LibreOffice
Community

LibreOffice Documentation Team

Calc Guide



7.5

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Note

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Calc Guide 7.5

Preface

Who is this book for?

This book is for beginner to advanced users of Calc, the spreadsheet component of LibreOffice. You may be new to spreadsheet software, or you may be familiar with another program. If you have never used LibreOffice before, or you want an introduction to all of its components, you might like to read the *Getting Started Guide* first. If you have never used spreadsheets before, you might also like to read a book or find some tutorials about the use of spreadsheets.

What's in this book?

This book introduces the features and functions of LibreOffice Calc. It is not a tutorial on using spreadsheets. Some chapters assume familiarity with basic spreadsheet usage when describing how to use Calc.

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 all of the data. Functions can be used to create formulas to perform complex calculations on data.

Some of the other features provided by Calc include:

- Database functions, to arrange, store, and filter data.
- Data statistics tools, to perform complex data analysis.
- Dynamic charts: a wide range of 2D, 3D charts and sparklines
- Ability to open, edit, and save Microsoft Excel and other spreadsheets.
- Import and export of spreadsheets from multiple formats, including HTML, CSV, and Data Interchange Format.

Where to get more help

This book, the other LibreOffice user guides, the built-in Help system, and user support systems assume that you are familiar with your computer and basic functions such as starting a program, opening and saving files.

Help system

LibreOffice comes with an extensive online Help system. This is the first line of support for using LibreOffice. Windows and Linux users can choose to download and install the offline Help for use when not connected to the Internet; the offline Help is installed with the program on macOS.

To display the Help system, press `F1` or select **Help > LibreOffice Help** from the Menu bar (Figure 1). If you do not have the offline help installed on your computer and you are connected to the Internet, your default browser will open the online Help pages on the LibreOffice website.

The Help menu includes links to other LibreOffice information and support facilities.

Note

The following options indicated by a ‡ symbol are only accessible if your computer is connected to the Internet.

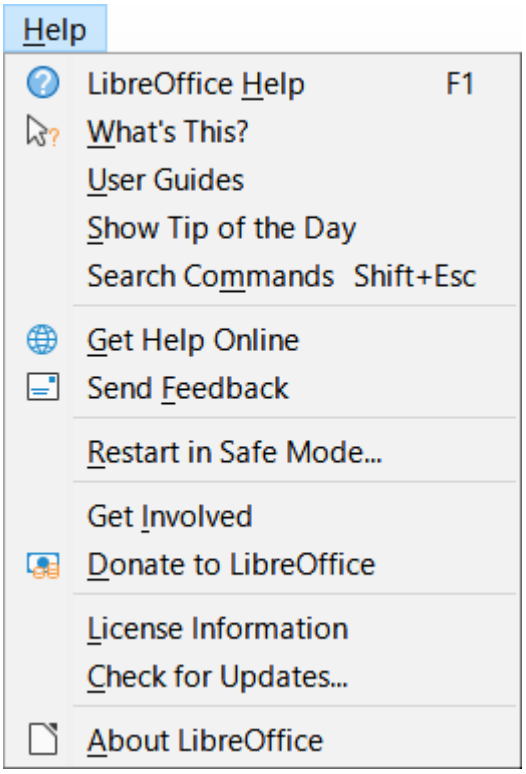


Figure 1: The Help menu

- **What's This?** – For quick tips when a toolbar is visible, place the mouse pointer over any of the icons to see a small box ("tooltip") with a brief explanation of the icon's function. For a more detailed explanation, select **Help > What's This?** and hold the pointer over the icon. In addition, you can choose whether to activate extended tips using **Tools > Options > LibreOffice > General > Extended tips**.
- **User Guides**‡ - Opens your default browser at the English Documentation page of the LibreOffice website https://documentation.libreoffice.org/en/english-documentation/. There you will find copies of User Guides and other useful information.
- **Show Tip of the Day** - Opens a dialog showing a useful bit of information to help expand your knowledge of LibreOffice.
- **Search Commands** – Opens a dialog where you can search for commands that are present in the main menu and then run a selected command. More information about this facility can be found in Chapter 1, Introduction.
- **Get Help Online**‡ - Opens your default browser at the Ask LibreOffice forum of questions and answers from the LibreOffice community https://ask.libreoffice.org/en/questions/.
- **Send Feedback**‡ – Opens your default browser at the Feedback page of the LibreOffice website https://community.documentfoundation.org/c/documentation/loguides/. From there you can report bugs, suggest new features, and communicate with others in the LibreOffice community.
- **Restart in Safe Mode** - Opens a dialog where you can restart LibreOffice and reset the software to its default settings.
- **Get Involved**‡ - Opens your default browser at the Get Involved page of the LibreOffice website https://www.libreoffice.org/community/get-involved/. There you can choose a topic of interest to help improve the program.
- **Donate to LibreOffice**‡ - Opens your default browser at the Donation page of the LibreOffice website https://donate.libreoffice.org/.

- **License Information** – Outlines the licenses under which LibreOffice is made available.
- **Check for Updates**‡ – Opens a dialog and checks the LibreOffice website for updates to your version of the software.
- **About LibreOffice** – Opens a dialog, which displays information about the version of LibreOffice and the operating system you are using. This information will often be requested if you ask the community for help or assistance with the software. A button is provided to enable you to copy this information to the clipboard so that you can subsequently paste it into a forum post, an email, or a bug report.

Other free online support

The LibreOffice community not only develops software, but provides free, volunteer-based support. In addition to the Help menu links above, there are other online community support options available, see Table 1.

