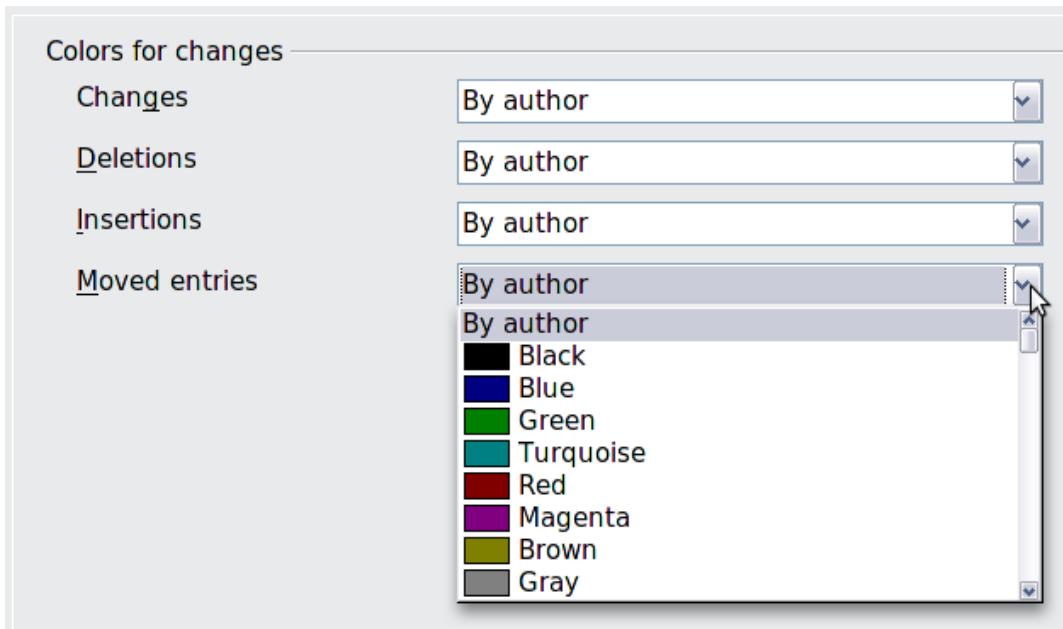


Figure 342: Calc options for highlighting changes

On this page you can specify options for highlighting recorded changes in spreadsheets. You can assign specific colors for insertions, deletions, and other changes, or you can let Calc assign colors based on the author of the change; in the latter case, one color will apply to all changes made by that author.

Grid options

The Grid page defines the grid settings for spreadsheets. Using a grid helps you determine the exact position of any charts or other objects you may add to a spreadsheet. You can also set this grid in line with the snap grid.

If you have activated the snap grid but wish to move or create individual objects without snap positions, you can press the *Ctrl* key to deactivate the snap grid for as long as needed.

In the Options dialog, choose **LibreOffice Calc → Grid**.

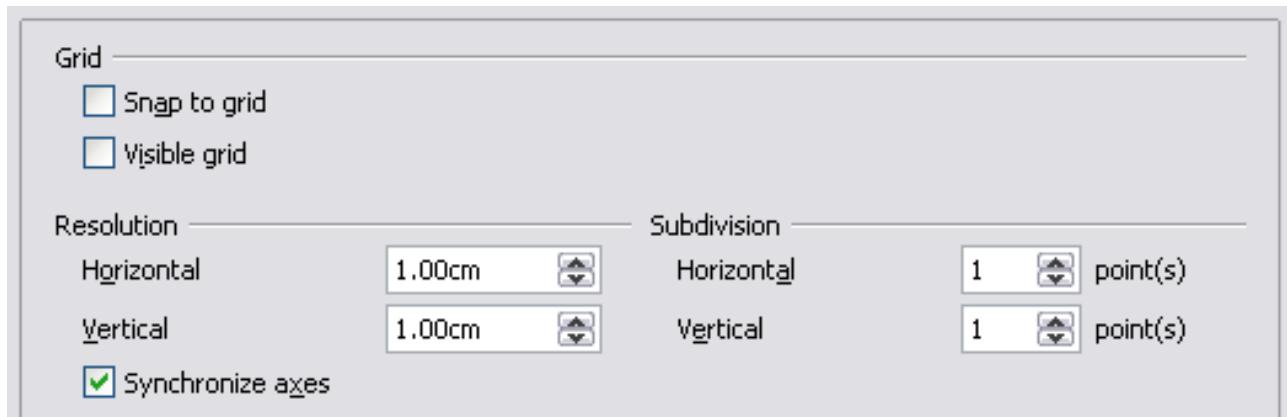


Figure 343: Calc grid options

Grid section

Snap to grid activates the snap function.

Visible grid displays grid points on the screen. These points are not printed.

Resolution section

Here you can set the unit of distance for the spacing between horizontal and vertical grid points and subdivisions (intermediate points) of the grid.

Synchronize axes changes the current grid settings symmetrically.

Print options

In the Options dialog, choose **LibreOffice Calc → Print**. See Chapter 6, Printing, Exporting, and E-mailing, for more about the options on this page.

Controlling Calc's AutoCorrect functions

Some people find some or all of the items in LibreOffice's AutoCorrect function annoying because they change what you type when you do not want it changed. Many people find some of the AutoCorrect functions quite helpful; if you do, then select the relevant options. But if you find unexplained changes appearing in your document, this is a good place to look to find the cause.

To open the AutoCorrect dialog, click **Tools → AutoCorrect Options**. (You need to have a document open for this menu item to appear.)

In Calc, this dialog has four tabs, as shown below. Options are described in the Help; many will be familiar to users of other office suites.

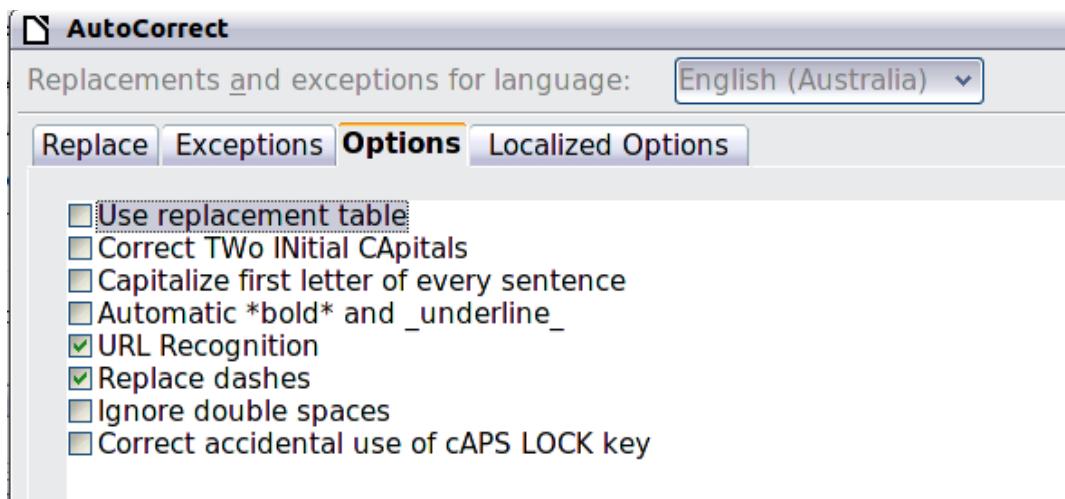


Figure 344: The AutoCorrect dialog in Calc

Customizing the user interface

Customizing the menu font

If you want to change the menu font from that supplied by LibreOffice to the system font for your operating system, do this:

- 1) Choose **Tools** → **Options** → **LibreOffice** → **View**.
- 2) Check **Use system font for user interface** and click **OK**.

Customizing menu content

In addition to changing the menu font, you can add and rearrange items on the menu bar, add items to menus, and make other changes.

To customize menus:

- 1) Choose **Tools** → **Customize**.
- 2) On the **Customize** dialog, pick the **Menus** page (Figure 336).

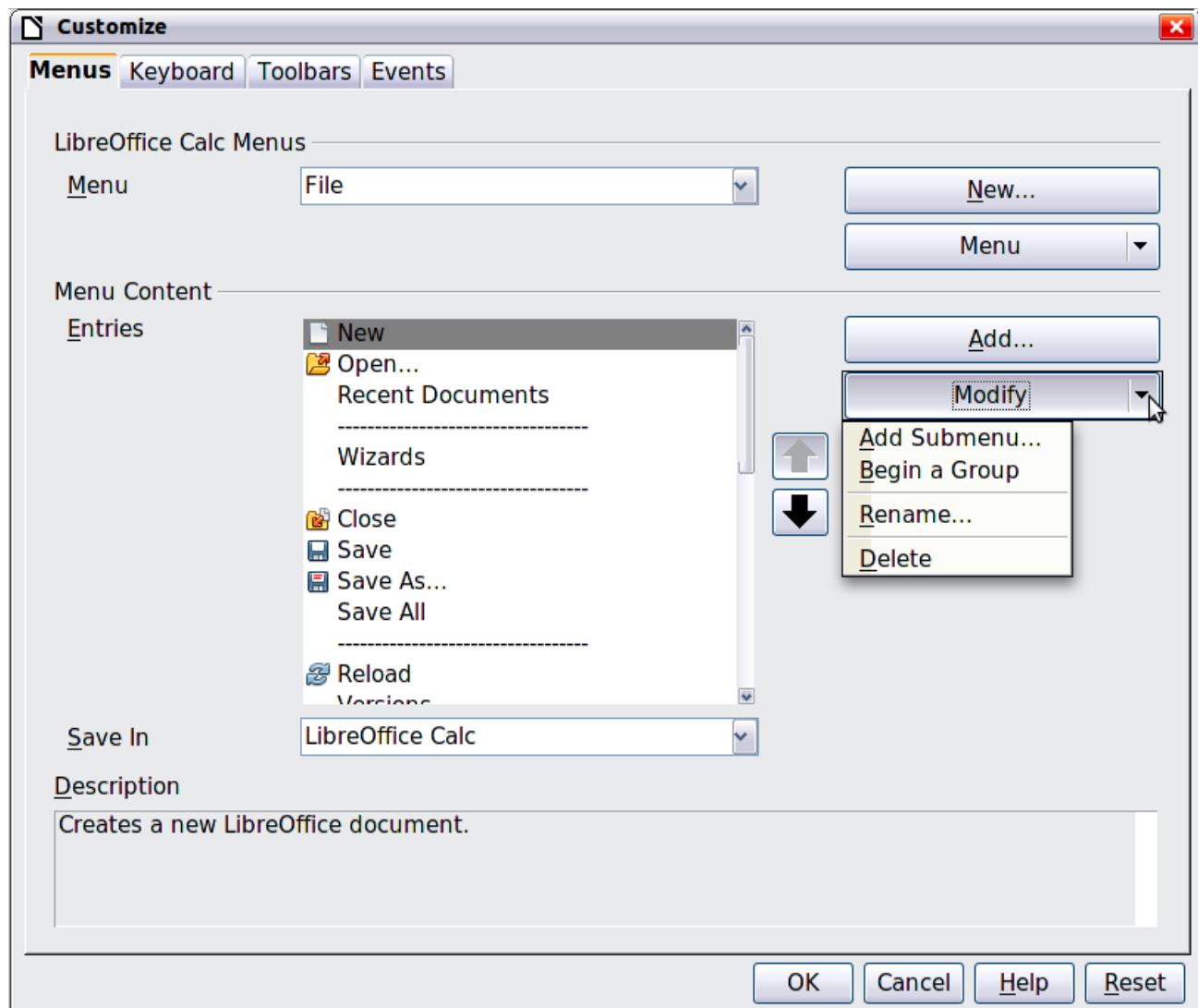


Figure 345: The Menus page of the Customize dialog

- 3) In the **Save In** drop-down list, choose whether to save this changed menu for Calc or for a selected document.
- 4) In the section **LibreOffice Calc Menus**, select from the **Menu** drop-down list the menu that you want to customize. The list includes all the main menus as well as sub-menus, that is menus that are contained under another menu. For example, in addition to *File*, *Edit*, *View*, and so on, there is *File | Send* and *File | Templates*. The commands available for the selected menu are shown in the central part of the dialog.
- 5) To customize the selected menu, click on the **Menu** or **Modify** buttons. You can also add commands to a menu by clicking on the **Add** button. These actions are described in the following sections. Use the up and down arrows next to the Entries list to move the selected menu item to a different position.
- 6) When you have finished making all your changes, click **OK** to save them.

Creating a new menu

In the Customize dialog, click **New** to display the dialog shown in Figure 335.

- 1) Type a name for your new menu in the **Menu name** box.
- 2) Use the up and down arrow buttons to move the new menu into the required position on the menu bar. Click **OK** to save.

The new menu now appears on the list of menus in the Customize dialog. (It will appear on the menu bar itself after you save your customizations.)

After creating a new menu, you need to add some commands to it, as described in “Adding a command to a menu” on page 351.

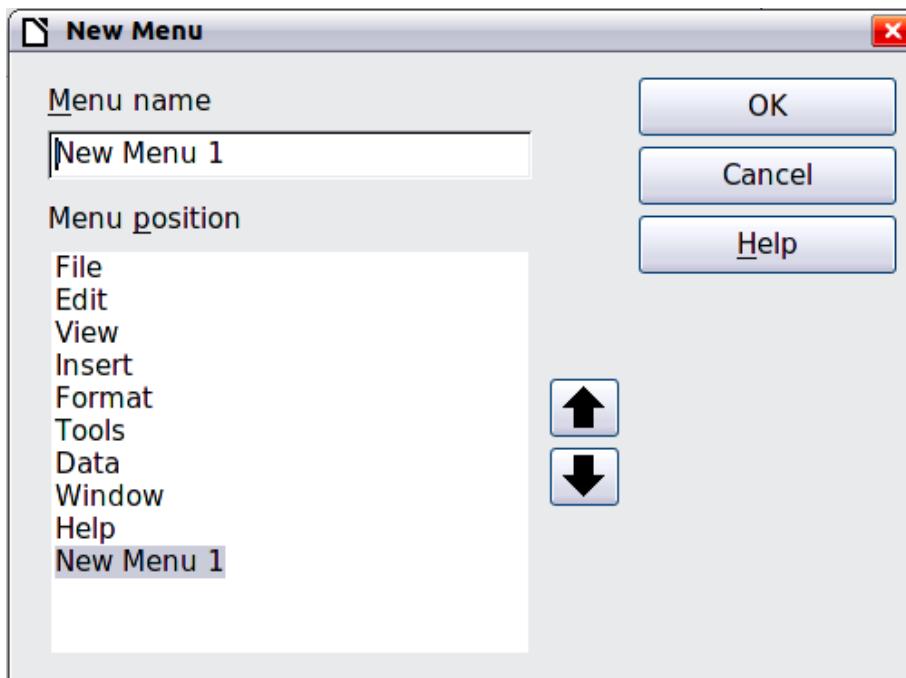


Figure 346: Adding a new menu

Modifying existing menus

To modify an existing menu, select it in the Menu list and click the **Menu** button to drop down a list of modifications: **Move**, **Rename**, **Delete**. Not all of these modifications can be applied to all the entries in the Menu list. For example, **Rename** and **Delete** are not available for the supplied menus.

To move a menu (such as *File*), choose **Menu** → **Move**. A dialog similar to the one shown in Figure 335 (but without the **Menu name** box) opens. Use the up and down arrow buttons to move the menu into the required position.

To move submenus (such as *File | Send*), select the main menu (File) in the Menu list and then, in the Menu Content section of the dialog, select the submenu (Send) in the Entries list and use the arrow keys to move it up or down in the sequence. Submenus are easily identified in the Entries list by a small black triangle on the right hand side of the name.

In addition to renaming, you can specify a keyboard shortcut that allows you to select a menu command when you press *Alt*+ an underlined letter in a menu command.

- 1) Select a menu or menu entry.
- 2) Click the **Menu** button and select **Rename**.
- 3) Add a tilde (~) in front of the letter that you want to use as an accelerator. For example, to select the Save All command by pressing *Alt*+V, enter **Sa~ve All**.

Adding a command to a menu

You can add commands to the supplied menus and to menus you have created. On the Customize dialog, select the menu in the Menu list and click the **Add** button in the Menu Content section of the dialog.

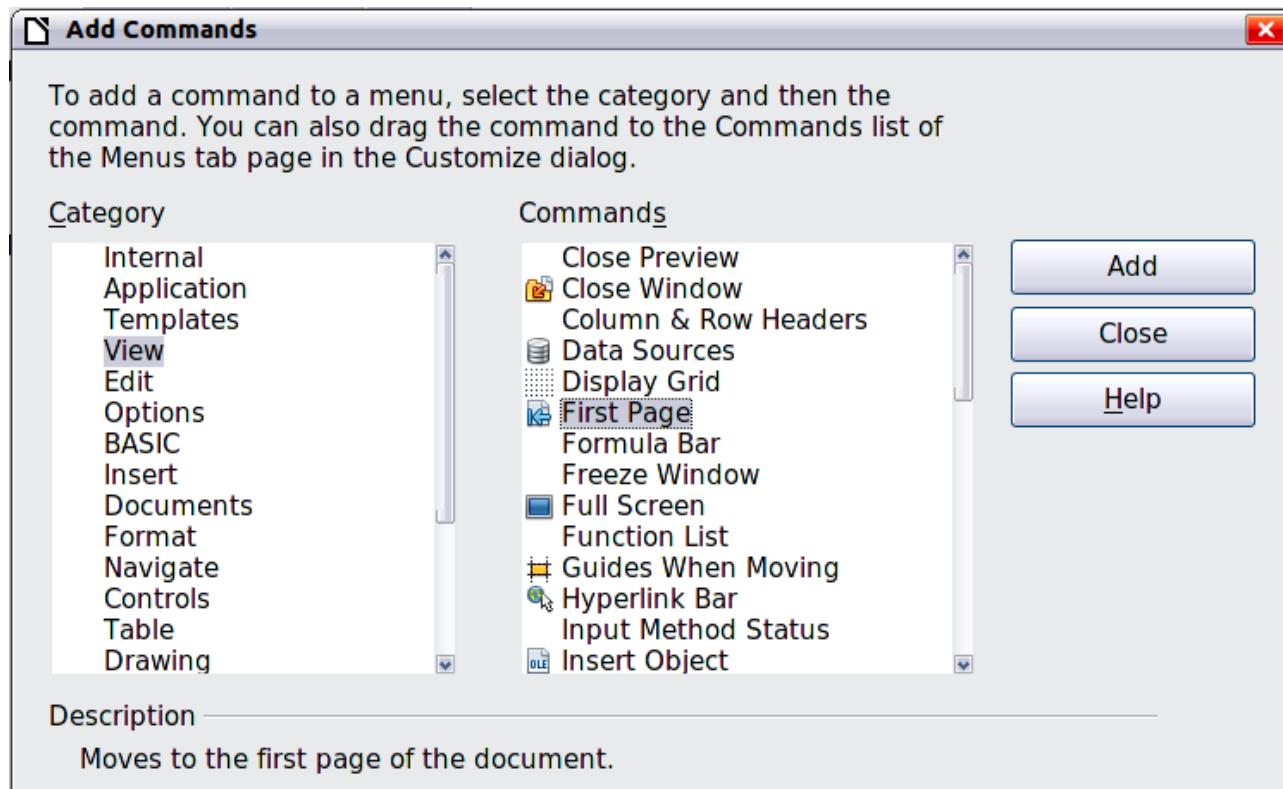


Figure 347: Adding a command to a menu

On the Add Commands dialog, select a category and then the command, and click **Add**. The dialog remains open, so you can select several commands. When you have finished adding commands, click **Close**. Back on the Customize dialog, you can use the up and down arrow buttons to arrange the commands in your preferred sequence.