Table 1: Free LibreOffice support

FAQs	Answers to frequently asked questions https://wiki.documentfoundation.org/Faq
Mailing lists	Free community support is provided by a network of experienced users https://www.libreoffice.org/get-help/mailing-lists/
Forum	As in the mailing lists above, but through forum https://community.documentfoundation.org/
Questions & Answers and Knowledge Base	Free community assistance is provided in a question and answer formatted web service. Search similar topics or open a new one in https://ask.libreoffice.org/c/english/5 The service is available in several other languages; click on the language button to open a dialog for language selection.
Native language support	The LibreOffice website in various languages https://www.libreoffice.org/community/nlc/ Mailing lists for native languages https://wiki.documentfoundation.org/Local_Mailing_Lists Information about social networking https://wiki.documentfoundation.org/Website/Web_Sites_services
Accessibility options	Information about available accessibility options https://www.libreoffice.org/get-help/accessibility/

Paid support and training

You can also pay for support through service contracts from a vendor or consulting firm specializing in LibreOffice. For information about certified professional support, see The Document Foundation's website: https://www.documentfoundation.org/gethelp/support/.

What you see may be different

Illustrations

LibreOffice runs on Windows, Linux, and macOS operating systems, each of which has several versions and can be customized by users (fonts, colors, themes, window managers). The illustrations in this guide were taken from a variety of computers and operating systems. Therefore, some illustrations will not look exactly like what you see on your computer display.

Also, some of the dialogs may be different because of the settings selected in LibreOffice. You can either use dialogs from your computer's operating system or from LibreOffice. The differences affect mainly Open, Save, and Print dialogs. To change which dialogs are used, go to **Tools > Options > LibreOffice > General** and select or deselect the option **Use LibreOffice dialogs**.

Icons

The LibreOffice community has created icons for several icon sets: Colibre, Breeze, Breeze Dark, Elementary, Karasa Jaga, Sifr, Sifr Dark, and Sukapura. Each user can select a preferred set. The icons in this guide have been taken from a variety of LibreOffice installations that use different sets of icons. The icons for some of the many tools available in LibreOffice may then differ from the ones used in this guide.

To change the icon set used, go to **Tools > Options > LibreOffice > View**. Choose from the drop-down list under *Icon Style*.

Note

The Galaxy, Oxygen, and Tango icon sets are no longer included as part of the standard installation package. They can be added back by downloading and installing the following extensions:
https://extensions.libreoffice.org/extensions/galaxy-icon-theme
https://extensions.libreoffice.org/extensions/oxygen-icon-theme
https://extensions.libreoffice.org/en/extensions/show/tango-icon-theme-for-libreoffice
Some of the previously included gallery backgrounds are now only available as an extension from:
https://extensions.libreoffice.org/extensions/legacy-gallery-backgrounds

Using LibreOffice on macOS

Some keystrokes and menu items are different on macOS from those used in Windows and Linux. Table 2 gives some common substitutions for the instructions in this document. For a more detailed list, see the application Help and Appendix A, Keyboard Shortcuts, to this guide.

Table 2: Example keystrokes for different environments

Windows or Linux	*macOS equivalent*	*Effect*
Tools > Options menu selection	**LibreOffice > Preferences**	Access setup options
Right-click	*Control*+click and/or right-click depending on computer setup	Open a context menu
Ctrl (Control)	⌘ (Command)	Used with other keys
F11	⌘*+T*	Open the Styles deck in the Sidebar

What are all these things called?

The terms used in LibreOffice for most parts of the user interface (the parts of the program you see and use, in contrast to the behind-the-scenes code that actually makes it work) are the same as for most other programs.

A dialog is a special type of window. Its purpose is to inform you of something, or request input from you, or both. It provides controls to use to specify how to carry out an action. The technical names for common controls are shown in Figure 2. In most cases the technical terms are not used in this book, but it is useful to know them because the Help and other sources of information often use them.

In most cases, you can interact only with the dialog (not the document itself) as long as the dialog remains open. When you close the dialog after use (usually, clicking **OK** or another button saves your changes and closes the dialog), then you can again work with your document.

Some dialogs can be left open as you work, so you can switch back and forth between the dialog and your document. An example of this type is the Find and Replace dialog.