Modifying menu entries

In addition to changing the sequence of entries on a menu or submenu, you can add submenus, rename or delete the entries, and add group separators.

To begin, select the menu or submenu in the Menu list near the top of the Customize page, then select the entry in the Entries list under Menu Content. Click the **Modify** button and choose the required action from the drop-down list of actions.

Most of the actions should be self-explanatory. **Begin a group** adds a separator line after the highlighted entry.

Customizing toolbars

You can customize toolbars in several ways, including choosing which icons are visible and locking the position of a docked toolbar, as described in Chapter 1, Introducing LibreOffice, of the *Getting Started* guide. This section describes how to create new toolbars and add other icons (commands) to the list of those available on a toolbar.

To get to the toolbar customization dialog, do any of the following:

- On the toolbar, click the arrow at the end of the toolbar and choose **Customize Toolbar**.
- Choose **View → Toolbars → Customize** from the menu bar.
- Choose **Tools → Customize** from the menu bar and pick the **Toolbars** page (Figure 334).

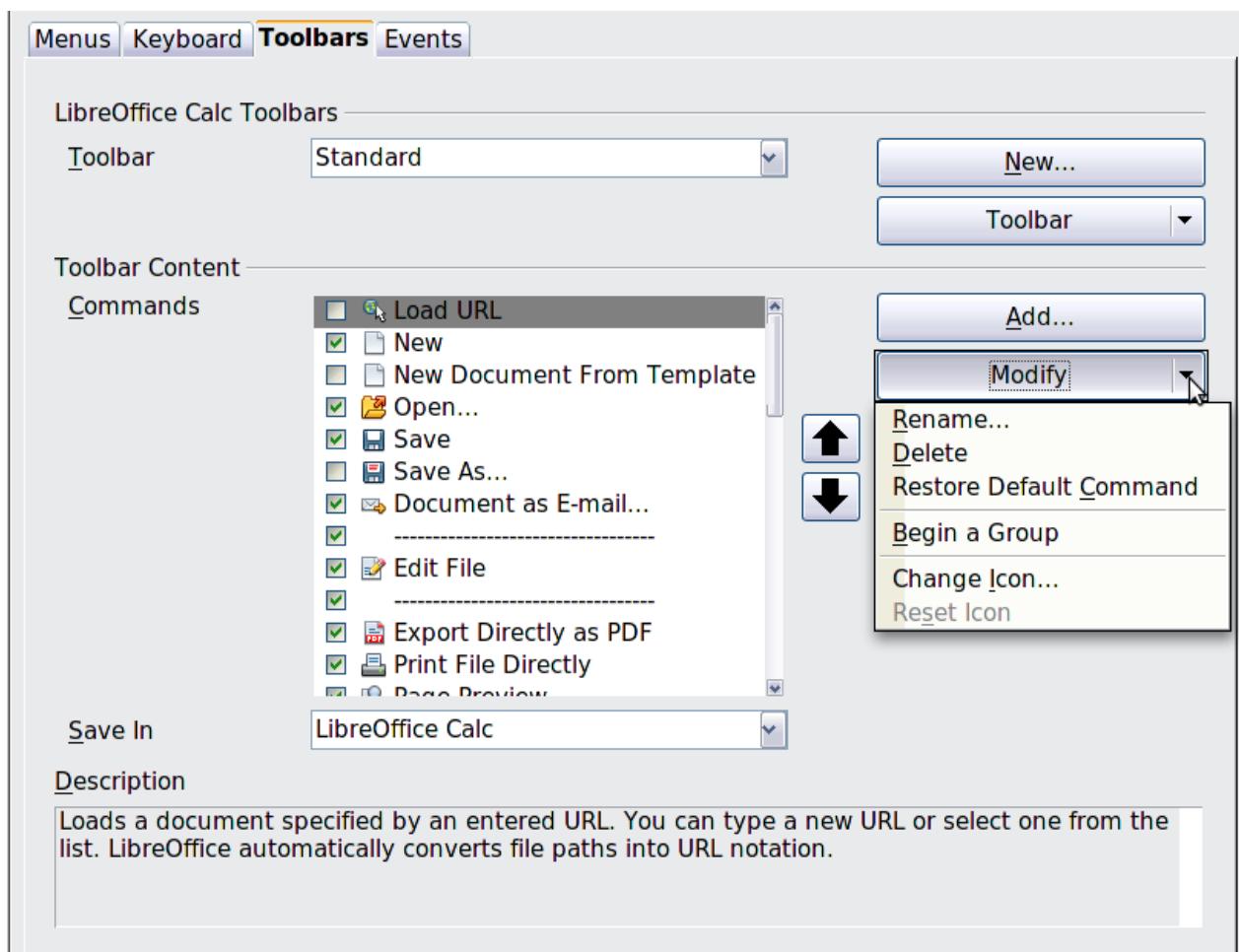


Figure 348: The Toolbars page of the Customize dialog

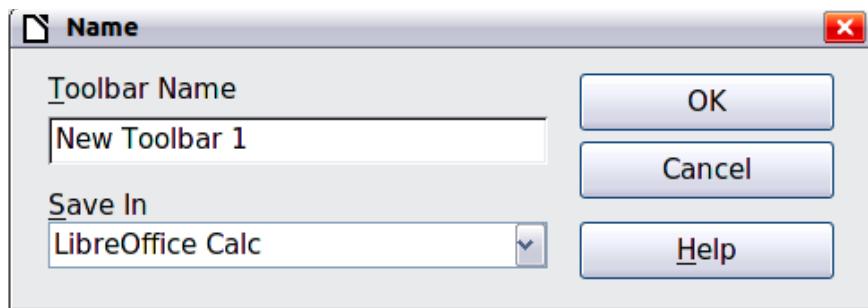
To customize toolbars:

- 1) In the **Save In** drop-down list, choose whether to save this changed toolbar for Calc or for a selected document.
- 2) In the section **LibreOffice Calc Toolbars**, select from the **Toolbar** drop-down list the toolbar that you want to customize.
- 3) You can create a new toolbar by clicking on the **New** button, or customize existing toolbars by clicking on the **Toolbar** or **Modify** buttons, and add commands to a toolbar by clicking on the **Add** button. These actions are described below.
- 4) When you have finished making all your changes, click **OK** to save them.

Creating a new toolbar

To create a new toolbar:

- 1) Choose **Tools** → **Customize** → **Toolbars** from the menu bar.
- 2) Click **New**. On the Name dialog, type the new toolbar's name and choose from the **Save In** drop-down list where to save this changed menu: for **Calc** or for a selected document.



The new toolbar now appears on the list of toolbars in the Customize dialog. After creating a new toolbar, you need to add some commands to it, as described below.

Adding a command to a toolbar

If the list of available buttons for a toolbar does not include all the commands you want on that toolbar, you can add commands. When you create a new toolbar, you need to add commands to it.

- 1) On the Toolbars page of the Customize dialog, select the toolbar in the Toolbar list and click the **Add** button in the Toolbar Content section of the dialog.
- 2) The Add Commands dialog is the same as for adding commands to menus (Figure 333). Select a category and then the command, and click **Add**. The dialog remains open, so you can select several commands. When you have finished adding commands, click **Close**. If you insert an item which does not have an associated icon, the toolbar will display the full name of the item: the next section describes how to choose an icon for a toolbar command.
- 3) Back on the Customize dialog, you can use the up and down arrow buttons to arrange the commands in your preferred sequence.
- 4) When you are done making changes, click **OK** to save.

Choosing icons for toolbar commands

Toolbar buttons usually have icons, not words, on them, but not all of the commands have associated icons.

To choose an icon for a command, select the command and click **Modify** → **Change icon**. On the Change Icon dialog (Figure 332), scroll through the available icons, select one, and click **OK** to assign it to the command.

To use a custom icon, create it in a graphics program and import it into LibreOffice by clicking the **Import** button on the Change Icon dialog. Custom icons must be 16 x 16 or 26 x 26 pixels in size and cannot contain more than 256 colors.

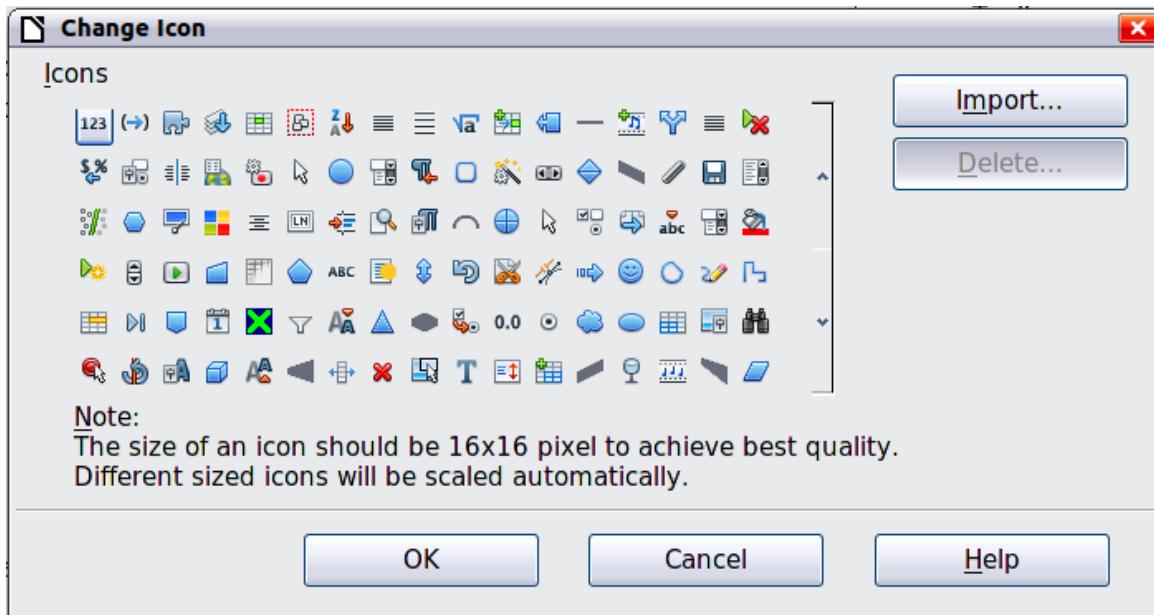


Figure 349: Change Icon dialog

Customizing keyboard shortcuts

In addition to using the built-in keyboard shortcuts (listed in Appendix A), you can define your own. You can assign shortcuts to standard LibreOffice functions or your own macros and save them for use with the entire LibreOffice suite or only for Calc.

Caution



Be careful when reassigning your operating system's or LibreOffice's predefined shortcut keys. Many key assignments are universally understood shortcuts, such as *F1* for Help, and are always expected to provide certain results. Although you can easily reset the shortcut key assignments to the LibreOffice defaults, changing some common shortcut keys can cause confusion, frustration and possible data loss or corruption, especially if other users share your computer.

Note

Shortcut keys that are greyed-out in the listing on the Customize dialog, such as *F1* and *F10*, are not available for reassignment.

To adapt shortcut keys to your needs, use the Customize dialog, as described below.

- 1) Select **Tools** → **Customize** → **Keyboard**. The *Keyboard* page of the Customize dialog opens.
- 2) To have the shortcut key assignment available only with Calc, select **Calc** in the upper right corner of the page; otherwise select **LibreOffice** to make it available to every component.
- 3) Next select the required function from the *Category* and *Function* lists.
- 4) Now select the desired shortcut keys in the *Shortcut keys* list and click the **Modify** button at the upper right.
- 5) Click **OK** to accept the change. Now the chosen shortcut keys will execute the function chosen in step 3 above whenever they are pressed.

Note

All existing shortcut keys for the currently selected *Function* are listed in the *Keys* selection box. If the *Keys* list is empty, it indicates that the chosen key combination is free for use. If it were not, and you wanted to reassign a shortcut key combination that is already in use, you must first delete the existing key.

Example: Assigning styles to shortcut keys

You can configure shortcut keys to quickly assign styles in your document.

- 1) On the *Keyboard* page of the Customize dialog, choose the shortcut keys you want to assign a style to. In this example, we have chosen *Ctrl+3*.

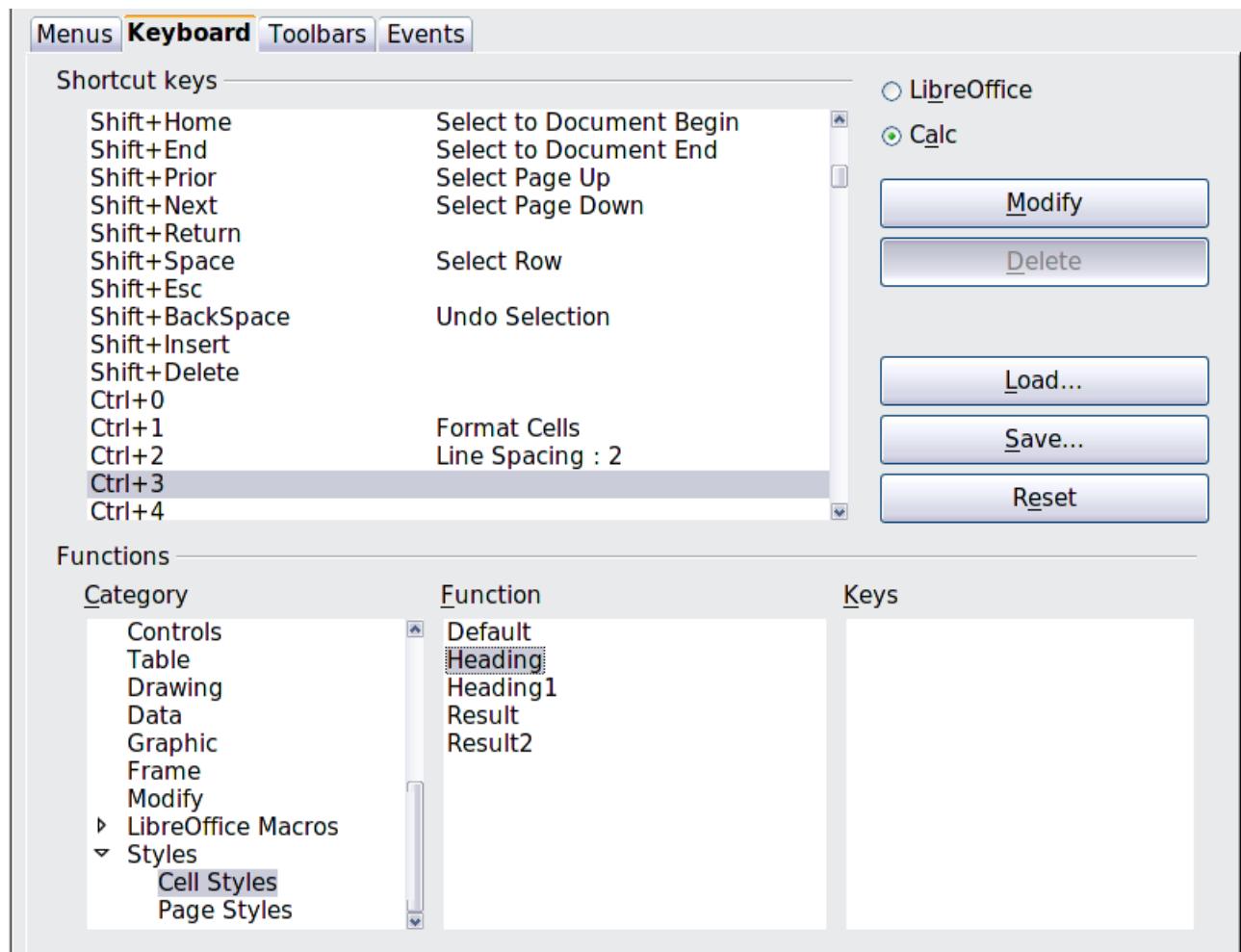


Figure 350: Assigning a cell style to a key combination

- 2) In the *Functions* section at the bottom of the dialog, scroll down in the Category list to *Styles*. Click the + sign to expand the list of styles.
- 3) Choose the category of style. (This example uses a cell style, but you can also choose page styles.) The *Function* list now displays the names of the available styles for the selected category. The example shows LibreOffice's predefined cell styles.
- 4) To assign *Ctrl+3* to be the shortcut key combination for the *Heading* style, select *Heading* in the *Function* list, and then click **Modify**. *Ctrl+3* now appears in the *Keys* list on the right, and *Heading* appears next to *Ctrl+3* in the *Shortcut keys* box at the top.
- 5) Make any other required changes, and then click **OK** to save these settings and close the dialog.

Saving changes to a file

Changes to the shortcut key assignments can be saved in a keyboard configuration file for use at a later time, thus permitting you to create and apply different configurations as the need arises. To save keyboard shortcuts to a file:

- 1) After making your keyboard shortcut assignments, click the **Save** button on the Customize dialog.
- 2) In the Save Keyboard Configuration dialog, select *All files* from the **Save as Type** list.
- 3) Next enter a name for the keyboard configuration file in the **File name** box, or select an existing file from the list. If you need to, browse to find a file from another location.
- 4) Click **Save**. A confirmation dialog appears if you are about to overwrite an existing file, otherwise there will be no feedback and the file will be saved.

Loading a saved keyboard configuration

To load a saved keyboard configuration file and replace your existing configuration, click the **Load** button near the bottom right of the Customize dialog, and then select the configuration file from the Load Keyboard Configuration dialog.

Resetting the shortcut keys

To reset all of the keyboard shortcuts to their default values, click the **Reset** button near the bottom right of the Customize dialog. Use this feature with care as no confirmation dialog will be displayed; the defaults will be set without any further notice or user input.

Running macros from key combinations

You can also define shortcut key combinations that will run macros. These shortcut keys are strictly user-defined; none are built in. For more information on macros, see Chapter 12, Calc Macros.

Adding functionality with extensions

An extension is a package that can be installed into LibreOffice to add new functionality.

Although individual extensions can be found in different places, the official LibreOffice extension repository is at <http://extensions.libreoffice.org/>. Some extensions are free of charge; others are available for a fee. Check the descriptions to see what licenses and fees apply to the ones that interest you.

Installing extensions

To install an extension, follow these steps:

- 1) Download an extension and save it anywhere on your computer.
- 2) In LibreOffice, select **Tools** → **Extension Manager** from the menu bar. In the Extension Manager dialog (Figure 330), click **Add**.
- 3) A file browser window opens. Find and select the extension you want to install and click **Open**. The extension begins installing. You may be asked to accept a license agreement.
- 4) When the installation is complete, the extension is listed in the Extension Manager dialog.

Tip

To get extensions that are listed in the repository, you can open the Extension Manager and click the **Get more extensions here** link. You do not need to download them separately as in step 1 above.

Note

To install a *shared* extension, you need write access to the LibreOffice installation directory.

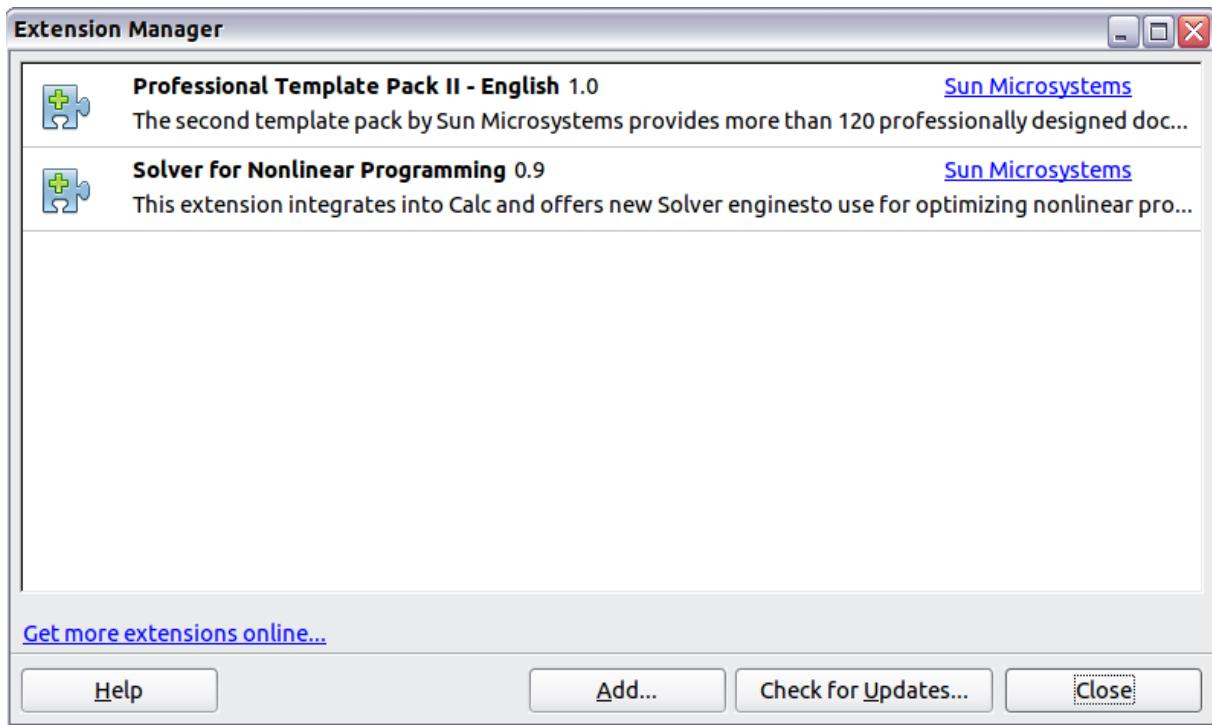


Figure 351: Installing an extension (you will probably also see other extensions, including dictionaries for several languages)

Using extensions

This section describes two of the available extensions for Calc. In each case, you need to install the extension as described in the previous section.

Professional Template Pack II

Provides more than 120 templates for Writer, Calc, and Impress. Available in several languages. After you have installed this extension, you will find the templates under **File** → **New** → **Templates and Documents**.

Solver for Nonlinear Programming

Calc ships with a solver engine for linear programming only. This extension adds more solvers, which are capable of handling nonlinear problems as well as linear ones:

- DEPS - Differential Evolution & Particle Swarm Optimization
- SCO - Social Cognitive Optimization

Some LibreOffice installations may have this extension included.



LibreOffice
The Document Foundation

Appendix A Keyboard Shortcuts

Introduction

You can use Calc without a pointing device such as a mouse or trackball, by using its built-in keyboard shortcuts.

LibreOffice has a general set of keyboard shortcuts, available in all components, and a component-specific set directly related to the work of that component.

For help with LibreOffice's keyboard shortcuts or using LibreOffice with a keyboard only, search the Help supplied with LibreOffice (also available online at <http://help.libreoffice.org>) using the "shortcut" or "accessibility" keywords.

In addition to using the built-in keyboard shortcuts listed in this Appendix, you can define your own. See Chapter 14, Setting Up and Customizing Calc, for instructions.

Formatting and editing shortcuts are described in Chapter 2, Entering, Editing, and Formatting Data.

Navigation and selection shortcuts

Table 29: Spreadsheet navigation shortcuts

Shortcut Keys	Effect
<i>Ctrl+Home</i>	Moves the cursor to the first cell in the sheet (cell A1).
<i>Ctrl+End</i>	Moves the cursor to the last cell on the sheet that contains data.
<i>Home</i>	Moves the cursor to the first cell of the current row.
<i>End</i>	Moves the cursor to the last cell of the current row in a column containing data.
<i>Ctrl+Left Arrow</i>	Moves the cursor to the left edge of the current data range. If the column to the left of the cell that contains the cursor is empty, the cursor moves to the next column to the left that contains data.
<i>Ctrl+Right Arrow</i>	Moves the cursor to the right edge of the current data range. If the column to the right of the cell that contains the cursor is empty, the cursor moves to the next column to the right that contains data.
<i>Ctrl+Up Arrow</i>	Moves the cursor to the top edge of the current data range. If the row above the cell that contains the cursor is empty, the cursor moves up to the next row that contains data.
<i>Ctrl+Down Arrow</i>	Moves the cursor to the bottom edge of the current data range. If the row below the cell that contains the cursor is empty, the cursor moves down to the next row that contains data.
<i>Ctrl+Shift+Arrow</i>	Selects all cells containing data from the current cell to the end of the continuous range of data cells, in the direction of the arrow pressed. If used to select rows and columns together, a rectangular cell range is selected.
<i>Ctrl+Page Up</i>	Moves one sheet to the left. In the page preview it moves to the previous print page.
<i>Ctrl+Page Down</i>	Moves one sheet to the right. In the page preview it moves to the next print page.
<i>Page Up</i>	Moves the viewable rows up one screen.

Shortcut Keys	Effect
<i>Page Down</i>	Moves the viewable rows down one screen.
<i>Alt+Page Up</i>	Moves the viewable columns one screen to the left.
<i>Alt+Page Down</i>	Moves the viewable columns one screen to the right.
<i>Shift+Ctrl+Page Up</i>	Adds the previous sheet to the current selection of sheets. If all the sheets in a spreadsheet are selected, this combination only selects the previous sheet. Makes the previous sheet the current sheet.
<i>Shift+Ctrl+Page Down</i>	Adds the next sheet to the current selection of sheets. If all the sheets in a spreadsheet are selected, this combination only selects the next sheet. Makes the next sheet the current sheet.
<i>Ctrl+*</i>	Selects the data range that contains the cursor. A range is a contiguous cell range that contains data and is bounded by empty rows and columns. The “*” key is the multiplication sign on the numeric key pad.
<i>Ctrl+/-</i>	Selects the matrix formula range that contains the cursor. The “/” key is the division sign on the numeric key pad.
<i>Enter</i> — in a selected range	By default, moves the cursor down one cell in a selected range. To specify the direction that the cursor moves, choose Tools → Options → LibreOffice Calc → General .

Function key shortcuts

Table 30: Function key shortcuts

Shortcut Keys	Effect
<i>F1</i>	Displays the LibreOffice help browser. When the help browser is already open <i>F1</i> jumps to the main help page.
<i>Shift+F1</i>	Displays context help.
<i>Ctrl+F1</i>	Displays the note that is attached to the current cell.
<i>F2</i>	Switches to Edit mode and places the cursor at the end of the contents of the current cell. If the cursor is in an input box in a dialog that has a minimize button, the dialog is hidden and the input box remains visible. Press <i>F2</i> again to show the whole dialog.
<i>Ctrl+F2</i>	Opens the Function Wizard.
<i>Shift+Ctrl+F2</i>	Moves the cursor to the input line where you can enter a formula for the current cell.
<i>Ctrl+F3</i>	Opens the <i>Define Names</i> dialog.
<i>F4</i>	Shows or hides the <i>Database Sources</i> menu.
<i>Shift+F4</i>	Rearranges the relative or absolute references (for example, A1, \$A\$1, \$A1, A\$1) in the input field.
<i>F5</i>	Shows or hides the <i>Navigator</i> .
<i>Shift+F5</i>	Traces dependents.
<i>Shift+Ctrl+F5</i>	Moves the cursor to the Name box.

Shortcut Keys	Effect
<i>F7</i>	Checks spelling in the current sheet.
<i>Ctrl+F7</i>	Opens the <i>Thesaurus</i> if the current cell contains text.
<i>Shift+F7</i>	Traces precedents.
<i>F8</i>	Turns additional selection mode on or off. In this mode, you can use the arrow keys to extend the selection. You can also click in another cell to extend the selection.
<i>Ctrl+F8</i>	Highlights cells containing numeric values (not text).
<i>F9</i>	Recalculates all of the formulas in the sheet.
<i>Ctrl+F9</i>	Updates the selected chart.
<i>F11</i>	Opens the Styles and Formatting window where you can apply a formatting style to the contents of the cell or to the current sheet.
<i>Shift+F11</i>	Creates a document template.
<i>Shift+Ctrl+F11</i>	Updates the templates.
<i>F12</i>	Groups the selected data range.
<i>Ctrl+F12</i>	Ungroups the selected data range.

Arrow key shortcuts

Table 31. Arrow key shortcuts

Shortcut Keys	Effect
<i>Alt+Down Arrow</i>	Increases the height of current row.
<i>Alt+Up Arrow</i>	Decreases the height of current row.
<i>Alt+Right Arrow</i>	Increases the width of the current column.
<i>Alt+Left Arrow</i>	Decreases the width of the current column.
<i>Alt+Shift+Arrow Key</i>	Optimizes the column width or row height based on the current cell.

Cell formatting shortcuts

Ctrl+1 open the Format Cells dialog.

Note	The shortcuts listed in Table 29 do not work under any Linux desktop tested. If you would like to have the functionality described in this table, you must create custom key sequences as explained in Chapter 14, Setting Up and Customizing Calc.
Note	The shortcut keys shown in Table 29 do not use the number keys on the number pad. They use the number keys above the letter keys on the main keyboard.

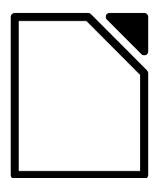
Table 32: Cell formatting shortcut keys

Shortcut Keys	Effect
<i>Ctrl+Shift+1</i>	Two decimal places, thousands separator
<i>Ctrl+Shift+2</i>	Standard exponential format
<i>Ctrl+Shift+3</i>	Standard date format
<i>Ctrl+Shift+4</i>	Standard currency format
<i>Ctrl+Shift+5</i>	Standard percentage format (two decimal places)
<i>Ctrl+Shift+6</i>	Standard format

DataPilot shortcuts

Table 33: DataPilot shortcut keys

Shortcut Keys	Effect
<i>Tab</i>	Changes the focus by moving forward through the areas and buttons of the dialog.
<i>Shift+Tab</i>	Changes the focus by moving backward through the areas and buttons of the dialog.
<i>Up arrow</i>	Moves the focus up one item in the current dialog area.
<i>Down arrow</i>	Moves the focus down one item in the current dialog area.
<i>Left arrow</i>	Moves the focus one item to the left in the current dialog area.
<i>Right arrow</i>	Moves the focus one item to the right in the current dialog area.
<i>Home</i>	Selects the first field in the current layout area.
<i>End</i>	Selects the last field in the current layout area.
<i>Alt+R</i>	Copies or moves the current field into the “Row” area.
<i>Alt+C</i>	Copies or moves the current field into the “Column” area.
<i>Alt+D</i>	Copies or moves the current field into the “Data” area.
<i>Ctrl+Up Arrow</i>	Moves the current field up one place.
<i>Ctrl+Down Arrow</i>	Moves the current field down one place.
<i>Ctrl+Left Arrow</i>	Moves the current field one place to the left.
<i>Ctrl+Right Arrow</i>	Moves the current field one place to the right.
<i>Ctrl+Home</i>	Moves the current field to the first place.
<i>Ctrl+End</i>	Move the current field to the last place.
<i>Alt+O</i>	Displays the options for the current field.
<i>Delete</i>	Removes the current field from the area.



LibreOffice
The Document Foundation

Appendix B Description of Functions

Functions available in Calc

Calc provides all of the commonly used functions found in modern spreadsheet applications. Since many of Calc's functions require very specific and carefully calculated input arguments, the descriptions in this appendix should not be considered complete references for each function. Refer to the application Help or the LibreOffice wiki for details and examples of all functions. On the wiki, start with http://help.libreoffice.org/Calc/Functions_by_Category

Over 300 standard functions are available in Calc. More can be added through extensions to Calc (see Chapter 14). The following tables list Calc's functions organized into eleven categories.

Note

Functions whose names end with **_ADD** are provided for compatibility with Microsoft Excel functions. They return the same results as the corresponding functions in Excel (without the suffix), which though they may be correct, are not based on international standards.

Terminology: numbers and arguments

Some of the descriptions in this appendix define limitations on the number of values or arguments that can be passed to the function. Specifically, functions that refer to the following arguments may lead to confusion.

- **Number_1; number_2;... number_30**
- Number 1 to 30
- a list of up to 30 numbers

There is a significant difference between a *list of numbers* (or integers) and the *number of arguments* a function will accept. For example the **SUM** function will only accept a maximum of 30 arguments. This limit does NOT mean that you can only sum 30 numbers, but that you can only pass 30 separate arguments to the function.

Arguments are values separated by semi-colons, and can include ranges which often refer to multiple values. Therefore one argument can refer to several values, and a function that limits input to 30 arguments may in fact accept more than 30 separate numerical values.

This appendix attempts to clarify this situation by using the term **arguments**, rather than any of the other phrases.

Mathematical functions

Table 34: Mathematical functions

Syntax	Description
ABS(number)	Returns the absolute value of the given number .
ACOS(number)	Returns the inverse cosine of the given number in radians.
ACOSH(number)	Returns the inverse hyperbolic cosine of the given number in radians.
ACOT(number)	Returns the inverse cotangent of the given number in radians.
ACOTH(number)	Returns the inverse hyperbolic cotangent of the given number in radians.
ASIN(number)	Returns the inverse sine of the given number in radians.

Syntax	Description
ASINH(number)	Returns the inverse hyperbolic sine of the given number in radians.
ATAN(number)	Returns the inverse tangent of the given number in radians.
ATAN2(number_x; number_y)	Returns the inverse tangent of the specified x and y coordinates. Number_x is the value for the x coordinate. Number_y is the value for the y coordinate.
ATANH(number)	Returns the inverse hyperbolic tangent of the given number. (Angle is returned in radians.)
CEILING(number; significance; mode)	Rounds the given number to the nearest integer or multiple of significance. Significance is the value to whose multiple of ten the value is to be rounded up (.01, .1, 1, 10, etc.). Mode is an optional value. If it is indicated and non-zero and if the number and significance are negative, rounding up is carried out based on that value.
COMBIN(count_1; count_2)	Returns the number of combinations for a given number of objects. Count_1 is the total number of elements. Count_2 is the selected count from the elements. This is the same as the nCr function on a calculator.
COMBINA(count_1; count_2)	Returns the number of combinations for a given number of objects (repetition included). Count_1 is the total number of elements. Count_2 is the selected count from the elements.
CONVERT(value; "text"; "text")	Converts a currency value of a European currency into Euros. Value is the amount in the currency to be converted. Text is the official abbreviation for the currency in question (for example, "EUR"). The first Text parameter gives the source value to be converted; the second Text parameter gives the destination value. Both text arguments must be within quotes.
COS(number)	Returns the cosine of the given number (angle in radians).
COSH(number)	Returns the hyperbolic cosine of the given number (angle in radians).
COT(number)	Returns the cotangent of the given number (angle in radians).
COTH(number)	Returns the hyperbolic cotangent of the given number (angle in radians).
COUNTBLANK(range)	Returns the number of empty cells. Range is the cell range in which the empty cells are counted.
COUNTIF(range; criteria)	Returns the number of elements that meet certain criteria within a cell range. Range is the range to which the criteria are to be applied. Criteria indicates the criteria in the form of a number, a regular expression, or a character string by which the cells are counted.
DEGREES(number)	Converts the given number in radians to degrees.
EVEN(number)	Rounds the given number up to the nearest even integer.
EXP(number)	Returns e raised to the power of the given number .
FACT(number)	Returns the factorial of the given number .

Syntax	Description
FLOOR(number; significance; mode)	Rounds the given number down to the nearest multiple of significance . Significance is the value to whose multiple of ten the number is to be rounded down (.01, .1, 1, 10, etc.). Mode is an optional value. If it is indicated and non-zero and if the number and significance are negative, rounding up is carried out based on that value.
GCD(numbers)	Returns the greatest common divisor of one or more integers. Numbers is a list of up to 30 numbers whose greatest common divisor is to be calculated, separated by semi-colons.
GCD_ADD(numbers)	Returns the greatest common divisor of a list of numbers. Numbers is a list of up to 30 numbers separated by semi-colons.
INT(number)	Rounds the given number down to the nearest integer.
ISEVEN(value)	Returns TRUE if the given value is an even integer, or FALSE if the value is odd. <i>If the value is not an integer, the function evaluates only the integer part of the value.</i>
ISODD(value)	Returns TRUE if the given value is an odd integer, or FALSE if the value is even. <i>If the value is not an integer, the function evaluates only the integer part of the value.</i>
LCM(integer_1; integer_2; ... integer_30)	Returns the least common multiple of one or more integers. Integer_1; integer_2;... integer_30 are integers whose lowest common multiple is to be calculated.
LCM_ADD(numbers)	Numbers is a list of up to 30 numbers separated by semi-colons. The result is the lowest common multiple of a list of numbers.
LN(number)	Returns the natural logarithm based on the constant e of the given number .
LOG(number; base)	Returns the logarithm of the given number to the specified base . Base is the base for the logarithm calculation.
LOG10(number)	Returns the base-10 logarithm of the given number .
MOD(dividend; divisor)	Returns the remainder after a number is divided by a divisor. Dividend is the number which will be divided by the divisor. Divisor is the number by which to divide the dividend.
MROUND(number; multiple)	The result is the nearest integer multiple of the number .
MULTINOMIAL (number(s))	Returns the factorial of the sum of the arguments divided by the product of the factorials of the arguments. Number(s) is a list of up to 30 numbers separated by semi-colons.
ODD(number)	Rounds the given number up to the nearest odd integer.
PI()	Returns the value of PI to fourteen decimal places.
POWER(base; power)	Returns the result of a number raised to a power. Base is the number that is to be raised to the given power. Power is the exponent by which the base is to be raised.