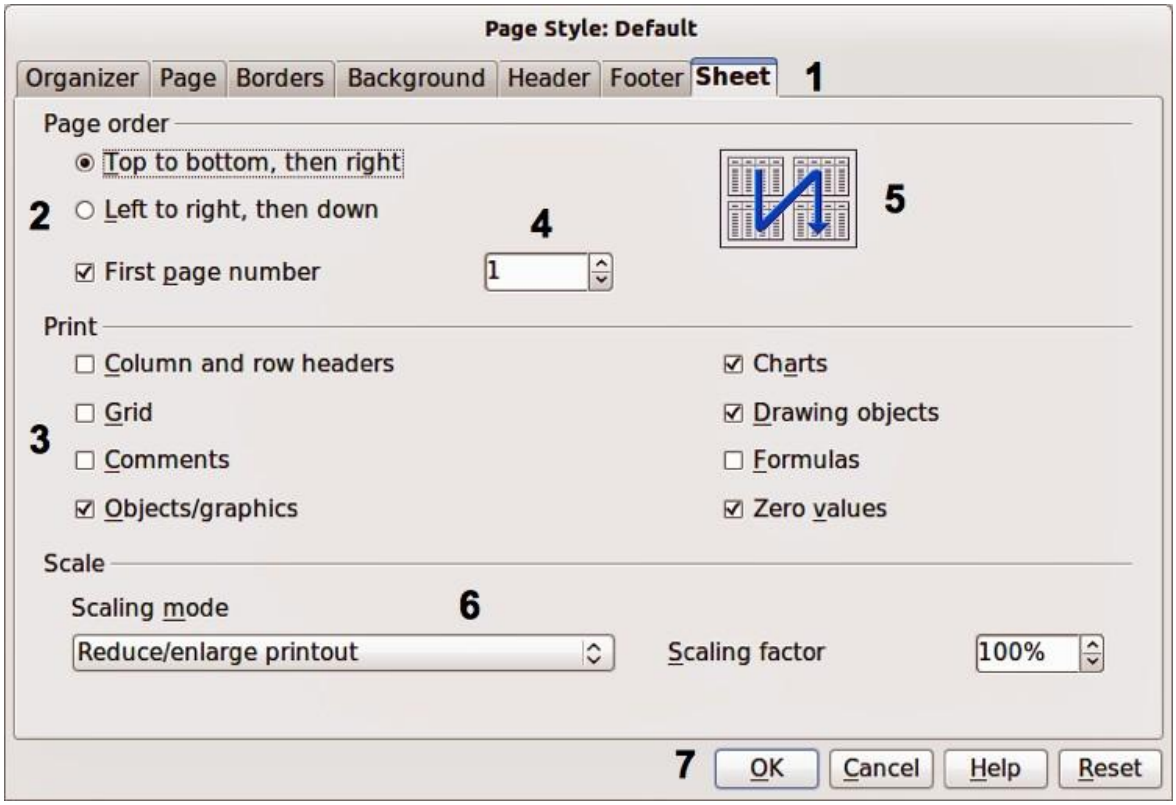


Figure 2: Dialog showing common controls

1) Tabbed page (not strictly speaking a control).
2) Radio buttons (only one can be selected at a time).
3) Checkbox (more than one can be selected at a time).
4) Spin box (click the up and down arrows to change the number shown in the text box next to it, or type in the text box).
5) Thumbnail or preview.
6) Drop-down list from which to select an item.
7) Push buttons.

Frequently asked questions

How is LibreOffice Licensed?

LibreOffice is distributed under the Open Source Initiative (OSI) approved Mozilla Public License (MPL). See https://www.libreoffice.org/about-us/licenses/.

It is based on code from Apache OpenOffice made available under the Apache License 2.0 but also includes software that differs from version to version under a variety of other Open Source licenses. New code is available under GNU Lesser General Public License (LGPL) 3.0 and MPL 2.0.

May I distribute LibreOffice to anyone? May I sell it? May I use it in my business?
Yes.

How many computers may I install it on?
As many as you like.

Is LibreOffice available in my language?
LibreOffice has been translated (localized) into over 100 languages, so your language is probably supported. Additionally, there are over 100 spelling, hyphenation, and thesaurus dictionaries available for languages, and dialects that do not have a localized program interface. The dictionaries are available by selecting the Dictionary tag filter from the LibreOffice Extension Center https://extensions.libreoffice.org/.

How can you make it for free?
LibreOffice is developed and maintained by volunteers and has the backing of several organizations.

Why do I need Java to run LibreOffice? Is it written in Java?
LibreOffice is not written in Java; it is mostly written in the C++ language. Java is one of several languages that can be used to extend the software. The Java JRE (Java Runtime Environment) is only required for some features. The most notable one is the HSQLDB relational database engine used by the Base component of LibreOffice. For Calc, Java is needed to run some of the solver engines described in Chapter 10, Data Analysis.

Java is available at no cost. More information and download links to the appropriate edition for your operating system can be found at:
https://java.com/en/download/manual.jsp.

Note

If you want to use LibreOffice features that require Java it is important that the correct 32 bit or 64 bit edition matches the installed version of LibreOffice.

How can I contribute to LibreOffice?
You can help with the development and user support of LibreOffice in many ways, and you do not need to be a programmer. To start, check out this webpage:
https://whatcanidoforlibreoffice.org .

May I distribute the PDF of this book, or print and sell copies?
Yes, as long as you meet the requirements of one of the licenses in the copyright statement at the beginning of this book. You do not have to request special permission. We request that you share with the project some of the profits you make from sales of books, in consideration of all the work we have put into producing them.

Donate to LibreOffice: https://www.libreoffice.org/donate/.

What's new in LibreOffice Calc 7.5 Community?

Information about the LibreOffice 7.5 Community release can be found in this announcement:
https://blog.documentfoundation.org/blog/2023/02/02/tdf-announces-libreoffice-75-community/

This user guide has been updated from Calc Guide 7.4. Significant changes include:

- Cell input with leading ' apostrophe in cells that are not formatted as Text was changed to always strip the first apostrophe and force the remainder as text content. Previously, the user had to know (or guess) whether an input could be converted to a numeric type (number, date, ...) and prefix only that to force text, but not prefix a textual type that could not be converted, which was confusing and bad UX. The handling is not changed for cells already formatted as Text, where every input is continued to be accepted literally as content and a leading apostrophe is not removed
- Conditional formatting's **begins-with**, **ends-with**, **contains** are now case-insensitive like the rest of the conditions were
- Preserve tab characters and line-breaks in cell contents
- Searching for a term in the Function Wizard now matches the function descriptions as well as their names,
- Number format dialog windows of Calc and Writer got default NatNum12 ("spell out") format codes.
- Data tables are now supported in Charts.

Other improvements or enhancements to this version include:

- New set of application and mime types icons



Figure 3: New Application Icons: standard (apps), standard (mime types), macOS specific.

- Support for dark and high contrast operating system themes on Windows, macOS and Linux was greatly improved
- The Start Center can now filter recent documents by type.

Full Release Notes for versions 7.4 and 7.5 can be found at:

7.4 : https://wiki.documentfoundation.org/ReleaseNotes/7.4

7.5 : https://wiki.documentfoundation.org/ReleaseNotes/7.5

What's new in this Guide

The Calc Guide 7.5has been updated with the following contents:

Chapter 1: Update on document properties.

Chapter 2: Autofilter update with color filtering and more.

Chapter 3: Added chart data table

Chapter 4: moved topic on Themes to chapter 5, notes on AutoFormat,

Chapter 5: Spreadsheet Themes and styles.

Chapter 6: precision on anchor for grouped objects

Chapter 8: precision on implicit array formulas



Calc Guide 7.5

Chapter 1 Introduction

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.
- Data statistics tools, to perform complex data analysis.
- Dynamic charts, including 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 Data Interchange Format.

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. For more information, see Chapter 13, Macros, in this guide or Chapter 13, Getting Started with Macros, in the *Getting Started Guide*.

Spreadsheets, sheets, and cells

Calc works with documents 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 up to 10,000 sheets and each sheet can have a maximum of 1,048,576 rows and 16,384 columns.

Calc main window

When Calc is started, the main window opens (Figure 4). The various parts of this display are explained below.

Note

By default, Calc's commands are grouped in menus and toolbars, as described in this section. In addition, Calc provides other user interface variations, displaying contextual groups of commands and contents. For more information, see Chapter 16, User Interface Variants.

Note

If any part of the Calc window in Figure 4 is not shown, you can display it using the **View** menu. For example, **View > Status Bar** on the Menu bar will toggle (show or hide) the Status Bar. It is not always necessary to display all of the parts shown; you can show or hide any of them as desired.

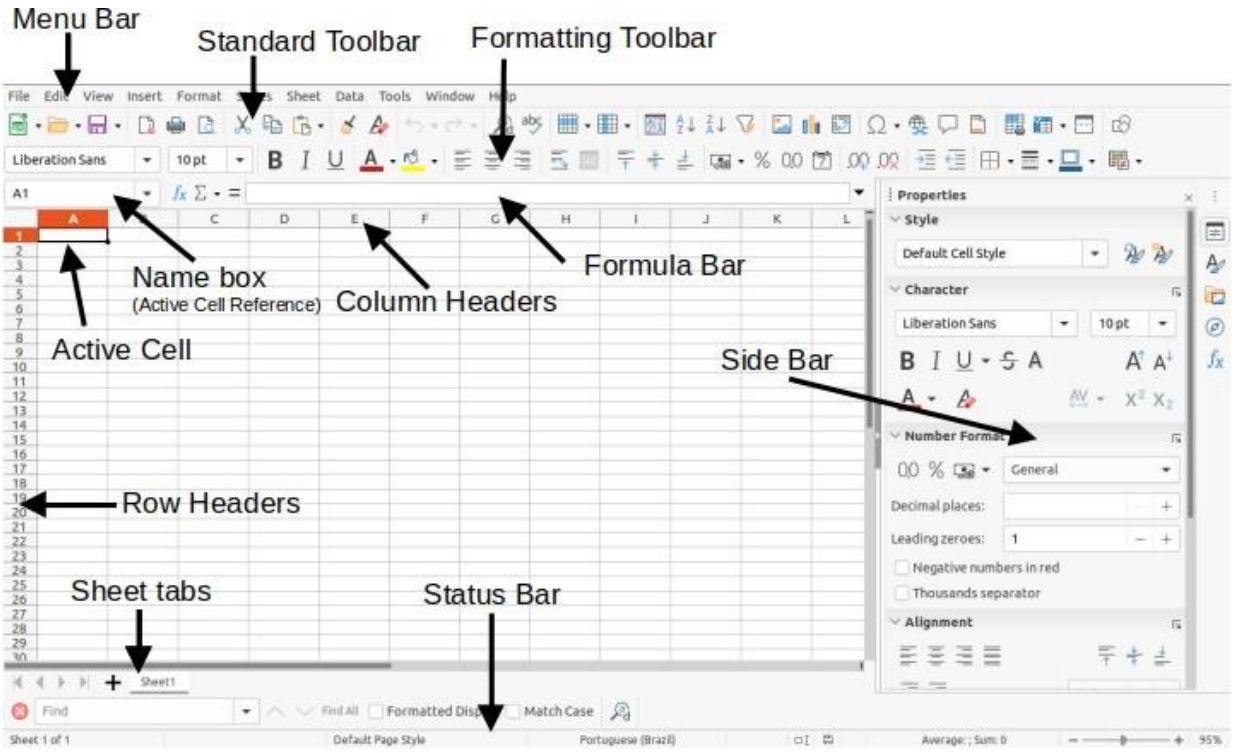


Figure 4: Calc main window

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.

Menu bar

Under the Title bar is the Menu bar. When you choose one of the menus, a list of options appears. You can also modify the Menu bar, as explained in Chapter 15, Setting up and Customizing.

- **File** – contains commands that apply to the entire document, such as **Open**, **Save**, **Wizards**, **Export as PDF**, **Print**, **Digital Signatures**, **Templates**.
- **Edit** – contains commands for editing the document, such as **Undo**, **Copy**, **Find and Replace**, **Track Changes**.
- **View** – contains commands for modifying how the Calc user interface looks, such as **Toolbars**, **View Headers**, **Full Screen**, **Zoom**.
- **Insert** – contains commands for inserting elements into a spreadsheet, such as **Image**, **Chart**, **Text Box**, **Headers and Footers**.