Syntax	Description
PRODUCT(number 1 to 30)	Multiples all the numbers given as arguments and returns the product. Number 1 to number 30 are up to 30 arguments whose product is to be calculated, separated by semi-colons.
QUOTIENT(numerator; denominator)	Returns the integer result of a division operation. Numerator is the number that will be divided. Denominator is the number the numerator will be divided by.
RADIANS(number)	Converts the given number in degrees to radians.
RAND()	Returns a random number between 0 and 1. This number will recalculate every time data is entered or F9 is pressed.
RANDBETWEEN (bottom; top)	Returns an integer random number between bottom and top (inclusive). This number will recalculate when the Control+Shift+F9 key combination is pressed.
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.
ROUNDDOWN(number; count)	Rounds the given number . Count (optional) is the number of digits to be rounded down to. If the count parameter is negative, only the whole number portion is rounded. It is rounded to the place indicated by the count.
ROUNDUP(number; count)	Rounds the given number up. Count (optional) is the number of digits to which rounding up is to be done. If the count parameter is negative, only the whole number portion is rounded. It is rounded to the place indicated by the count.
SERIESSUM(x; n; m; coefficients)	Returns a sum of powers of the number x in accordance with the following formula: $\text{SERIESSUM}(x;n;m;\text{coefficients}) = \text{coefficient_1} \cdot x^n + \text{coefficient_2} \cdot x^{n+m} + \text{coefficient_3} \cdot x^{n+2m} + \dots + \text{coefficient_i} \cdot x^{n+(i-1)m}$ <p>x is the number as an independent variable. n is the starting power. m is the increment. Coefficients is a series of coefficients. For each coefficient the series sum is extended by one section. You can only enter coefficients using cell references.</p>
SIGN(number)	Returns the sign of the given number . The function returns the result 1 for a positive sign, -1 for a negative sign, and 0 for zero.
SIN(number)	Returns the sine of the given number (angle in radians).
SINH(number)	Returns the hyperbolic sine of the given number (angle in radians).
SQRT(number)	Returns the positive square root of the given number . The value of the number must be positive.
SQRTPI(number)	Returns the square root of the product of the given number and PI.

Syntax	Description
SUBTOTAL(function; range)	Calculates subtotals. If a range already contains subtotals, these are not used for further calculations. Function is a value that stands for another function such as Average, Count, Min, Sum, Var. Range is the range whose cells are included.
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.
SUMIF(range; criteria; sum_range)	Adds the cells specified by a given criteria. The search supports regular expressions. Range is the range to which the criteria are to be applied. Criteria is the cell in which the search criterion is shown, or the search criterion itself. Sum_range is the range from which values are summed; if it has not been indicated, the values found in the Range are summed.
SUMSQ(number_1; number_2; ... number_30)	Calculates the sum of the squares of numbers (totaling up of the squares of the arguments) Number_1; number_2;... number_30 are up to 30 arguments, the sum of whose squares is to be calculated.
TAN(number)	Returns the tangent of the given number (angle in radians).
TANH(number)	Returns the hyperbolic tangent of the given number (angle in radians).
TRUNC(number; count)	Truncates a number to an integer by removing the fractional part of the number according to the precision specified in Tools → Options → LibreOffice Calc → Calculate . Number is the number whose decimal places are to be cut off. Count is the number of decimal places which are not cut off.

Financial analysis functions

A note about dates

Date values used as parameters for Calc's financial functions must be entered in a specific manner. For example, a date (entered in the US form) must be surrounded by quotes and with periods separating each value. To represent August 6, 2004, or 8/6/04, you would enter "08.06.2004". If you do not enter the date values as required by the function, you will not get the correct results. Date formats are locale specific; check the Help for the acceptable formatting.

A note about interest rates

You can enter interest rates in either of two ways:

- As a decimal. To enter an interest rate as a decimal, divide it by 100 before entering it into a function. For example, to compute a loan with a 3.25% interest rate, enter .0325 into the function.
- As a percentage. To enter an interest rate as a percentage, type in the interest rate followed by the % key. For example, to compute a loan with a 3.25% interest rate, enter 3.25% into the function.

If you enter it as 3.25, the function will treat it as a 325% interest rate.

Accounting systems vary in the number of days in a month or a year used in calculations. The following table gives the integers used for the **basis** parameter used in some of the financial analysis functions.

Table 35: Basis calculation types

Basis	Calculation
0 or missing	US method (NASD), 12 months of 30 days each.
1	Exact number of days in months, exact number of days in year.
2	Exact number of days in month, year has 360 days.
3	Exact number of days in month, year has 365 days.
4	European method, 12 months of 30 days each.

Table 36: Financial analysis functions

Syntax	Description
<code>ACCRINT(issue; first_interest; settlement; rate; par; frequency; basis)</code>	Calculates the accrued interest of a security in the case of periodic payments. Issue is the issue date of the security. First_interest is the first interest date of the security. Settlement is the maturity date. Rate is the annual nominal rate of interest (coupon interest rate). Par is the par value of the security. Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.
<code>ACCRINTM(issue; settlement; rate; par; basis)</code>	Calculates the accrued interest of a security in the case of one-off payment at the settlement date. Issue is the issue date of the security. Settlement is the maturity date. Rate is the annual nominal rate of interest (coupon interest rate). Par is the par value of the security. Basis indicates how the year is to be calculated.
<code>AMORDEGRC(cost; date_purchased; first_period; salvage; period; rate; basis)</code>	Calculates the amount of depreciation for a settlement period as degressive amortization. Unlike AMORLINC, a depreciation coefficient that is independent of the depreciable life is used here. Cost is the acquisition cost. Date_purchased is the date of acquisition. First_period is the end date of the first settlement period. Salvage is the salvage value of the capital asset at the end of the depreciable life. Period is the settlement period to be considered. Rate is the rate of depreciation. Basis indicates how the year is to be calculated.

Syntax	Description
AMORLINC(cost; date_purchased; first_period; salvage; period; rate; basis)	Calculates the amount of depreciation for a settlement period as linear amortization. If the capital asset is purchased during the settlement period, the proportional amount of depreciation is considered. Cost is the acquisition cost. Date_purchased is the date of acquisition. First_period is the end date of the first settlement period. Salvage is the salvage value of the capital asset at the end of the depreciable life. Period is the settlement period to be considered. Rate is the rate of depreciation. Basis indicates how the year is to be calculated.
COUPDAYBS(settlement; maturity; frequency; basis)	Returns the number of days from the first day of interest payment on a security until the settlement date. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.
COUPDAYS(settlement; maturity; frequency; basis)	Returns the number of days in the current interest period in which the settlement date falls. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.
COUPDAYNC(settlement; maturity; frequency; basis)	Returns the number of days from the settlement date until the next interest date. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.
COUPNCD(settlement; maturity; frequency; basis)	Returns the date of the first interest date after the settlement date, and formats the result as a date. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.
COUPNUM(settlement; maturity; frequency; basis)	Returns the number of coupons (interest payments) between the settlement date and the maturity date. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.
COUPPCD(settlement; maturity; frequency; basis)	Returns the date of the interest date prior to the settlement date, and formats the result as a date. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.

Syntax	Description
CUMIPMT(rate; NPER; PV; S; E; type)	Calculates the cumulative interest payments (the total interest) for an investment based on a constant interest rate. Rate is the periodic interest rate. NPER is the payment period with the total number of periods. NPER can also be a non-integer value. The rate and NPER must refer to the same unit, and thus both must be calculated annually or monthly. PV is the current value in the sequence of payments. S is the first period. E is the last period. Type is the due date of the payment at the beginning (1) or end (0) of each period.
CUMIPMT_ADD(rate; NPER; PV; start_period; end_period; type)	Calculates the accumulated interest for a period. Rate is the interest rate for each period. NPER is the total number of payment periods. The rate and NPER must refer to the same unit, and thus both must be calculated annually or monthly. PV is the current value. Start_period the first payment period for the calculation. End_period the last payment period for the calculation. Type is the due date of the payment at the beginning (1) or end (0) of each period.
CUMPRINC(rate; NPER; PV; S; E; type)	Returns the cumulative interest paid for an investment period with a constant interest rate. Rate is the periodic interest rate. NPER is the payment period with the total number of periods. NPER can also be a non-integer value. The rate and NPER must refer to the same unit, and thus both must be calculated annually or monthly. PV is the current value in the sequence of payments. S is the first period. E is the last period. Type is the due date of the payment at the beginning (1) or end (0) of each period.
CUMPRINC_ADD(rate; NPER; PV; start_period; end_period; type)	Calculates the cumulative redemption of a loan in a period. Rate is the interest rate for each period. NPER is the total number of payment periods. The rate and NPER must refer to the same unit, and thus both must be calculated annually or monthly. PV is the current value. Start period is the first payment period for the calculation. End period is the last payment period for the calculation. Type is the due date of the payment at the beginning (1) or end (0) of each period.
DB(cost; salvage; life; period; month)	Returns the depreciation of an asset for a specified period using the double-declining balance method. Cost is the initial cost of an asset. Salvage is the value of an asset at the end of the depreciation. Life defines the period over which an asset is depreciated. Period is the length of each period. The life must be entered in the same date unit as the depreciation period. Month (optional) denotes the number of months for the first year of depreciation.

Syntax	Description
DDB(cost; salvage; life; period; factor)	Returns the depreciation of an asset for a specified period using the arithmetic-declining method. Note that the book value will never reach zero under this calculation type. Cost fixes the initial cost of an asset. Salvage fixes the value of an asset at the end of its life. Life is the number of periods defining how long the asset is to be used. Period defines the length of the period. The period must be entered in the same time unit as the life. Factor (optional) is the factor by which depreciation decreases.
DISC(settlement; maturity; price; redemption; basis)	Calculates the allowance (discount) of a security as a percentage. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Price is the price of the security per 100 currency units of par value. Redemption is the redemption value of the security per 100 currency units of par value. Basis indicates how the year is to be calculated.
DOLLARDE(fractional _dollar; fraction)	Converts a quotation that has been given as a decimal fraction into a decimal number. Fractional_dollar is a number given as a decimal fraction. (In this number, the decimal value is the numerator of the fraction.) Fraction is a whole number that is used as the denominator of the decimal fraction.
DOLLARFR(decimal _dollar; fraction)	Converts a quotation that has been given as a decimal number into a mixed decimal fraction. The decimal of the result is the numerator of the fraction that would have Fraction as the denominator. Decimal_dollar is a decimal number. Fraction is a whole number that is used as the denominator of the decimal fraction.
DURATION(rate; PV; FV)	Calculates the number of periods required by an investment to attain the desired value. Rate (a constant) is the interest rate to be calculated for the entire duration. Entering the interest rate divided by the periods per year, can calculate the interest after each period. PV is the present value. FV is the desired future value of the investment.
DURATION_ADD (settlement; maturity; coupon; yield; frequency; basis)	Calculates the duration of a fixed interest security in years. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Coupon is the annual coupon interest rate (nominal rate of interest). Yield is the annual yield of the security. Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.
EFFECT_ADD(nominal _rate; Npery)	Calculates the effective annual rate of interest on the basis of the nominal interest rate and the number of interest payments per annum. Nominal interest refers to the amount of interest due at the end of a calculation period. Nominal_rate is the annual nominal rate of interest. Npery is the number of interest payments per year.

Syntax	Description
EFFECTIVE(NOM; P)	Calculates the effective annual rate of interest on the basis of the nominal interest rate and the number of interest payments per annum. Nominal interest refers to the amount of interest due at the end of a calculation period. NOM is the nominal interest. P is the number of interest payment periods per year.
FV(rate; NPER; PMT; PV; type)	Returns the future value of an investment based on periodic, constant payments and a constant interest rate. Rate is the periodic interest rate. NPER is the total number of periods. PMT is the annuity paid regularly per period. PV (optional) is the present cash value of an investment. Type (optional) defines whether the payment is due at the beginning (1) or the end (0) of a period.
FVSCHEDULE(principal; schedule)	Calculates the accumulated value of the starting capital for a series of periodically varying interest rates. Principal is the starting capital. Schedule is a series of interest rates. Schedule has to be entered with cell references.
INTRATE(settlement; maturity; investment; redemption; basis)	Calculates the annual interest rate that results when a security (or other item) is purchased at an investment value and sold at a redemption value with no interest being paid. Settlement is the date of purchase of the security. Maturity is the date on which the security is sold. Investment is the purchase price. Redemption is the selling price. Basis indicates how the year is to be calculated.
IPMT(rate; period; NPER; PV; FV; type)	Calculates the periodic amortization for an investment with regular payments and a constant interest rate. Rate is the periodic interest rate. Period is the period for which the compound interest is calculated. NPER is the total number of periods during which annuity is paid. Period=NPER , if compound interest for the last period is calculated. PV is the present cash value in sequence of payments. FV (optional) is the desired value (future value) at the end of the periods. Type (optional) defines whether the payment is due at the beginning (1) or the end (0) of a period.
IRR(values; guess)	Calculates the internal rate of return for an investment. The values represent cash flow values at regular intervals; at least one value must be negative (payments), and at least one value must be positive (income). Values is an array containing the values. Guess (optional) is the estimated value. If you can provide only a few values, you should provide an initial guess to enable the iteration.
ISPMT(rate; period; total_periods; invest)	Calculates the level of interest for unchanged amortization installments. Rate sets the periodic interest rate. Period is the number of installments for calculation of interest. Total_periods is the total number of installment periods. Invest is the amount of the investment.

Syntax	Description
MDURATION(settlement; maturity; coupon; yield; frequency; basis)	Calculates the modified Macauley duration of a fixed interest security in years. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Coupon is the annual nominal rate of interest (coupon interest rate) Yield is the annual yield of the security. Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.
MIRR(values; investment; reinvest_rate)	Calculates the modified internal rate of return of a series of investments. Values corresponds to the array or the cell reference for cells whose content corresponds to the payments. Investment is the rate of interest of the investments (the negative values of the array) Reinvest_rate is the rate of interest of the reinvestment (the positive values of the array).
NOMINAL(effective_rate; Npery)	Calculates the yearly nominal interest rate, given the effective rate and the number of compounding periods per year. Effective_rate is the effective interest rate Npery is the number of periodic interest payments per year.
NOMINAL_ADD(effective_rate; Npery)	Calculates the yearly nominal rate of interest, given the effective rate and the number of compounding periods per year. Effective_rate is the effective annual rate of interest. Npery is the number of interest payments per year.
NPER(rate; PMT; PV; FV; type)	Returns the number of periods for an investment based on periodic, constant payments and a constant interest rate. Rate is the periodic interest rate. PMT is the constant annuity paid in each period. PV is the present value (cash value) in a sequence of payments. FV (optional) is the future value, which is reached at the end of the last period. Type (optional) defines whether the payment is due at the beginning (1) or the end (0) of a period.
NPV(Rate; value_1; value_2; ... value_30)	Returns the net present value of an investment based on a series of periodic cash flows and a discount rate. Rate is the discount rate for a period. Value_1; value_2;... value_30 are values representing deposits or withdrawals.
ODDFPRICE(settlement; maturity; issue; first_coupon; rate; yield; redemption; frequency; basis)	Calculates the price per 100 currency units par value of a security, if the first interest date falls irregularly. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Issue is the date of issue of the security. First_coupon is the first interest date of the security. Rate is the annual rate of interest. Yield is the annual yield of the security. Redemption is the redemption value per 100 currency units of par value. Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.
ODDFYIELD(settlement; maturity; issue; first_coupon; rate; price; redemption; frequency; basis)	DDB(cost; salvage; life; period; factor)

Syntax	Description
ODDLPRICE(settlement; maturity; last_interest; rate; yield; redemption; frequency; basis)	Calculates the price per 100 currency units par value of a security, if the last interest date falls irregularly. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Last_interest is the last interest date of the security. Rate is the annual rate of interest. Yield is the annual yield of the security. Redemption is the redemption value per 100 currency units of par value. Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.
ODDLYIELD(settlement; maturity; last_interest; rate; price; redemption; frequency; basis)	Calculates the yield of a security if the last interest date falls irregularly. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Last_interest is the last interest date of the security. Rate is the annual rate of interest. Price is the price of the security. Redemption is the redemption value per 100 currency units of par value. Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.
PMT(rate; NPER; PV; FV; type)	Returns the periodic payment for an annuity with constant interest rates. Rate is the periodic interest rate. NPER is the number of periods in which annuity is paid. PV is the present value (cash value) in a sequence of payments. FV (optional) is the desired value (future value) to be reached at the end of the periodic payments. Type (optional) defines whether the payment is due at the beginning (1) or the end (0) of a period.
PPMT(rate; period; NPER; PV; FV; type)	Returns for a given period the payment on the principal for an investment that is based on periodic and constant payments and a constant interest rate. Rate is the periodic interest rate. Period is the amortization period. NPER is the total number of periods during which annuity is paid. PV is the present value in the sequence of payments. FV (optional) is the desired (future) value. Type (optional) defines whether the payment is due at the beginning (1) or the end (0) of a period.
PRICE(settlement; maturity; rate; yield; redemption; frequency; basis)	Calculates the market value of a fixed interest security with a par value of 100 currency units as a function of the forecast yield. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Rate is the annual nominal rate of interest (coupon interest rate). Yield is the annual yield of the security. Redemption is the redemption value per 100 currency units of par value. Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.

Syntax	Description
PRICEDISC(settlement; maturity; discount; redemption; basis)	Calculates the price per 100 currency units of par value of a non-interest-bearing security. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Discount is the discount of a security as a percentage. Redemption is the redemption value per 100 currency units of par value. Basis indicates how the year is to be calculated.
PRICEMAT(settlement; maturity; issue; rate; yield; basis)	Calculates the price per 100 currency units of par value of a security, that pays interest on the maturity date. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Issue is the date of issue of the security. Rate is the interest rate of the security on the issue date. Yield is the annual yield of the security. Basis indicates how the year is to be calculated.
PV(rate; NPER; PMT; FV; type)	Returns the present value of an investment resulting from a series of regular payments. Rate defines the interest rate per period. NPER is the total number of payment periods. PMT is the regular payment made per period. FV (optional) defines the future value remaining after the final installment has been made. Type (optional) defines whether the payment is due at the beginning (1) or the end (0) of a period.
RATE(NPER; PMT; PV; FV; type; guess)	Returns the constant interest rate per period of an annuity. NPER is the total number of periods, during which payments are made (payment period). PMT is the constant payment (annuity) paid during each period. PV is the cash value in the sequence of payments. FV (optional) is the future value, which is reached at the end of the periodic payments. Type (optional) defines whether the payment is due at the beginning (1) or the end (0) of a period. Guess (optional) determines the estimated value of the interest with iterative calculation.
RECEIVED(settlement; maturity; investment; discount; basis)	Calculates the amount received that is paid for a fixed-interest security at a given point in time. Settlement is the date of purchase of the security. Maturity is the date on which the security matures. Investment is the purchase sum. Discount is the percentage discount on acquisition of the security. Basis indicates how the year is to be calculated.
RRI(P; PV; FV)	Calculates the interest rate resulting from the profit (return) of an investment. P is the number of periods needed for calculating the interest rate. PV is the present value (must be >0). FV is determines what is desired as the cash value of the deposit.
SLN(cost; salvage; life)	Returns the straight-line depreciation of an asset for one period. The amount of the depreciation is constant during the depreciation period. Cost is the initial cost of an asset. Salvage is the value of an asset at the end of the depreciation. Life is the depreciation period determining the number of periods in the depreciation of the asset.

Syntax	Description
SYD(cost; salvage; life; period)	Returns the arithmetic-declining depreciation rate. Use this function to calculate the depreciation amount for one period of the total depreciation span of an object. Arithmetic declining depreciation reduces the depreciation amount from period to period by a fixed sum. Cost is the initial cost of an asset. Salvage is the value of an asset after depreciation. Life is the period fixing the time span over which an asset is depreciated. Period defines the period for which the depreciation is to be calculated.
TBILLEQ(settlement; maturity; discount)	Calculates the annual return on a treasury bill. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). (The settlement and maturity date must be in the same year.) Discount is the percentage discount on acquisition of the security.
TBILLPRICE(settlement; maturity; discount)	Calculates the price of a treasury bill per 100 currency units. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Discount is the percentage discount upon acquisition of the security.
TBILLYIELD(settlement; maturity; price)	Calculates the yield of a treasury bill. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Price is the price (purchase price) of the treasury bill per 100 currency units of par value.
VDB(cost; salvage; life; start; end; factor; type)	Returns the depreciation of an asset for a specified or partial period using a variable declining balance method. Cost is the initial value of an asset. Salvage is the value of an asset at the end of the depreciation. Life is the depreciation duration of the asset. Start is the start of the depreciation entered in the same date unit as the life. End is the end of the depreciation. Factor (optional) is the depreciation factor. FA=2 is double rate depreciation. Type (optional) defines whether the payment is due at the beginning (1) or the end (0) of a period.
XIRR(values; dates; guess)	Calculates the internal rate of return for a list of payments which take place on different dates. The calculation is based on a 365 days per year basis, ignoring leap years. If the payments take place at regular intervals, use the IRR function. Values and dates are a series of payments and the series of associated date values entered as cell references. Guess (optional) is a guess for the internal rate of return. The default is 10%.
XNPV(rate; values; dates)	Calculates the capital value (net present value) for a list of payments which take place on different dates. The calculation is based on a 365 days per year basis, ignoring leap years. If the payments take place at regular intervals, use the NPV function. Rate is the internal rate of return for the payments. Values and dates are a series of payments and the series of associated date values entered as cell references.

Syntax	Description
YIELD(settlement; maturity; rate; price; redemption; frequency; basis)	Calculates the yield of a security. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Rate is the annual rate of interest. Price is the price (purchase price) of the security per 100 currency units of par value. Redemption is the redemption value per 100 currency units of par value. Frequency is the number of interest payments per year (1, 2 or 4). Basis indicates how the year is to be calculated.
YIELDDISC(settlement; maturity; price; redemption; basis)	Calculates the annual yield of a non-interest-bearing security. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Price is the price (purchase price) of the security per 100 currency units of par value. Redemption is the redemption value per 100 currency units of par value. Basis indicates how the year is to be calculated.
YIELDMAT(settlement; maturity; issue; rate; price; basis)	Calculates the annual yield of a security, the interest of which is paid on the date of maturity. Settlement is the date of purchase of the security. Maturity is the date on which the security matures (expires). Issue is the date of issue of the security. Rate is the interest rate of the security on the issue date. Price is the price (purchase price) of the security per 100 currency units of par value. Basis indicates how the year is to be calculated.

Statistical analysis functions

Calc includes over 70 statistical functions which enable the evaluation of data from simple arithmetic calculations, such as averaging, to advanced distribution and probability computations. Several other statistics-based functions are available through the Add-ins which are noted at the end of this appendix.

Table 37: Statistical analysis functions

Syntax	Description
AVEDEV(number1; number2; ... number_30)	Returns the average of the absolute deviations of data points from their mean. Displays the diffusion in a data set. Number_1; number_2; ... number_30 are values or ranges that represent a sample. Each number can also be replaced by a reference.
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.
AVERAGEA(value_1; value_2; ... value_30)	Returns the average of the arguments. The value of a text is 0. Value_1; value_2; ... value_30 are values or ranges.
B(trials; SP; T_1; T_2)	Returns the probability of a sample with binomial distribution. Trials is the number of independent trials. SP is the probability of success on each trial. T_1 defines the lower limit for the number of trials. T_2 (optional) defines the upper limit for the number of trials.

Syntax	Description
BETADIST(number; alpha; beta; start; end)	Returns the cumulative beta probability density function. Number is the value between Start and End at which to evaluate the function. Alpha is a parameter to the distribution. Beta is a parameter to the distribution. Start (optional) is the lower bound for number . End (optional) is the upper bound for number .
BETAINV(number; alpha; beta; start; end)	Returns the inverse of the cumulative beta probability density function. Number is the value between Start and End at which to evaluate the function. Alpha is a parameter to the distribution. Beta is a parameter to the distribution. Start (optional) is the lower bound for number . End (optional) is the upper bound for number .
BINOMDIST(X; trials; SP; C)	Returns the individual term binomial distribution probability. X is the number of successes in a set of trials. Trials is the number of independent trials. SP is the probability of success on each trial. C = 0 calculates the probability of a single event and C = 1 calculates the cumulative probability.
CHIDIST(number; degrees_freedom)	Returns the probability value that a hypothesis will be confirmed from the indicated chi square. The probability determined by CHIDIST can also be determined by CHITEST. Number is the chi-square value of the random sample used to determine the error probability. Degrees_freedom is the degrees of freedom of the experiment.
CHIINV(number; degrees_freedom)	Returns the inverse of the one-tailed probability of the chi-squared distribution. Number is the value of the error probability. Degrees_freedom is the degrees of freedom of the experiment.
CHITEST(data_B; data_E)	Returns the chi-square distribution from a random distribution of two test series based on the chi-square test for independence. The probability determined by CHITEST can also be determined with CHIDIST, in which case the chi square of the random sample must then be passed as a parameter instead of the data row. Data_B is the array of the observations. Data_E is the range of the expected values.
CONFIDENCE(alpha; STDEV; size)	Returns the (1-alpha) confidence interval for a normal distribution. Alpha is the level of the confidence interval. STDEV is the standard deviation for the total population. Size is the size of the total population.
CORREL(data_1; data_2)	Returns the correlation coefficient between two data sets. Data_1 is the first data set. Data_2 is the second data set.
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.

Syntax	Description
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.
COVAR(data_1; data_2)	Returns the covariance of the product of paired deviations. Data_1 is the first data set. Data_2 is the second data set.
CRITBINOM(trials; SP; alpha)	Returns the smallest value for which the cumulative binomial distribution is less than or equal to a criterion value. Trials is the total number of trials. SP is the probability of success for one trial. Alpha is the threshold probability to be reached or exceeded.
DEVSQ(number_1; number_2; ... number_30)	Returns the sum of squares of deviations based on a sample mean. Number_1; number_2; ... number_30 are numerical values or ranges representing a sample.
EXPONDIST(number; lambda; C)	Returns the exponential distribution. Number is the value of the function. Lambda is the parameter value. C is a logical value that determines the form of the function. C = 0 calculates the density function, and C = 1 calculates the distribution.
FDIST(number; degrees_freedom_1; degrees_freedom_2)	Calculates the values of an F probability distribution. Number is the value for which the F distribution is to be calculated. Degrees_freedom_1 is the degrees of freedom in the numerator in the F distribution. Degrees_freedom_2 is the degrees of freedom in the denominator in the F distribution.
FINV(number; degrees_freedom_1; degrees_freedom_2)	Returns the inverse of the F probability distribution. Number is probability value for which the inverse F distribution is to be calculated. Degrees_freedom_1 is the number of degrees of freedom in the numerator of the F distribution. Degrees_freedom_2 is the number of degrees of freedom in the denominator of the F distribution.
FISHER(number)	Returns the Fisher transformation for the given number and creates a function close to a normal distribution.
FISHERINV(number)	Returns the inverse of the Fisher transformation for the given number and creates a function close to a normal distribution.
FORECAST(value; data_Y; data_X)	Extrapolates future values based on existing x and y values. Value is the x value, for which the y value of the linear regression is to be returned. Data_Y is the array or range of known Ys. Data_X is the array or range of known Xs. Does not work for exponential functions.
FTEST(data_1; data_2)	Returns the result of an F test. Data_1 is the first record array. Data_2 is the second record array.

Syntax	Description
GAMMADIST(number; alpha; beta; C)	Returns the values of a Gamma cumulative distribution. Number is the value for which the Gamma distribution is to be calculated. Alpha is the parameter Alpha of the Gamma distribution. Beta is the parameter Beta of the Gamma distribution. C = 0 calculates the density function, and C = 1 calculates the distribution.
GAMMAINV(number; alpha; beta)	Returns the inverse of the Gamma cumulative distribution. This function allows you to search for variables with different distribution. Number is the probability value for which the inverse Gamma distribution is to be calculated. Alpha is the parameter Alpha of the Gamma distribution. Beta is the parameter Beta of the Gamma distribution.
GAMMALN(number)	Returns the natural logarithm of the Gamma function, G(x), for the given number .
GAUSS(number)	Returns the standard normal cumulative distribution for the given number .
GEOMEAN(number_1; number_2; ... number_30)	Returns the geometric mean of a sample. Number_1; number_2; ... number_30 are numerical arguments or ranges that represent a random sample.
HARMEAN(number_1; number_2; ... number_30)	Returns the harmonic mean of a data set. Number_1; number_2; ... number_30 are values or ranges that can be used to calculate the harmonic mean.
HYPGEOMDIST(X; n_sample; successes; n_population)	Returns the hypergeometric distribution. X is the number of results achieved in the random sample. N_sample is the size of the random sample. Successes is the number of possible results in the total population. N_population is the size of the total population.
INTERCEPT(data_Y; data_X)	Calculates the y-value at which a line will intersect the y-axis by using known x-values and y-values. Data_Y is the dependent set of observations or data. Data_X is the independent set of observations or data. Names, arrays or references containing numbers must be used here. Numbers can also be entered directly.
KURT(number_1; number_2; ... number_30)	Returns the kurtosis of a data set (at least 4 values required). Number_1; number_2; ... number_30 are numerical arguments or ranges representing a random sample of distribution.
LARGE(data; rank_c)	Returns the Rank_c-th largest value in a data set. Data is the cell range of data. Rank_c is the ranking of the value (2nd largest, 3rd largest, etc.) written as an integer.
LOGINV(number; mean; STDEV)	Returns the inverse of the lognormal distribution for the given Number , a probability value. Mean is the arithmetic mean of the standard logarithmic distribution. STDEV is the standard deviation of the standard logarithmic distribution.

Syntax	Description
LOGNORMDIST(number; mean; STDEV)	Returns the cumulative lognormal distribution for the given Number , a probability value. Mean is the mean value of the standard logarithmic distribution. STDEV is the standard deviation of the standard logarithmic distribution.
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.
MAXA(value_1; value_2; ... value_30)	Returns the maximum value in a list of arguments. Unlike MAX, text can be entered. The value of the text is 0. Value_1; value_2; ... value_30 are values or ranges.
MEDIAN(number_1; number_2; ... number_30)	Returns the median of a set of numbers. Number_1; number_2; ... number_30 are values or ranges, which represent a sample. Each number can also be replaced by a reference.
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.
MINA(value_1; value_2; ... value_30)	Returns the minimum value in a list of arguments. Here text can also be entered. The value of the text is 0. Value_1; value_2; ... value_30 are values or ranges.
MODE(number_1; number_2; ... number_30)	Returns the most common value in a data set. Number_1; number_2; ... number_30 are numerical values or ranges. If several values have the same frequency, it returns the smallest value. An error occurs when a value does not appear twice.
NEGBINOMDIST(X; R; SP)	Returns the negative binomial distribution. X is the value returned for unsuccessful tests. R is the value returned for successful tests. SP is the probability of the success of an attempt.
NORMDIST(number; mean; STDEV; C)	Returns the normal distribution for the given Number in the distribution. Mean is the mean value of the distribution. STDEV is the standard deviation of the distribution. C = 0 calculates the density function, and C = 1 calculates the distribution.
NORMINV(number; mean; STDEV)	Returns the inverse of the normal distribution for the given Number in the distribution. Mean is the mean value in the normal distribution. STDEV is the standard deviation of the normal distribution.
NORMSDIST(number)	Returns the standard normal cumulative distribution for the given Number .
NORMSINV(number)	Returns the inverse of the standard normal distribution for the given Number , a probability value.
PEARSON(data_1; data_2)	Returns the Pearson product moment correlation coefficient r. Data_1 is the array of the first data set. Data_2 is the array of the second data set.

Syntax	Description
PERCENTILE(data; alpha)	Returns the alpha-percentile of data values in an array. Data is the array of data. Alpha is the percentage of the scale between 0 and 1.
PERCENTRANK(data; value)	Returns the percentage rank (percentile) of the given value in a sample. Data is the array of data in the sample.
PERMUT(count_1; count_2)	Returns the number of permutations for a given number of objects. Count_1 is the total number of objects. Count_2 is the number of objects in each permutation.
PERMUTATIONA(count_1; count_2)	Returns the number of permutations for a given number of objects (repetition allowed). Count_1 is the total number of objects. Count_2 is the number of objects in each permutation.
PHI(number)	Returns the values of the distribution function for a standard normal distribution for the given Number .
POISSON(number; mean; C)	Returns the Poisson distribution for the given Number . Mean is the middle value of the Poisson distribution. C = 0 calculates the density function, and C = 1 calculates the distribution.
PROB(data; probability: start; end)	Returns the probability that values in a range are between two limits. Data is the array or range of data in the sample. Probability is the array or range of the corresponding probabilities. Start is the start value of the interval whose probabilities are to be summed. End (optional) is the end value of the interval whose probabilities are to be summed. If this parameter is missing, the probability for the Start value is calculated.
QUARTILE(data; type)	Returns the quartile of a data set. Data is the array of data in the sample. Type is the type of quartile. (0 = Min, 1 = 25%, 2 = 50% (Median), 3 = 75% and 4 = Max.)
RANK(value; data; type)	Returns the rank of the given Value in a sample. Data is the array or range of data in the sample. Type (optional) is the sequence order, either ascending (0) or descending (1).
RSQ(data_Y; data_X)	Returns the square of the Pearson correlation coefficient based on the given values. Data_Y is an array or range of data points. Data_X is an array or range of data points.
SKEW(number_1; number_2; ... number_30)	Returns the skewness of a distribution. Number_1; number_2; ... number_30 are numerical values or ranges.
SLOPE(data_Y; data_X)	Returns the slope of the linear regression line. Data_Y is the array or matrix of Y data. Data_X is the array or matrix of X data.
SMALL(data; rank_c)	Returns the Rank_c-th smallest value in a data set. Data is the cell range of data. Rank_c is the rank of the value (2nd smallest, 3rd smallest, etc.) written as an integer.

Syntax	Description
STANDARDIZE(number; mean; STDEV)	Converts a random variable to a normalized value. Number is the value to be standardized. Mean is the arithmetic mean of the distribution. STDEV is the standard deviation of the distribution.
STDEV(number_1; number_2; ... number_30)	Estimates the standard deviation based on a sample. Number_1; number_2; ... number_30 are numerical values or ranges representing a sample based on an entire population.
STDEVA(value_1; value_2; ... value_30)	Calculates the standard deviation of an estimation based on a sample. Value_1; value_2; ... value_30 are values or ranges representing a sample derived from an entire population. Text has the value 0.
STDEVP(number_1; number_2; ... number_30)	Calculates the standard deviation based on the entire population. Number_1; number_2; ... number_30 are numerical values or ranges representing a sample based on an entire population.
STDEVPA(value_1; value_2; ... value_30)	Calculates the standard deviation based on the entire population. Value_1; value_2; ... value_30 are values or ranges representing a sample derived from an entire population. Text has the value 0.
STEYX(data_Y; data_X)	Returns the standard error of the predicted y value for each x in the regression. Data_Y is the array or matrix of Y data. Data_X is the array or matrix of X data.
TDIST(number; degrees_freedom; mode)	Returns the t-distribution for the given Number . Degrees_freedom is the number of degrees of freedom for the t-distribution. Mode = 1 returns the one-tailed test, Mode = 2 returns the two-tailed test.
TINV(number; degrees_freedom)	Returns the inverse of the t-distribution, for the given Number associated with the two-tailed t-distribution. Degrees_freedom is the number of degrees of freedom for the t-distribution.
TRIMMEAN(data; alpha)	Returns the mean of a data set without the Alpha proportion of data at the margins. Data is the array of data in the sample. Alpha is the proportion of the marginal data that will not be taken into consideration.
TTEST(data_1; data_2; mode; type)	Returns the probability associated with a Student's t-Test. Data_1 is the dependent array or range of data for the first record. Data_2 is the dependent array or range of data for the second record. Mode = 1 calculates the one-tailed test, Mode = 2 the two-tailed test. Type of t-test to perform: paired (1), equal variance (homoscedastic) (2), or unequal variance (heteroscedastic) (3).
VAR(number_1; number_2; ... number_30)	Estimates the variance based on a sample. Number_1; number_2; ... number_30 are numerical values or ranges representing a sample based on an entire population.

Syntax	Description
VARA(value_1; value_2; ... value_30)	Estimates a variance based on a sample. The value of text is 0. Value_1; value_2; ... value_30 are values or ranges representing a sample derived from an entire population. Text has the value 0.
VARP(Number_1; number_2; ... number_30)	Calculates a variance based on the entire population. Number_1; number_2; ... number_30 are numerical values or ranges representing an entire population.
VARPA(value_1; value_2; .. .value_30)	Calculates the variance based on the entire population. The value of text is 0. Value_1; value_2; ... value_30 are values or ranges representing an entire population.
WEIBULL(number; alpha; beta; C)	Returns the values of the Weibull distribution for the given Number . Alpha is the Alpha parameter of the Weibull distribution. Beta is the Beta parameter of the Weibull distribution. C indicates the type of function: C= 0 the form of the function is calculated, C=1 the distribution is calculated.
ZTEST(data; number; sigma)	Returns the two-tailed P value of a z test with standard distribution. Data is the array of the data. Number is the value to be tested. Sigma (optional) is the standard deviation of the total population. If this argument is missing, the standard deviation of the sample is processed.