- **Format** – contains commands for modifying the layout of a spreadsheet, such as **Cells**, **Page Style**, **AutoFormat Styles**, **Align Text**.
- **Styles** – contains options for applying and managing styles, such as **Heading 1**, **Footnote**, **Manage Styles**.
- **Sheet** – contains commands for inserting and deleting elements and modifying the entire sheet, such as **Delete Rows**, **Insert Sheet**, **Rename Sheet**, **Navigate**.
- **Data** – contains commands for manipulating data in your spreadsheet, such as **Define Range**, **Sort**, **AutoFilter**, **Consolidate**, **Statistics**.
- **Tools** – contains functions to help check and customize a spreadsheet, for example **Spelling**, **Share Spreadsheet**, **Macros**, **Options**.
- **Window** – contains two commands; **New Window** and **Close Window**. Also shows all open windows in other LibreOffice applications.
- **Help** – contains links to **LibreOffice Help** (included with the software), **User Guides**, and other miscellaneous functions; for example **Restart in Safe Mode**, **License Information**, **Check for Updates, About LibreOffice**.

The scope of the Menu bar can be daunting for some people and even experienced users can forget where to look for rarely used functions. To quickly locate and run a command in the Menu bar, select **Help > Search Commands** or press *Shift*+*Esc*. Calc displays the dialog shown in Figure 5.

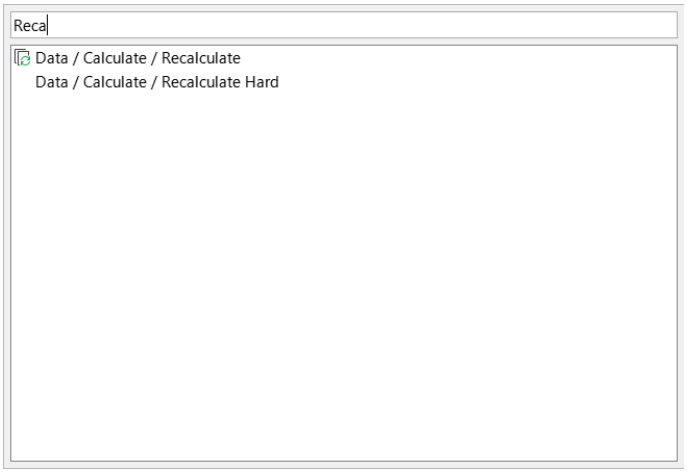


Figure 5: Search Commands dialog

In the above example the pop-up is used to search for the available recalculate options, which appear in the lower area as soon as the letters “Reca” are typed in the upper area. The required option is run by clicking on it, or by using the arrow buttons on the keyboard to move through the options and then pressing the *Enter* key.

Toolbars

The default setting when Calc opens is for the Standard and Formatting toolbars to be docked at the top of the workspace (Figure 4).

Calc toolbars can be either docked (fixed in place), or floating, allowing you to move a toolbar to a more convenient location on your workspace. Docked toolbars can be undocked and moved to a different docked location or become floating toolbars. Likewise, floating toolbars can be docked.

The initial default is for all displayed toolbars to be locked in their docked positions. An individual toolbar can be unlocked, when a vertical handle is displayed at its left edge, and this handle can be used to drag the toolbar to a new screen position. To lock / unlock all toolbars at once, select **View > Toolbars > Lock Toolbars** (LibreOffice must be restarted to apply this change).

You can choose the single-toolbar alternative to the default double toolbar arrangement. It contains the most-used commands. To activate it, enable **View > User Interface > Single Toolbar**. Other variations are also available through **View > User Interface**.

For additional information on toolbars, see Chapter 1, Introducing LibreOffice, in the *Getting Started Guide*.

The default set of icons (sometimes called buttons) on toolbars provides a wide range of common commands and functions. You can also remove or add icons to toolbars. See Chapter 15, Setting up and Customizing, for more information.

Placing the mouse pointer over an icon, text box, or menu command, displays a small box called a tooltip that shows the name of the item's function. To close a tooltip, move away from the underlying component or press the `Esc` key.

To see a more detailed explanation of an icon, text box, or menu command, do one of the following to open extended tips:

- To activate extended tips just once: press `Shift+F1`.
- To activate extended tips from the Menu bar: go to **Help > What's This?** and hover the mouse pointer over an icon.
- To turn extended tips on or off: go to **Tools > Options > LibreOffice > General** on the Menu bar and toggle the **Extended tips** checkbox.

Formula Bar

The Formula Bar is located at the top of the Calc workspace. It is permanently docked in this position and cannot be used as a floating toolbar. However, it can be hidden or made visible by going to **View > Formula Bar** on the Menu bar.



Figure 6: Formula Bar

From left to right in Figure 6, the Formula Bar consists of the following:

- **Name Box** – gives the current active cell reference using a combination of a letter and number, for example A1. The letter indicates the column and the number indicates the row of the selected cell. If you have selected a range of cells that is also a named range, the name of the range is shown in this box. You can also type a cell reference in the Name Box to jump to the referenced cell. If you type the name of a named range and press the `Enter` key, the named range is selected and displayed.
- **Function Wizard** – opens a dialog from which you can search through lists of available functions and formulas. This can be very useful because it also shows how the functions are formatted.
- **Select Function** – performs a calculation on the numbers in the cells above the selected cell and then places the result in it. If there are no numbers above the selected cell, then the calculation operates on the cells to the left. The calculation to be performed is selected from a drop-down menu containing options for **Sum**, **Average**, **Min**, **Max**, **Count, CountA, Product, Stdev, StdevP, Var, and VarP**. The `Alt+=` keyboard shortcut is equivalent to clicking the **Select Function** icon and selecting the **Sum** option.