Date and time functions

Use these functions for inserting, editing, and manipulating dates and times. LibreOffice handles and computes a date/time value as a number. When you assign the number format "Number" to a date or time value, it is displayed as a number. For example, 01/01/2000 12:00 PM, converts to 36526.5. This is just a matter of formatting; the actual value is always stored and manipulated as a number. To see the date or time displayed in a standard format, change the number format (date or time) accordingly.

To set the default date format used by Calc. go to **Tools → Options → LibreOffice Calc → Calculate**.

Caution



When entering dates, slashes or dashes used as date separators may be interpreted as arithmetic operators. To keep dates from being interpreted as parts of formulas, and thus returning erroneous results, always place them in quotation marks, for example, "12/08/52".

Table 38: Data and time functions

Syntax	Description
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.
DATEVALUE("Text")	Returns the internal date number for text in quotes. Text is a valid date expression and must be entered with quotation marks.

Syntax	Description
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.
DAYS(date_2; date_1)	Calculates the difference, in days, between two date values. Date_1 is the start date. Date_2 is the end date. If Date_2 is an earlier date than Date_1 , the result is a negative number.
DAYS360(date_1; date_2; type)	Returns the difference between two dates based on the 360 day year used in interest calculations. If Date_2 is earlier than Date_1 , the function will return a negative number. Type (optional) determines the type of difference calculation: the US method (0) or the European method ($\neq 0$).
DAYSINMONTH(date)	Calculates the number of days in the month of the given date.
DAYSINYEAR(date)	Calculates the number of days in the year of the given date .
EASTERSUNDAY(integer)	Returns the date of Easter Sunday for the entered year. Year is an integer between 1583 and 9956 or 0 and 99.
EDATE(start_date; months)	The result is a date a number of Months away from the given Start_date . Only months are considered; days are not used for calculation. Months is the number of months.
EOMONTH(start_date; months)	Returns the date of the last day of a month which falls Months away from the given Start_date . Months is the number of months before (negative) or after (positive) the start date.
HOUR(number)	Returns the hour, as an integer, for the given time value. Number is a time value.
ISLEAPYEAR(date)	Determines whether a given date falls within a leap year. Returns either 1 (TRUE) or 0 (FALSE).
MINUTE(number)	Returns the minute, as an integer, for the given time value. Number is a time value.
MONTH(number)	Returns the month, as an integer, for the given date value. Number is a time value.
MONTHS(start_date; end_date; type)	Calculates the difference, in months, between two date values. Date_1 is the start (earlier) date. Date_2 is the end date. Type is one of two possible values, 0 (interval) or 1 (in calendar months). If Date_2 is an earlier date than Date_1 , the result is a negative number.
NETWORKDAYS(start_date; end_date; holidays)	Returns the number of workdays between start_date and end_date . Holidays can be deducted. Start_date is the date from which the calculation is carried out. End_date is the date up to which the calculation is carried out. If the start or end date is a workday, the day is included in the calculation. Holidays (optional) is a list of holidays. Enter a cell range in which the holidays are listed individually.
NOW()	Returns the computer system date and time. The value is updated when your document recalculates. NOW is a function without arguments.

Syntax	Description
SECOND(number)	Returns the second, as an integer, for the given time value. Number is a time value.
TIME(hour; minute; second)	Returns the current time value from values for hours, minutes and seconds. This function can be used to convert a time based on these three elements to a decimal time value. Hour , minute and second must all be integers.
TIMEVALUE(text)	Returns the internal time number from a text enclosed by quotes in a time entry format. The internal number indicated as a decimal is the result of the date system used under LibreOffice to calculate date entries.
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).
WEEKNUM(number; mode)	Calculates the number of the calendar week of the year for the internal date number . Mode sets the start of the week and the calculation type: 1 = Sunday, 2 = Monday.
WEEKNUM_ADD(date; return_type)	Calculates the calendar week of the year for a Date . Date is the date within the calendar week. Return_type sets the start of the week and the calculation type: 1 = Sunday, 2 = Monday.
WEEKS(start_date; end_date; type)	Calculates the difference in weeks between two dates, start_date and end_date . Type is one of two possible values, 0 (interval) or 1 (in numbers of weeks).
WEEKSINYEAR(date)	Calculates the number of weeks in a year until a certain date . A week that spans two years is added to the year in which most days of that week occur.
WORKDAY(start_date; days; holidays)	Returns a date number that can be formatted as a date. You then see the date of a day that is a certain number of Workdays away from the start_date . Holidays (optional) is a list of holidays. Enter a cell range in which the holidays are listed individually.
YEAR(number)	Returns the year as a number according to the internal calculation rules. Number shows the internal date value for which the year is to be returned.
YEARFRAC(start_date; end_date; basis)	Returns a number between 0 and 1, representing the fraction of a year between start_date and end_date . Start_date and end_date are two date values. Basis is chosen from a list of options and indicates how the year is to be calculated.
YEARS(tart_date; end_date; type)	Calculates the difference in years between two dates: the start_date and the end_date . Type calculates the type of difference.

Logical functions

Use the logical functions to test values and produce results based on the result of the test. These functions are conditional and provide the ability to write longer formulas based on input or output.

Table 39: Logical functions

Syntax	Description
AND(logical_value_1; logical_value_2; ...logical_value_30)	Returns TRUE if all arguments are TRUE. If any element is FALSE, this function returns the FALSE value. Logical_value_1; logical_value_2; ...logical_value_30 are conditions to be checked. All conditions can be either TRUE or FALSE. If a range is entered as a parameter, the function uses the value from the range that is in the current column or row. The result is TRUE if the logical value in all cells within the cell range is TRUE
FALSE()	Set the logical value to FALSE. The FALSE() function does not require any arguments.
IF(test; then_value; otherwise_value)	Specifies a logical test to be performed. Test is any value or expression that can be TRUE or FALSE. Then_value (optional) is the value that is returned if the logical test is TRUE. Otherwise_value (optional) is the value that is returned if the logical test is FALSE.
NOT(logical_value)	Reverses the logical value. Logical_value is any value to be reversed.
OR(logical_value_1; logical_value_2; ...logical_value_30)	Returns TRUE if at least one argument is TRUE. Returns the value FALSE if all the arguments have the logical value FALSE. Logical_value_1; logical_value_2; ...logical_value_30 are conditions to be checked. All conditions can be either TRUE or FALSE. If a range is entered as a parameter, the function uses the value from the range that is in the current column or row.
TRUE()	Sets the logical value to TRUE. The TRUE() function does not require any arguments.

Informational functions

These functions provide information (or feedback) regarding the results of a test for a specific condition, or a test for the type of data or content a cell contains.

Table 40: Informational functions

Syntax	Description
CELL(info_type; reference)	Returns information on a cell such as its address, formatting or contents of a cell based on the value of the info_type argument. Info_type specifies the type of information to be returned and comes from a predefined list of arguments. Info_type is not case sensitive, but it must be enclosed within quotes. Reference is the address of the cell to be examined. If reference is a range, the cell reference moves to the top left of the range. If reference is missing, Calc uses the position of the cell in which this formula is located.
CURRENT()	Calculates the current value of a formula at the actual position.

Syntax	Description
FORMULA(reference)	Displays the formula of a formula cell at any position. The formula will be returned as a string in the Reference position. If no formula cell can be found, or if the presented argument is not a reference, returns the error value #N/A.
ISBLANK(value)	Returns TRUE if the reference to a cell is blank. This function is used to determine if the content of a cell is empty. A cell with a formula inside is not empty. If an error occurs, the function returns a logical or numerical value. Value is the content to be tested.
ISERR(value)	Returns TRUE if the value refers to any error value except #N/A. You can use this function to control error values in certain cells. If an error occurs, the function returns a logical or numerical value. Value is any value or expression in which a test is performed to determine whether an error value not equal to #N/A is present.
ISERROR(value)	The ISERROR tests if the cells contain general error values. ISERROR recognizes the #N/A error value. If an error occurs, the function returns a logical or numerical value. Value is any value where a test is performed to determine whether it is an error value.
ISEVEN_ADD(number)	Tests for even numbers . Returns TRUE (1) if the number returns a whole number when divided by 2.
ISFORMULA(reference)	Returns TRUE if a cell is a formula cell. If an error occurs, the function returns a logical or numerical value. Reference indicates the reference to a cell in which a test will be performed to determine if it contains a reference.
ISLOGICAL(value)	Returns TRUE if the cell contains a logical number format. The function is used in order to check for both TRUE and FALSE values in certain cells. If an error occurs, the function returns a logical or numerical value. Value is the value to be tested for logical number format.
ISNA(value)	Returns TRUE if a cell contains the #N/A (value not available) error value. If an error occurs, the function returns a logical or numerical value. Value is the value or expression to be tested.
ISNONTEXT(value)	Tests if the cell contents are text or numbers, and returns FALSE if the contents are text. If an error occurs, the function returns a logical or numerical value. Value is any value or expression where a test is performed to determine whether it is a text or numbers or a Boolean value.
ISNUMBER(value)	Returns TRUE if the value refers to a number. If an error occurs, the function returns a logical or numerical value. Value is any expression to be tested to determine whether it is a number or text.
ISODD_ADD(number)	Returns TRUE (1) if the number does not return a whole number when divided by 2. Number is the number to be tested.

Syntax	Description
ISREF(value)	Tests if the content of one or several cells is a reference. Verifies the type of references in a cell or a range of cells. If an error occurs, the function returns a logical or numerical value. Value is the value to be tested, to determine whether it is a reference.
ISTEXT(value)	Returns TRUE if the cell contents refer to text. If an error occurs, the function returns a logical or numerical value. Value is a value, number, Boolean value, or error value to be tested.
N(value)	Returns the number 1, if the parameter is TRUE. Returns the parameter, if the parameter is a number. Returns the number 0 for other parameters. If an error occurs, the function returns a logical or numerical value. Value is the parameter to be converted into a number.
NA()	Returns the error value #N/A.
TYPE(value)	Returns the type of value. If an error occurs, the function returns a logical or numerical value. Value is a specific value for which the data type is determined. Value 1 = number, value 2 = text, value 4 = Boolean value, value 8 = formula, value 16 = error value.

Database functions

This section deals with functions used with data organized as one row of data for one record. The *Database* category should not be confused with the Base database component in LibreOffice. A Calc database is simple a range of cells that comprises a block of related data where each row contains a separate record. There is no connection between a database in LibreOffice and the *Database* category in LibreOffice Calc.

The database functions use the following common arguments:

- **Database** is a range of cells which define the database.
- **Database_field** specifies the column where the function operates on after the search criteria of the first parameter is applied and the data rows are selected. It is not related to the search criteria itself. The number 0 specifies the whole data range. To reference a column by using the column header name, place quotation marks around the header name.
- **Search_criteria** is a cell range containing the search criteria.. Empty cells in the search criteria range will be ignored.

Note

All of the **search-criteria** arguments for the database functions support regular expressions. For example, "all.*" can be entered to find the first location of "all" followed by any characters. To search for text that is also a regular expression, precede every character with a \ character. You can switch the automatic evaluation of regular expressions on and off in **Tools → Options → LibreOffice Calc → Calculate**.

Table 41: Database average

Syntax	Description
DAVERAGE(database; database_field; search_criteria)	Returns the average of the values of all cells (fields) in all rows (database records) that match the specified search_criteria . The search supports regular expressions.
DCOUNT(database; database_field; search_criteria)	Counts the number of rows (records) in a database that match the specified search_criteria and contain numerical values. The search supports regular expressions. For the database_field parameter, enter a cell address to specify the column, or enter the number 0 for the entire database. The parameter cannot be empty.
DCOUNTA(database; database_field; search_criteria)	Counts the number of rows (records) in a database that match the specified search_criteria and contain numeric or alphanumeric values. The search supports regular expressions.
DGET(database; database_field; search_criteria)	Returns the contents of the referenced cell in a database which matches the specified search_criteria . In case of an error, the function returns either #VALUE! for no row found, or Err502 for more than one cell found.
DMAX(database; database_field; search_criteria)	Returns the maximum content of a cell (field) in a database (all records) that matches the specified search_criteria . The search supports regular expressions.
DMIN(database; database_field; search_criteria)	Returns the minimum content of a cell (field) in a database that matches the specified search_criteria . The search supports regular expressions.
DPRODUCT(database; database_field; search_criteria)	Multiplies all cells of a data range where the cell contents match the search_criteria . The search supports regular expressions.
DSTDEV(database; database_field; search_criteria)	Calculates the standard deviation of a population based on a sample, using the numbers in a database column that match the search_criteria . The records are treated as a sample of data. Note that a representative result of a large population can not be obtained from a sample of fewer than one thousand.
DSTDEVP(database; database_field; search_criteria)	Calculates the standard deviation of a population based on all cells of a data range which match the search_criteria . The records from the example are treated as the whole population.
DSUM(database; database_field; search_criteria)	Returns the total of all cells in a database field in all rows (records) that match the specified search_criteria . The search supports regular expressions.
DVAR(database; database_field; search_criteria)	Returns the variance of all cells of a database field in all records that match the specified search_criteria . The records from the example are treated as a sample of data. A representative result of a large population cannot be obtained from a sample population of fewer than one thousand.
DVARP(database; database_field; search_criteria)	Calculates the variance of all cell values in a database field in all records that match the specified search_criteria . The records are from the example are treated as an entire population.

Array functions

Table 42: Array functions

Syntax	Description
FREQUENCY(data; classes)	Calculates the frequency distribution in a one-column-array. The default value supply and the number of intervals or classes are used to count how many values are omitted on the single intervals. Data is the array of, or reference to, the set of values to be counted. Classes is the array of the class set.
GROWTH(data_Y; data_X; new_data_X; function_type)	Calculates the points of an exponential trend in an array. Data_Y is the Y Data array. Data_X (optional) is the X Data array. New_Data_X (optional) is the X data array, in which the values are recalculated. Function_type is optional. If function_type = 0, functions in the form $y = m^x$ are calculated. Otherwise, $y = b \cdot m^x$ functions are calculated.
LINEST(data_Y; data_X; linear_type; stats)	Returns the parameters of a linear trend. Data_Y is the Y Data array. Data_X (optional) is the X Data array. Linear_Type (optional): If the line goes through the zero point, then set Linear_Type = 0. Stats (optional): If Stats=0, only the regression coefficient is calculated. Otherwise, other statistics will be seen.
LOGEST(data_Y; data_X; function_type; stats)	Calculates the adjustment of the entered data as an exponential regression curve ($y=b \cdot m^x$). Data_Y is the Y Data array. Data_X (optional) is the X Data array. Function_type (optional): If function_type = 0, functions in the form $y = m^x$ are calculated. Otherwise, $y = b \cdot m^x$ functions are calculated. Stats (optional). If Stats=0, only the regression coefficient is calculated.
MDETERM(array)	Returns the array determinant of an array. This function returns a value in the current cell; it is not necessary to define a range for the results. Array is a square array in which the determinants are defined.
MINVERSE(array)	Returns the inverse array. Array is a square array that is to be inverted.
MMULT(array; array)	Calculates the array product of two arrays. The number of columns for array 1 must match the number of rows for array 2. The square array has an equal number of rows and columns. Array at first place is the first array used in the array product. Array at second place is the second array with the same number of rows.
MUNIT(dimensions)	Returns the unitary square array of a certain size. The unitary array is a square array where the main diagonal elements equal 1 and all other array elements are equal to 0. Dimensions refers to the size of the array unit.
SUMPRODUCT(array 1; array 2; ...array 30)	Multiplies corresponding elements in the given arrays, and returns the sum of those products. Array 1; array 2;...array 30 are arrays whose corresponding elements are to be multiplied. At least one array must be part of the argument list. If only one array is given, all array elements are summed.

Syntax	Description
SUMX2MY2(array_X; array_Y)	Returns the sum of the difference of squares of corresponding values in two arrays. Array_X is the first array whose elements are to be squared and added. Array_Y is the second array whose elements are to be squared and subtracted.
SUMX2PY2(array_X; array_Y)	Returns the sum of the sum of squares of corresponding values in two arrays. Array_X is the first array whose arguments are to be squared and added. Array_Y is the second array, whose elements are to be added and squared.
SUMXMY2(array_X; array_Y)	Adds the squares of the variance between corresponding values in two arrays. Array_X is the first array whose elements are to be subtracted and squared. Array_Y is the second array, whose elements are to be subtracted and squared.
TRANSPOSE(array)	Transposes the rows and columns of an array. Array is the array in the spreadsheet that is to be transposed.
TREND(data_Y; data_X; new_data_X; linear_Type)	Returns values along a linear trend. Data_Y is the Y Data array. Data_X (optional) is the X Data array. New_data_X (optional) is the array of the X data, which are used for recalculating values. Linear_type is optional. If linear_type = 0, then lines will be calculated through the zero point. Otherwise, offset lines will also be calculated. The default is linear_type <> 0.

Spreadsheet functions

Use spreadsheet functions to search and address cell ranges and provide feedback regarding the contents of a cell or range of cells. You can use functions such as HYPERLINK() and DDE() to connect to other documents or data sources.

Table 43: Spreadsheet functions

Syntax	Description
ADDRESS(row; column; abs; sheet)	Returns a cell address (reference) as text, according to the specified row and column numbers. Optionally, whether the address is interpreted as an absolute address (for example, \$A\$1) or as a relative address (as A1) or in a mixed form (A\$1 or \$A1) can be determined. The name of the sheet can also be specified. Row is the row number for the cell reference. Column is the column number for the cell reference (the number, not the letter). Abs determines the type of reference. Sheet is the name of the sheet.
AREAS(reference)	Returns the number of individual ranges that belong to a multiple range. A range can consist of contiguous cells or a single cell. Reference is the reference to a cell or cell range.
CHOOSE(index; value1; ... value30)	Uses an index to return a value from a list of up to 30 values. Index is a reference or number between 1 and 30 indicating which value is to be taken from the list. Value1; ... value30 is the list of values entered as a reference to a cell or as individual values.

Syntax	Description
COLUMN(reference)	Returns the column number of a cell reference. If the reference is a cell, the column number of the cell is returned; if the parameter is a cell area, the corresponding column numbers are returned in a single-row array if the formula is entered as an array formula. If the COLUMN function with an area reference parameter is not used for an array formula, only the column number of the first cell within the area is determined. Reference is the reference to a cell or cell area whose first column number is to be found. If no reference is entered, the column number of the cell in which the formula is entered is found. Calc automatically sets the reference to the current cell.
COLUMNS(array)	Returns the number of columns in the given reference. Array is the reference to a cell range whose total number of columns is to be found. The argument can also be a single cell.
DDE(server; file; range; mode)	Returns the result of a DDE-based link. If the contents of the linked range or section changes, the returned value will also change. The spreadsheet can be reloaded, or Edit → Links selected, to see the updated links. Cross-platform links, for example from an LibreOffice installation running on a Windows machine to a document created on a Linux machine, are not supported. Server is the name of a server application. LibreOffice applications have the server name "Soffice". File is the complete file name, including path. Range is the area containing the data to be evaluated. Mode is an optional parameter that controls the method by which the DDE server converts its data into numbers.
ERRORTYPE(reference)	Returns the number corresponding to an error value occurring in a different cell. With the aid of this number, an error message text can be generated. If an error occurs, the function returns a logical or numerical value. Reference contains the address of the cell in which the error occurs.
HLOOKUP(search_criteria; array; index; sorted)	Searches for a value and reference to the cells below the selected area. This function verifies if the first row of an array contains a certain value. The function returns the value in a row of the array, named in the index , in the same column. The search supports regular expressions.
HYPERNLINK(URL) or HYPERNLINK(URL; cell_text)	When a cell that contains the HYPERNLINK function is clicked, the hyperlink opens. URL specifies the link target. The optional cell_text argument is the text displayed in the cell. If the cell_text parameter is not specified, the URL is displayed.

Syntax	Description
INDEX(reference; row; column; range)	Returns the content of a cell, specified by row and column number or an optional range name. Reference is a cell reference, entered either directly or by specifying a range name. If the reference consists of multiple ranges, the reference or range name must be enclosed in parentheses. Row (optional) is the row number of the reference range, for which to return a value. Column (optional) is the column number of the reference range, for which to return a value. Range (optional) is the index of the subrange if referring to a multiple range.
INDIRECT(reference)	Returns the reference specified by a text string. This function can also be used to return the area of a corresponding string. Reference is a reference to a cell or an area (in text form) for which to return the contents.
LOOKUP(search_criterion; search_vector; result_vector)	Returns the contents of a cell either from a one-row or one-column range or from an array. Optionally, the assigned value (of the same index) is returned in a different column and row. As opposed to VLOOKUP and HLOOKUP, search and result vectors may be at different positions; they do not have to be adjacent. Additionally, the search vector for the LOOKUP must be sorted, otherwise the search will not return any usable results. The search supports regular expressions. Search_criterion is the value to be searched for; entered either directly or as a reference. Search_vector is the single-row or single-column area to be searched. Result_vector is another single-row or single-column range from which the result of the function is taken. The result is the cell of the result vector with the same index as the instance found in the search vector.
MATCH(search_criterion; lookup_array; type)	Returns the relative position of an item in an array that matches a specified value. The function returns the position of the value found in the lookup_array as a number. Search_criterion is the value which is to be searched for in the single-row or single-column array. Lookup_array is the reference searched. A lookup array can be a single row or column, or part of a single row or column. Type may take the values 1, 0, or -1. This corresponds to the same function in Microsoft Excel. The search supports regular expressions
OFFSET(reference; rows; columns; height; width)	Returns the value of a cell offset by a certain number of rows and columns from a given reference point. Reference is the cell from which the function searches for the new reference. Rows is the number of cells by which the reference was corrected up (negative value) or down. Columns is the number of columns by which the reference was corrected to the left (negative value) or to the right. Height is the optional vertical height for an area that starts at the new reference position. Width is the optional horizontal width for an area that starts at the new reference position.

Syntax	Description
ROW(reference)	Returns the row number of a cell reference. If the reference is a cell, it returns the row number of the cell. If the reference is a cell range, it returns the corresponding row numbers in a one-column Array if the formula is entered as an array formula. If the ROW function with a range reference is not used in an array formula, only the row number of the first range cell will be returned. Reference is a cell, an area, or the name of an area. If a reference is not indicated, Calc automatically sets the reference to the current cell.
ROWS(array)	Returns the number of rows in a reference or array. Array is the reference or named area whose total number of rows is to be determined.
SHEET(reference)	Returns the sheet number of a reference or a string representing a sheet name. If no parameters are entered, the result is the sheet number of the spreadsheet containing the formula. Reference (optional) is the reference to a cell, an area, or a sheet name string.
SHEETS(reference)	Determines the number of sheets in a reference. If no parameters are entered, the result is the number of sheets in the current document. Reference (optional) is the reference to a sheet or an area.
STYLE(style; time; style2)	Applies a style to the cell containing the formula. After a set amount of time, another style can be applied. This function always returns the value 0, allowing it to be added to another function without changing the value. Style is the name of a cell style assigned to the cell. Time is an optional time range in seconds. Style2 is the optional name of a cell style assigned to the cell after a certain amount of time has passed.
VLOOKUP(search_criterion; array; index; sort_order)	Searches vertically with reference to adjacent cells to the right. If a specific value is contained in the first column of an array, returns the value to the same line of a specific array column named by index . The search supports regular expressions. Search_criterion is the value searched for in the first column of the array. Array is the reference, which must include at least two columns. Index is the number of the column in the array that contains the value to be returned. The first column has the number 1. Sort_order (optional) indicates whether the first column in the array is sorted in ascending order.

Text functions

Use Calc's text functions to search and manipulate text strings or character codes.

Table 44: Text functions

Syntax	Description
ARABIC(text)	Calculates the value of a Roman number. The value range must be between 0 and 3999. Text is the text that represents a Roman number.
BASE(number; radix; [minimum_length])	Converts a positive integer to a specified base then into text using the characters from the base's numbering system (decimal, binary, hexadecimal, etc.). Only the digits 0-9 and the letters A-Z are used. Number is the positive integer to be converted. Radix is the base of the number system. It may be any positive integer between 2 and 36. Minimum_length (optional) is the minimum length of the character sequence that has been created. If the text is shorter than the indicated minimum length, zeros are added to the left of the string.
CHAR(number)	Converts a number into a character according to the current code table. The number can be a two-digit or three-digit integer number. Number is a number between 1 and 255 representing the code value for the character.
CLEAN(text)	Removes all non-printing characters from the string. Text refers to the text from which to remove all non-printable characters.
CODE(text)	Returns a numeric code for the first character in a text string. Text is the text for which the code of the first character is to be found.
CONCATENATE(text_1; text_2; ...; text_30)	Combines several text strings into one string. Text_1; text_2; ... text_30 are text passages that are to be combined into one string.
DECIMAL(text; radix)	Converts text with characters from a number system to a positive integer in the base radix given. The radix must be in the range 2 to 36. Spaces and tabs are ignored. The text field is not case-sensitive. Text is the text to be converted. To differentiate between a hexadecimal number, such as A1 and the reference to cell A1, place the number in quotation marks; for example, "A1" or "FACE". Radix is the base of the number system. It may be any positive integer between 2 and 36.
DOLLAR(value; decimals)	Converts a number to an amount in the currency format, rounded to a specified decimal place. Value is the number to be converted to currency; it can be a number, a reference to a cell containing a number, or a formula which returns a number. Decimals (optional) is the number of decimal places. If no decimals value is specified, all numbers in currency format will be displayed with two decimal places. The currency format is set in the system settings.
EXACT(text_1; text_2)	Compares two text strings and returns TRUE if they are identical. This function is case-sensitive. Text_1 is the first text to compare. Text_2 is the second text to compare.

Syntax	Description
FIND(find_text; text; position)	Looks for a string of text within another string. Where to begin the search can also be defined. The search term can be a number or any string of characters. The search is case-sensitive. Find_text is the text to be found. Text is the text where the search takes place. Position (optional) is the position in the text from which the search starts.
FIXED(number; decimals; no_thousands_separator)	Specifies that a number be displayed with a fixed number of decimal places and with or without a thousands separator. This function can be used to apply a uniform format to a column of numbers. Number is the number to be formatted. Decimals is the number of decimal places to be displayed. No_thousands_separator (optional) determines whether the thousands separator is used or not. If the parameter is a number not equal to 0, the thousands separator is suppressed. If the parameter is equal to 0 or if it is missing altogether, the thousands separators of the current locale setting are displayed.
LEFT(text; number)	Returns the first character or characters in a text string. Text is the text where the initial partial words are to be determined. Number (optional) is the number of characters for the start text. If this parameter is not defined, one character is returned.
LEN(text)	Returns the length of a string including spaces. Text is the text whose length is to be determined.
LOWER(text)	Converts all uppercase letters in a text string to lowercase. Text is the text to be converted.
MID(text; start; number)	Returns a text segment of a character string. The parameters specify the starting position and the number of characters. Text is the text containing the characters to extract. Start is the position of the first character in the text to extract. Number is the number of characters in the part of the text.
PROPER(text)	Capitalizes the first letter in all words of a text string. Text is the text to be converted.
REPLACE(text; position; length; new_text)	Replaces part of a text string with a different text string. This function can be used to replace both characters and numbers (which are automatically converted to text). The result of the function is always displayed as text. To perform further calculations with a number which has been replaced by text, convert it back to a number using the VALUE function. Any text containing numbers must be enclosed in quotation marks so it is not interpreted as a number and automatically converted to text. Text is text of which a part will be replaced. Position is the position within the text where the replacement will begin. Length is the number of characters in text to be replaced. New_text is the text which replaces text .
REPT(text; number)	Repeats a character string by the given number of copies. Text is the text to be repeated. Number is the number of repetitions. The result can be a maximum of 255 characters.

Syntax	Description
RIGHT(text; number)	Defines the last character or characters in a text string. Text is the text of which the right part is to be determined. Number (optional) is the number of characters from the right part of the text.
ROMAN(number; mode)	Converts a number into a Roman numeral. The value range must be between 0 and 3999; the modes can be integers from 0 to 4. Number is the number that is to be converted into a Roman numeral. Mode (optional) indicates the degree of simplification. The higher the value, the greater is the simplification of the Roman numeral.
ROT13(text)	Encrypts a character string by moving the characters 13 positions in the alphabet. After the letter Z, the alphabet begins again (Rotation). Applying the encryption function again to the resulting code, decrypts the text. Text: Enter the character string to be encrypted. ROT13(ROT13(Text)) decrypts the code.
SEARCH(find_text; text; position)	Returns the position of a text segment within a character string. The start of the search can be set as an option. The search text can be a number or any sequence of characters. The search is not case-sensitive. The search supports regular expressions. Find_text is the text to be searched for. Text is the text where the search will take place. Position (optional) is the position in the text where the search is to start.
SUBSTITUTE(text; search_text; new text; occurrence)	Substitutes new text for old text in a string. Text is the text in which text segments are to be exchanged. Search_text is the text segment that is to be replaced (a number of times). New text is the text that is to replace the text segment. Occurrence (optional) indicates how many occurrences of the search text are to be replaced. If this parameter is missing, the search text is replaced throughout.
T(value)	Converts a number to a blank text string. Value is the value to be converted. Also, a reference can be used as a parameter. If the referenced cell includes a number or a formula containing a numerical result, the result will be an empty string.
TEXT(number; format)	Converts a number into text according to a given format. Number is the numerical value to be converted. Format is the text which defines the format. Use decimal and thousands separators according to the language set in the cell format.
TRIM(text)	Removes spaces that are in front of a string, or aligns cell contents to the left. Text is the text in which leading spaces are removed, or the cell in which the contents will be left-aligned.
UPPER(text)	Converts the string specified in the text parameter to uppercase. Text is the lower case letters you want to convert to upper case.
VALUE(text)	Converts a text string into a number. Text is the text to be converted to a number.

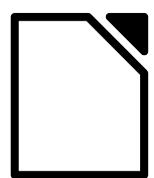
Add-in functions

Table 45: Add-in functions

Syntax	Description
BESSELI(x; n)	Calculates the modified Bessel function $I_n(x)$. x is the value on which the function will be calculated. n is the order of the Bessel function.
BESSELJ(x; n)	Calculates the Bessel function $J_n(x)$ (cylinder function). x is the value on which the function will be calculated. n is the order of the Bessel function.
BESSELK(x; n)	Calculates the modified Bessel function $K_n(x)$. x is the value on which the function will be calculated. n is the order of the Bessel function.
BESSELY(x; n)	Calculates the modified Bessel function $Y_n(x)$, also known as the Weber or Neumann function. x is the value on which the function will be calculated. n is the order of the Bessel function.
BIN2DEC(number)	Returns the decimal number for the binary number entered. Number is the binary number.
BIN2HEX(number; places)	Returns the hexadecimal number for the binary number entered. Number is the binary number. Places is the number of places to be output.
BIN2OCT(number; places)	Returns the octal number for the binary number entered. Number is the binary number. Places is the number of places to be output.
COMPLEX(real_num; i_num; suffix)	Returns a complex number from a real coefficient and an imaginary coefficient. Real_num is the real coefficient of the complex number. I_num is the imaginary coefficient of the complex number. Suffix is list of options, "i" or "j".
CONVERT_ADD(number; from_unit; to_unit)	Converts a value from one unit of measure to the corresponding value in another unit of measure. Number is the number to be converted. From_unit is the unit from which conversion is taking place. To_unit is the unit to which conversion is taking place.
DEC2BIN(number; places)	Returns the binary number for the decimal number entered between -512 and 511. Number is the decimal number. Places is the number of places to be output.
DEC2HEX(number; places)	Returns the hexadecimal number for the decimal number entered. Number is the decimal number. Places is the number of places to be output.
DEC2OCT(number; places)	Returns the octal number for the decimal number entered. Number is the decimal number. Places is the number of places to be output.
DELTA(number_1; number_2)	Returns TRUE (1) if both numbers are equal, otherwise returns FALSE (0).

Syntax	Description
ERF(lower_limit; upper_limit)	Returns values of the Gaussian error integral. Lower_limit is the lower limit of integral. Upper_limit (optional) is the upper limit of the integral. If this value is missing, the calculation takes places between 0 and the lower limit.
ERFC(lower_limit)	Returns complementary values of the Gaussian error integral between x and infinity. Lower limit is the lower limit of integral (x).
FACTDOUBLE(number)	Returns the factorial of the number with increments of 2. If the number is even, the following factorial is calculated: $n*(N-2)*(n-4)*...*4*2$. If the number is uneven, the following factorial is calculated: $n*(N-2)*(n-4)*...*3*1$.
GESTEP(number; step)	Returns 1 if number is greater than or equal to step .
HEX2BIN(number; places)	Returns the binary number for the hexadecimal number entered. Number is the hexadecimal number. Places is the number of places to be output.
HEX2DEC(number)	Returns the decimal number for the hexadecimal number entered. Number is the hexadecimal number.
HEX2OCT(number; places)	Returns the octal number for the hexadecimal number entered. Number is the hexadecimal number. Places is the number of places to be output.
IMABS(complex_number)	Returns the absolute value (modulus) of a complex_number . The complex number is entered in the form "x + yi" or "x + yj"
IMAGINARY(complex_number)	Returns the imaginary coefficient of a complex_number . The complex number is entered in the form "x + yi" or "x + yj"
IMARGUMENT(complex_number)	Returns the argument (the phi angle) of a complex_number . The complex number is entered in the form "x + yi" or "x + yj"
IMCONJUGATE(complex_number)	Returns the conjugated complex complement to a complex_number . The complex number is entered in the form "x + yi" or "x + yj"
IMCOS(complex_number)	Returns the cosine of a complex_number . The complex number is entered in the form "x + yi" or "x + yj"
IMDIV(numerator; denominator)	Returns the division of two complex numbers. Numerator , Denominator are entered in the form "x + yi" or "x + yj"
IMEXP(complex_number)	Returns the power of e (the Eulerian number) and the complex number. The complex_number is entered in the form "x + yi" or "x + yj"
IMLN(complex_number)	Returns the natural logarithm of a complex_number . The complex_number is entered in the form "x + yi" or "x + yj"
IMLOG10(complex_number)	Returns the common logarithm of a complex_number . The complex number is entered in the form "x + yi" or "x + yj"

Syntax	Description
IMLOG2(complex_number)	Returns the binary logarithm of a complex_number . The complex number is entered in the form "x + yi" or "x + yj".
IMPOWER(complex_number; number)	Returns the integer power of a complex_number . The complex number is entered in the form "x + yi" or "x + yj". Number is the exponent.
IMPRODUCT(complex_number; complex_number_1; ...)	Returns the product of up to 29 complex_numbers . The complex numbers are entered in the form "x + yi" or "x + yj"
IMREAL(complex_number)	Returns the real coefficient of a complex_number . The complex number is entered in the form "x + yi" or "x + yj"
IMSIN(complex_number)	Returns the sine of a complex_number . The complex number is entered in the form "x + yi" or "x + yj"
IMSQRT(complex_number)	Returns the square root of a complex_number . The complex numbers are entered in the form "x + yi" or "x + yj"
IMSUB(complex_number_1; complex_number_2)	Returns the subtraction of two complex_numbers . The complex_numbers are entered in the form "x + yi" or "x + yj"
IMSUM(complex_number; complex_number_1; ...)	Returns the sum of up to 29 complex numbers. The complex_numbers are entered in the form "x + yi" or "x + yj"
OCT2BIN(number; places)	Returns the binary number for the octal number entered. Number is the octal number. Places is the number of places to be output.
OCT2DEC(number)	Returns the decimal number for the octal number entered. Number is the octal number.
OCT2HEX(number; places)	Returns the hexadecimal number for the octal number entered. Number is the octal number. Places is the number of places to be output.



LibreOffice
The Document Foundation

Appendix C Calc Error Codes

Introduction to Calc error codes

Calc provides feedback for errors of miscalculation, incorrect use of functions, invalid cell references and values, and other user initiated mistakes. The feedback may be displayed within the cell that contains the error (Figure 352) or on the status bar (Figure 353) or in both, depending on the type of error. Generally speaking, if the error occurs in the cell that is selected (or contains the cursor), the error message is displayed on the status bar.

As an example, Figure 352 shows the error code returned when a column is too narrow to display the entire formatted date. The date displayed within the input line, 04/05/1998, would fit within the cell without a problem, but the format used by the cell produces the date value *Sunday, April 05, 1998*.

C2				
	A	B	C	D
1				
2	#NAME?	#REF!	####	
3				

Figure 352: Error codes displayed within cells

When the cell displaying the #REF error code in Figure 352 is selected, the status bar displays the error message as shown in Figure 353. This message is more descriptive than the message displayed in the cell, but it still may not provide enough information to correctly diagnose the problem. For fuller explanations, consult the following tables and the Help topic, *Error Codes in LibreOffice Calc*.

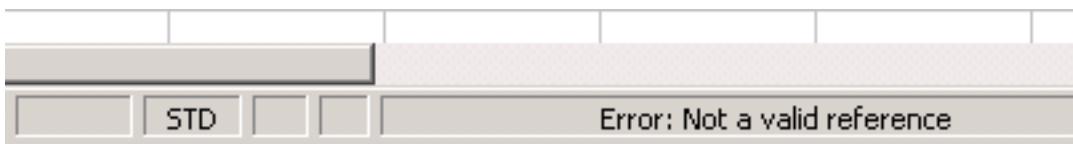


Figure 353: An error message displayed in the status bar.