- **Formula** – inserts an equals (=) sign in the selected cell and the Input line, allowing a formula to be entered.
- **Input line** – displays the contents of the selected cell (data, formula, or function) and allows you to edit the cell contents. To turn the Input line into a multi-line input area for very long formulas, click the **Expand Formula Bar** icon on the right or Click and drag between the Formula Bar and top of the Column Headers (when mouse pointer turns into a double arrow) to extend downwards. To edit inside the Input line area, click in the area, then type your changes. The height of the formula bar will be saved in your document.

You can also directly edit inside the cell by double-clicking on the cell. When you enter new data into a cell, the **Select Function** and **Formula** icons change to **Cancel** and **Accept** icons.

Note

In a spreadsheet, the term “function” covers much more than just mathematical functions. See Chapter 8, Using Formulas and Functions, for more information.

Status Bar

The Status Bar at the bottom of the workspace (Figure 7) provides information about the spreadsheet and convenient ways to quickly change some of its features. Most of the fields are similar to those in other components of LibreOffice. See Chapter 1, Introducing LibreOffice, in the *Getting Started Guide* for more information.

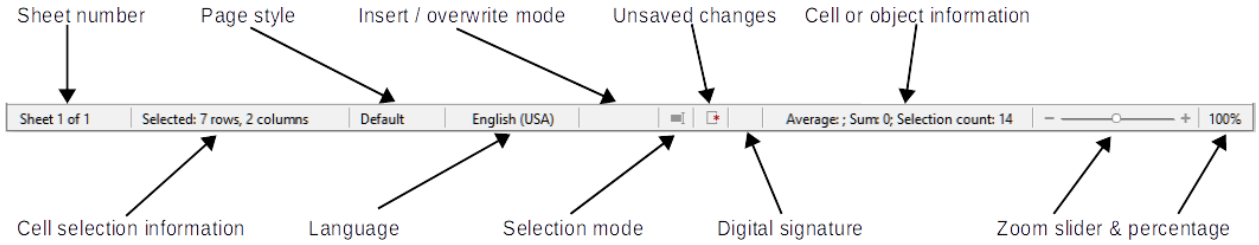


Figure 7: Status Bar

The fields on the Status Bar, from left to right, are as follows.

Sheet number
Shows the sequence number of the current sheet and the total number of sheets in the spreadsheet. The sequence number may not be the same as the name on the sheet tab if sheets have been moved. Double-click on this zone to open the Navigator dialog.

Cell selection information
Shows how many rows and how many columns are selected. Blank if the selected cells do not form a rectangular block.

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

Language
Shows current default language as selected at **Tools > Options > Language Settings > Languages**.

Insert / overwrite mode
When you are interacting with a cell in edit mode, this field distinguishes between the insert and overwrite modes. If the cell being edited is in overwrite mode, the field shows the text *Overwrite*. In other cases, the field is blank. You can press the `Insert` key on the keyboard, or click on this field, to switch between insert and overwrite modes.

Selection mode
Click to open a context menu and select **Standard selection**, **Extending selection**, or **Adding selection**. The icon changes when different selection modes are selected. See Chapter 1, Introducing LibreOffice, in the *Getting Started Guide* for more information.

Unsaved changes
The appearance of this icon indicates whether the spreadsheet contains unsaved changes. When there are unsaved changes, click this icon, use **File > Save**, click the **Save** icon on the Standard toolbar, or press *Ctrl+S* to save the spreadsheet.

Digital signature
If the document has been digitally signed, an icon shows here. You can click the icon to view the certificate. See Chapter 7, Printing, Exporting, E-mailing, and Signing for more information about digital signatures.

Cell or object information
Displays information related to the position of the cursor or the selected element of the spreadsheet. When a group of cells is selected, the average and sum of the contents is displayed by default. Right-click in this field to select other functions, such as the maximum value, minimum value, or count (number of items selected).

Zoom slider
Drag the zoom slider, click on the slider's rail, or click the + and – symbols to change the view magnification.

Zoom percentage
Indicates the magnification level of the document. Right-click on the percentage to open a list of magnification values from which to choose. Click on the percentage to open the Zoom & View Layout dialog.

Sidebar

The Sidebar (Figure 8) is a mixture of toolbar and dialog. When opened (**View > Sidebar** or *Ctrl+F5*), it appears on the right side of the window. When entering or editing data in cells, the Sidebar consists of five decks: *Properties*, *Styles*, *Gallery*, *Navigator*, and *Functions*. Each deck has a corresponding icon on the Tab panel to the right of the Sidebar, allowing you to switch between them. These decks are described below. However, the Sidebar is context-sensitive and the number of decks and the content of each may change when you select objects such as images or charts.

Properties
The Properties deck includes five content panels. Each panel has a **More Options** button that provides additional options. If a dialog opens, it locks the document for editing until it is closed.

Style: Options for applying, updating, or creating cell and page styles.

Character: Options for formatting the text, such as font name, size, and color. Some controls, such as superscript, only become active when the text cursor is active in the Input line of the Formula Bar or the cell.

Number Format: Options for formatting numbers, including decimals, currency, dates, or numeric text.

Alignment: Options for arranging the text in various ways, including horizontal and vertical alignment, wrapping, indenting, merging, text orientation, and vertical stacking.