This appendix presents error codes in two tables. This first table explains error messages which are displayed within the cell that actually contains the error. Except in the case of the #### error, they all correspond to a Calc error code number. The second table explains all of the error codes, listed by code number, including those errors codes in the first table.

Error codes displayed within cells

Cell error	Code	Explanation of the error
###	N/A	The column is too narrow to display the complete formatted contents of the cell. This is not really an error value, so there is no corresponding numerical error code. The solutions to this problem are to increase the width of the column, or select Format → Cells → Alignment and click either <i>Wrap text automatically</i> or <i>Shrink to fit cell size</i> to make the text match the current column width.
Err502	502	Function argument is not valid, or more than one matching cell is found by the DGET function.
#NUM!	503	A calculation resulted in an overflow of the defined value range.
#VALUE	519	The formula within the cell returns a value that does not correspond to the definition of the formula or functions used. This error could also mean that the cell referenced by the formula contains text instead of a number.
#REF!	524	The formula within the cell uses a reference that does not exist. Either a column or row description name could not be resolved, or the column, row, or sheet that contains a referenced cell is missing.
#NAME?	525	An identifier could not be evaluated: no valid reference, no valid domain name, no column/row label, no macro, incorrect decimal divider, add-in not found. For example, entering in a cell =sum(bob*5) where there is no cell named "bob" or containing the text "bob" generates this error.
#DIV/0!	532	Division operator / if the denominator is 0. Some more functions return this error; see next table for details.

General error codes

The following table is an overview of the most common error messages for LibreOffice Calc.

Note	Errors described as <i>Internal errors</i> should not be encountered by users under normal conditions. Errors listed as <i>Not used</i> are not currently assigned to any error condition and will not occur.	
Code	Message	Explanation of the error
501	Invalid character	Character in a formula is not valid. This error is the same as the <i>Invalid Name</i> error (525) except that it occurs within a formula. The cell containing the error will display the #NAME? error reference.
502	Invalid argument	Function argument is not valid; for example, a negative number for the root function. This error also occurs if more than one matching cell is found by the DGET function.
503	Invalid floating point operation (cell displays #NUM!)	Division by 0, or another calculation that results in an overflow of the defined value range (a value too big or too small).
504	Parameter list error	Function parameter is not valid; for example, text instead of a number, or a domain reference instead of a cell reference.
505	Internal syntax error	Not used.
506	Invalid semicolon	Not used.
507	Pair missing	Not used.
508	Pair missing	Missing bracket or parenthesis; for example, closing brackets but no opening brackets.
509	Missing operator	Operator is missing; for example, "=2(3+4) * ", where the operator between "2" and "(" is missing.
510	Missing variable	Variable is missing; for example, when two operators are together "=1+*2".
511	Missing variable	Function requires more variables than are provided; for example, AND() and OR().
512	Formula overflow	The total number of internal tokens (that is, operators, variables, brackets) in the formula exceeds 512, or the total number of matrices the formula creates exceeds 150. This includes basic functions that receive too large an array as a parameter.
513	String overflow	An identifier in the formula exceeds 64 KB in size, or a result of a string operation exceeds 64 KB in size.
514	Internal overflow	Sort operation attempted on too much numerical data (max. 100000) or a calculation stack overflow.

Code	Message	Explanation of the error
515	Internal syntax error	Not used.
516	Internal syntax error	Matrix is expected on the calculation stack, but is not available.
517	Internal syntax error	Unknown error; for example, a document with a newer function is loaded in an older version of Calc that does not contain the function.
518	Internal syntax error	Variable is not available.
519	No result (cell displays #VALUE)	Formula yields a value that does not correspond to the definition, or a cell that is referenced in the formula contains text instead of a number.
520	Internal syntax error	Compiler creates an unknown compiler code.
521	Internal syntax error	No result.
522	Circular reference	Formula refers directly or indirectly to itself and the Iterations option is not selected under Tools → Options → LibreOffice Calc → Calculate .
523	The calculation procedure does not converge	Financial statistics function missed a targeted value, or iterations of circular references do not reach the minimum change within the maximum steps that are set.
524	Invalid references (cell displays #REF!)	A column or row description name could not be resolved, or the column, row, or sheet that contains a referenced cell is missing.
525	Invalid names (cell displays #NAME?)	An identifier could not be evaluated; for example, no valid reference, no valid domain name, no column/row label, no macro, incorrect decimal divider, add-in not found.
526	Internal syntax error	Obsolete, no longer used, but could come from old documents if the result is a formula from a domain.
527	Internal overflow	References, such as when a cell references a cell, are too encapsulated or deeply nested. This is an internal error and should not be displayed in LibreOffice.
528– 531	—	Not used.
532	Division by zero	Division operator / if the denominator is 0. Some more functions return this error; for example: VARP with less than 1 argument STDEVP with less than 1 argument VAR with less than 2 arguments STDEV with less than 2 arguments STANDARDIZE with stdev=0 NORMDIST with stdev=0

Index

3

3D chart
appearance 80
area chart 89
bar chart 87
elements 72
formatting 79
illumination 81
line chart 90
moving elements 78
pie chart 88
rotation and perspective 79
rotation, interactive 82
types 70

A

absolute reference 163
advanced functions 185
anchor, visible 343
anchoring of objects 129
appearance of 3D chart 80
appearance options 336
Apply Style list 14, 99
area charts 89
arguments 366
arguments in functions 170
arithmetic operators 157
array functions 394
arrow keys
 navigating within spreadsheets 26
assign styles to shortcut keys 99
auto filters 314
AutoCorrect
 options 348
AutoCorrect changes 44
AutoInput 44
automatic changes, deactivating 44
automatic saving 21
axes labels 70

B

background
 cell styles 101
bar charts 87
Base
 editing data sources 268
borders
 cell styles 101
bubble charts 91

C

Calc options
 calculate 344
 case sensitive 345

changes 347
dates 345
grid 347
grid lines, viewing 343
guides while moving 343
handles 343
input settings 341
iterative references 345
page breaks, visible 343
screen display 343
sort lists 346
unit of measurement 341
updating links 341
Zoom 344
calculation options 344
calculation order 165
calculations
 linking sheets 165
case sensitive sorting 61
cell alignment and orientation 54
cell protection 101
cell styles
 alignment options 101
 applying 98
 background 101
 border options 101
 description 96, 97
 Fill Format mode 98
 font effects 101
 font options 101
 linked with 101
 numbers 101
cells
 description 10, 15
 focus 25
 hiding and showing 58
 information on status bar 17
 range 28
 selecting 28
 validating contents 47
changes
 accepting or rejecting 284
 adding comments 280
 editing comments 281
 options 347
 recording 279
 reviewing 283
 viewing 283
chart
 appearance of 3D 80
 area 72
 area background 78
 colors 79
 creating 68
 data labels 74, 83

editing 72
formatting 77
formatting 3D 79
graphic background 79
grids 71
illumination of 3D 81
interactive 3D rotation 82
mean value lines 76
moving elements 78
perspective 79
Position and Size dialog 85
resizing 85
rotation 79
titles 71
trend lines 75
types 86
wall 72
Y error bars 76
chart elements 72
chart type 70, 72
Chart wall 72
Chart Wizard 69
collaboration 276
color coding for input 178
color options 333
Color toolbar 121
column and line charts 94
column charts 86
columns
 deleting 31
 freezing 34
 hiding and showing 58
 inserting 30
 selecting 29
comma separated values (CSV) 20, 23
comments
 adding 281
 editing 282
 finding 283
 formatting 283
comments on changes
 adding 280
 editing 281
comparative operators 158
comparing documents 286
concatenation operator 161
consolidating data 234
create document from template 106
creating new spreadsheets 17
cropping 121
CSV files 20, 23
custom sort order 62
customizing
 Enter key 27
 keyboard shortcuts 354
 menus 349
 toolbars 352

D

dashes, entering 43
data analysis
 consolidating data 234
 DataPilot 188
 Goal Seek 246
 introduction 234
 Multiple Operations tool 241
 scenarios 237
 Solver 247
 subtotals 236
data entry
 keyboard 42
 speeding up 44
data labels on charts 74, 83
data ranges 70
data series 71
data source
 data to text 269
 editing 268
 editing using Base 268
 linking 266
 registering 266
 using in OOo documents 268
 viewing 268
data to text 269
database functions 392
database range 310
DataPilot
 cell formatting 225
 change layout 217
 data fields 212
 data sources 208
 dialog 209
 examples of use 188
 filter 224
 GETPIVOTDATA 228
 group date or time values 218
 group rows or columns 217
 group scalar values 217
 group without intervals 219
 multiple data fields 225
 page fields 217
 preconditions 207
 refresh 224
 row or column fields 213
 shortcuts 228
 sort results 221
 starting 208
date conversion, automatic 44
date functions 387
dates and times, entry 43
DDE link
 description 272
 in Calc 273
 in Writer 273
default template 110
deleting

columns and rows 31
sheets 32
Detective 178
digital rights management (DRM) 149
digital signature 152
digital signature
 status bar indicator 17
docking/floating windows 13
documents
 comparing 286
 merging 285
drag and drop 115
drag mode 38
drawing object properties 127
Drawing Object Properties toolbar 127
drawing objects
 grouping 128
 properties 127
 resizing 128
Drawing toolbar 127
drawing tools 125
Dynamic Data Exchange (DDE) 272

E

e-mailing
 Calc document as attachment 151
 several recipients 151
editing data
 changing part of data in a cell 50
 removing data from a cell 49
 replacing data in a cell 50
en and em dashes 43
Enter key 27
EPS images in PDF 145
Err:503 Division by zero 177
error codes
 common messages 408
 displayed within cells 407
 introduction 406
error messages 176, 180
error-checking formulas 154
errors, finding and fixing 176
EuroOffice Solver 249
export directly as PDF 145
exporting to PDF 145
Extension Manager 109
extensions
 installing 356
 introduction 356
 Professional Template Pack 357
 Solver for Nonlinear Programming 357
External Data dialog 262

F

FDF 146
features 10
file sharing options 334
Fill Format mode 98

fill series
 adding 45
 defining 46
Fill tool 44
filled net charts 92
filtering 313
filters
 advanced 317
 auto 314
 standard 314
financial analysis functions 370
find and replace
 cell styles 64
 Find & Replace dialog 63
 formulas or values 63
 text 64
 wildcards 64
fixed values 154
floating toolbars 12
focus 25
formatting
 chart 77
 data labels 83
 symbols 84
formatting
 autoformatting 56
 cell background 55
 cell borders 55
 conditional 57
 themes 57
formatting data
 font 53
 font effects 53
 manual line breaks 51
 multiple lines of text 51
 numbers 52
 shrinking data to fit cell 52
 wrapping 51
Formatting toolbar 14
formula bar 14
formulas
 absolute reference 163
 breaking into parts 175
 calculation examples 155
 concatenation operator 161
 definition 154
 intersection operator 162
 operator types 157
 operators in 155
 range operator 160
 relative reference 162
 strategies for creating 174
 using the Basic editor to create 176
Function List 171
Function Wizard 15, 172
functions
 add-in 402
 ADDRESS 325
 arguments 170, 300, 366

array 394
basic arithmetic 180
CEILING 183
CONCATENATE 158
COUNTIF 184, 321
database 320, 392
date and time 387
date formats 370
definition 154
description 154
entering 155
examples 180
financial analysis 370
FLOOR 183
HLOOKUP 323
INDEX 327
INDIRECT 326
informational 390
logical 390
LOOKUP 324
macros 294
MATCH 324
mathematical 366
MROUND 183
nested 171
OFFSET 326
overview 169
ROUND 183
ROUNDDOWN 183
ROUNDUP 183
simple statistics 181
spreadsheet 395
statistical analysis 380
structure 170
SUBTOTAL 322
SUMIF 321
terminology 366
text 399
VLOOKUP 323

G

Gallery
 Hide/Show button 117
 opening 117
GETPIVOTDATA function 228
Goal Seek 246
graphic filters 120
graphics
 adding 114
 anchoring 129
 arrangement 128
 linking 115
 positioning 128
 resizing 122
 transparency 121
graphics mode 120
grid
 options 347

grid lines, viewing 343
grids in charts 71
guides while moving 343

H

headers and footers 103
Hide/Show button 117
hiding and showing data 58
HTML compatibility 339
hyperlinks
 absolute 259
 creating 259
 Ctrl-click to activate 335
 editing 261
 relative 259
 removing 261

I

illumination of 3D chart 81
image map 130
images
 adding 114
 context menu 123
 cropping 121
 embedding 116
 inserting from file 114
 inserting from the clipboard 117
 inserting from the Gallery 117
 linking 115
 modifying 118
 resizing 122
 rotating 123
informational functions 390
input settings options 341
insert mode 16
Insert Picture dialog 114
inserting
 columns and rows 30
 sheets 31
interest rates 370
intersection operator 162

K

keyboard data entry 42
keyboard keys
 navigating within spreadsheets 26
keyboard shortcuts
 arrow keys 362
 assigning 354
 cell formatting 362
 customizing 354
 DataPilot 363
 function keys 361
 introduction 360
 loading from a file 356
 navigation 360
 resetting to default values 356
 saving to a file 356

selection 360

L

layout settings
format 102
page layout 102
table alignment 102
legend of chart 71
line charts 90
linking to external data
External Data dialog 262
find required range 264
Navigator 263
load Basic code to edit 338
load/save options 337
logical functions 390

M

macro recorder 290
macro security options 335
macros 356
macros
accessing cells directly 300
arguments 299
arguments in functions 300
as Calc functions 294
introduction 290
organizing 294
recording 290
sorting data 302
main window, description 10
manual line breaks 51
margins 102
mathematical functions 366
mean value lines 76
menu bar 11
menu font, customizing 349
menus
adding commands 351
creating 350
customizing 349
modifying 350
modifying entries 352
merging documents 285
Microsoft Excel 22
Microsoft Office file conversion 338
moving chart elements 78
moving from sheet to sheet 27
Multiple Operations tool 241
multiple sheets
introduction 252
setting up 252

N

named range 307
navigating within spreadsheets
cell reference 25
focus 25

keyboard 26
methods 25
Navigator 25, 36
scenarios 240
nested functions 171
net charts 92
nonlinear programming solver 249
numbers
entering in spreadsheet cell 42
numbers, data entry 42

O

Object Linking and Embedding (OLE) 270
ODF plugin (Sun) 21
OLE object
linked 272
non-linked 272
other (Windows) 271
OpenDocument Format 337
opening spreadsheets 19
order of calculation 165
outline group controls 59
overlining 53
OXT extension 109

P

page breaks, visible 343
page style on status bar 16
page styles
applying 99
background 103
borders 103
description 96, 97
options 101
sheet settings 103
paper format 102
password protection 23
password-protect PDF 149
PDF
blank page export 147
digital rights management (DRM) 149
embed standard fonts 147
encrypt 149
EPS 145
export documents to 145
form 146
image compression and resolution 145
initial view selection 147
pages to export 145
password-protect 149
security settings 149
tagged 146
user interface settings 147
PDF Options dialog 145
PDF/A-1 145
perspective of chart 79
picture context menu 123
Picture toolbar 118

pictures
linking 115
resizing 122
transparency 121
pie charts 87
Position and Size dialog for chart 85
Position and Size of graphics 123
precision 345
prepare document for review 278
print file directly 134
print options 333
printer metrics 342
printing
choosing what to print 134
general options 135
multiple pages per sheet 135
page orientation 135
selecting what to print 136
Professional Template Pack 357
Properties dialog 39
protect a document 278

Q

Quickstarter
Windows 17

R

range
database 310
named 307
range operators 160
record changes 278
reference operators 160
references in color 344
referencing
other spreadsheets 257
sheets 255
regular expressions 64
enable in formulas 346
in functions 184
relative reference 162
relief options 54
remove personal information on saving 335
removing data from a cell 49
renaming
sheets 32
replacing data in a cell 50
resolution options 348
rotating images 123
rotation
chart 79
rounding methods 183
rounding off numbers 182
rows
deleting 31
freezing 34
hiding and showing 58
inserting 30

selecting 29

S

save original Basic code 338
saving AutoRecovery info 21
saving spreadsheets
as CSV file 23
as HTML 23
methods 21
to Microsoft Excel format 21
scatter charts 91
scenarios 237
security 23
selecting
cells 28
columns and rows 29
sheets 30
selection list 47
selection mode indicator 16
send document as e-mail 151
shared extension 357
shared spreadsheet
introduction 276
opening 277
saving 277
setting up 276
sheet tabs 15
sheets
deleting 32
description 10
hiding and showing 58
identifying 252
inserting 31, 252
inserting from other spreadsheets 254
navigating 27
referencing 255
renaming 32, 254
searching 62
selecting 30
sequence number 16
sharing content 47
shrinking data to fit cell 52
size optimization 337
snap grid 347
Solver 247
Solver for Nonlinear Programming 249, 357
sort lists
options 346
sorting 312
sorting
using macros 302
sorting records
case sensitive 61
method 60
options 61
special characters 43
splitting the screen 35
spreadsheet

create from template 106
update from changed template 108
spreadsheet functions 395
spreadsheets
 comparing 286
 creating new 17
 description 10
 documentation, internal 154
 embedding 269
 identifying copies 279
 merging 285
 opening 19
 opening shared spreadsheet 277
 saving 21
 saving as CSV 23
 saving as Microsoft Excel 21
 saving shared 277
 setting up sharing 276
 sharing 276
statistical analysis functions 380
status bar 16
stock charts 93
strikethrough 54
Style dialog 103
style organizer 100
styles
 accessing 97
 assign to shortcut keys 99
 assigning to shortcut keys 355
 cell 97
 copy 104
 create by drag and drop 104
 create from selection 104
 create using Style dialog 103
 delete 106
 description 96
 linking 103
 modifying 100
 move 104
 organizer 100
 page 97, 99
 types supported 96
Styles and Formatting window 98
subtotals 236
synchronize axes 348
system font 349

T

tear-off toolbars 12
template
 associate spreadsheet with different template 111
 create spreadsheet from 106
 delete 112
 delete folder 111
 description 96
 edit 107
 export 112

Extension Manager 109
folder 111
import 112
move 112
organize 111
reset default 110
set custom template as default 110
update document styles from 108
text functions 399
text operators 158
text overflow 343
text, data entry 42
time functions 387
title bar 10
titles of charts 71
toolbars 11
 adding commands 353
 choosing icons for commands 353
 creating 353
 description 12
 tooltip 12
track changes 278
transparency 121
trend lines 75

U

underlining 53
unsaved changes indicator 17
URL Recognition 259
user data options 332
user interface, customizing 349

V

validating cell contents 47
value highlighting 343
VBA properties load/save options 338
versions
 saving 287
viewing Calc 33
viewing data
 filtering 60
 hiding and showing 58
 outline group controls 59
visible grid 348

W

wall of chart 72
wildcards 64

X

XML 337
XY charts 91

Y

Y error bars 76

Z

zoom

dialog 33
slider 17

#

#REF! Incorrect references 178
#VALUE Non-existent value 178