Cell Appearance: Options include background color and border formats, including line color and style.

Styles

The Styles deck enables you to apply existing styles, modify existing styles, or create new styles. This deck can also be opened by selecting **Styles > Manage Styles** on the Menu bar, selecting **View > Styles** on the Menu bar, or pressing *F11*.

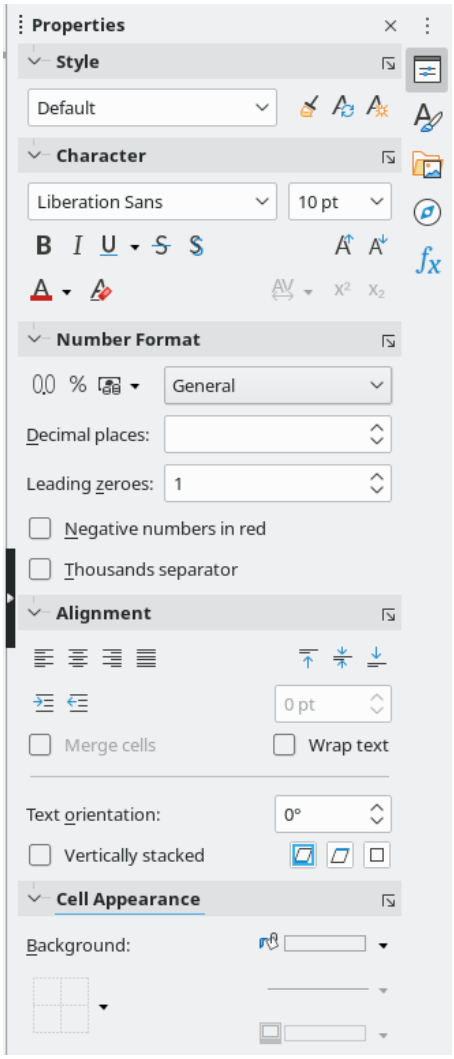


Figure 8: Sidebar

Gallery

The Gallery deck enables you to add images, diagrams, or other objects that are available in the Gallery themes. This deck can also be opened by selecting **View > Gallery** on the Menu bar.

Navigator

The Navigator deck can also be opened by selecting **View > Navigator** from the Menu bar or pressing *F5*. See “Using the Navigator” on page 49.

Functions

The Functions deck contains a list of Calc’s many functions organized by category. It is a simpler version of the Function Wizard, which is opened by selecting **Insert > Function** on the Menu bar, clicking the **Function Wizard** icon on the Formula Bar, or pressing *Ctrl+F2*.

To the right side of the title bar of each open deck is a **Close Sidebar Deck** button, which closes the deck to leave only the Tab bar of the Sidebar open. Click any button in the Tab bar to toggle on / off the display of the associated deck.

To hide the Sidebar, or reveal it if already hidden, click on the left edge **Hide/Show** button. To adjust the deck width, drag on the left edge of the Sidebar.

Spreadsheet layout

Individual cells

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

At the top of the columns and the left end of the rows are a series of header boxes containing letters and numbers. The column headers use alphabetic characters that start with A and increase to the right. The row headers use numerical characters that start at 1 and increase down.

These column and row headers form the cell references that appear in the Name Box on the Formula Bar (Figure 6). If the headers are not visible on the spreadsheet, go to **View > View Headers** on the Menu bar.

When the mouse pointer lies over the grid of cells, the system default pointer is normally shown (typically an arrow pointer). However, a configuration option is available to switch to using the pointer shape defined in the icon theme (typically a fat cross). See Chapter 15, Setting up and Customizing for more information.

Sheet tabs

A spreadsheet file can contain many individual sheets. At the bottom of the grid of cells in a spreadsheet are sheet tabs (Figure 4). Each tab represents a sheet in a spreadsheet. You can create a new sheet by clicking on the plus sign to the left of the sheet tabs or by clicking in the blank space to the right of the sheet tabs.

Clicking on a tab makes an individual sheet active. When a sheet is active, the tab is highlighted. To select multiple sheets, hold down the `Ctrl` key while clicking on the sheet tabs.

To change the default name for a sheet (Sheet1, Sheet2, and so on):

1) Right-click on the sheet tab and select **Rename Sheet** in the context menu. In the dialog that opens, type in a new name for the sheet.
2) Click **OK** when finished to close the dialog.

To change the color of a sheet tab:

1) Right-click on the sheet tab and select **Tab Color** in the context menu to open the Tab Color dialog (Figure 9).

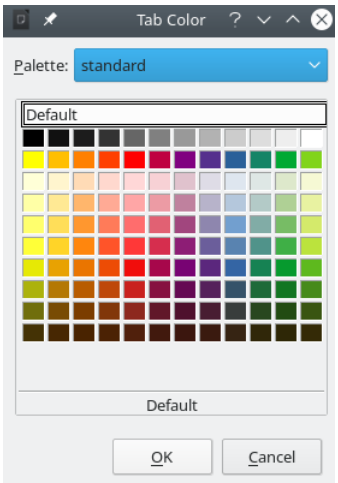


Figure 9: Tab Color dialog

2) Select a color and click **OK** when finished to apply the color and close the dialog.

To add new colors to this color palette, see "Adding custom colors" in Chapter 15, Setting up and Customizing.

Creating, opening, and saving spreadsheets

Creating and opening

Creating and opening spreadsheets is identical to creating and opening documents in the other LibreOffice modules. For more information on creating and opening spreadsheets, see Chapter 1, Introducing LibreOffice, in the *Getting Started Guide*.

Using templates

Calc documents can also be created from templates. For information on how to create and use templates, see Chapter 5, Using Styles and Templates, in this guide.

Opening a CSV file

Comma-separated values (CSV) files are spreadsheet files in a text format where cell contents are separated by a character such as a comma or semi-colon. Each line in a CSV text file represents a row in a spreadsheet. Text is entered between quotation marks; numbers are entered without quotation marks.

To open a CSV file in Calc:

1) Choose **File > Open** on the Menu bar, click the **Open** icon on the Standard toolbar, or press *Ctrl*+*O* and locate the CSV file that you want to open.
2) Select the file and click **Open**. By default, a CSV file has the extension .csv. However, some CSV files may have a .txt extension.
3) The Text Import dialog (Figure 10) opens. Here you can select options for importing a CSV file into a Calc spreadsheet.
4) Click **OK** to open and import the file.

The options for importing CSV files into a Calc spreadsheet are as follows:

Import

- *Character set* – specifies the character set to be used in the imported file.
- *Language* – determines how the number strings are imported. If *Language* is set to *Default*, Calc will use the language associated with the locale selected at **Tools > Options > Language Settings > Languages > Formats**. If another language is selected, that language will determine how numbers are treated.
- *From row* – specifies which row the import starts with. The initial rows are visible in the preview window at the bottom of the dialog.

Separator Options

- *Fixed width* – separates data into columns by a set number of characters. Click on the ruler that appears in the preview window to set the width.
- *Separated by* – separates data into columns based on the separator defined here. Select **Other** to specify another character used to separate data into columns. This custom separator must also be contained in the data.
- *Merge delimiters* – combines consecutive delimiters and removes blank data fields.
- *Trim spaces* – removes starting and trailing spaces from within fields.

- *String delimiter* – select a character to delimit text data.

Tip

CSV files can identify the separator to use by including a first row of sep=X or "sep=X" where X is the separator character. Set From row to 2 to import correctly.

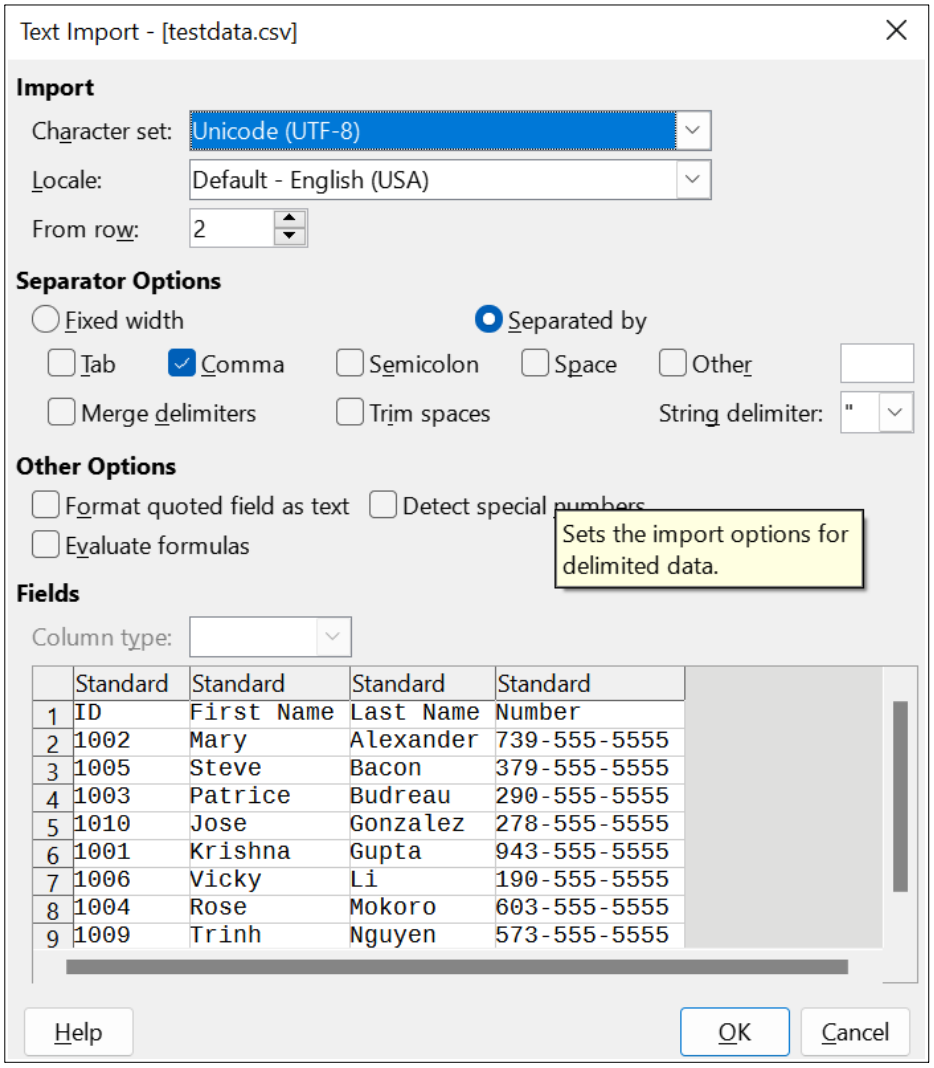


Figure 10: Text Import dialog

Other options

- *Format quoted field as text* – when this option is enabled, fields or cells whose values are entirely within quotes are imported as text.
- *Detect special numbers* – when this option is enabled, Calc will automatically detect all number formats, including special number formats such as dates, time, and scientific notation. The selected language influences how such special numbers are detected, since different languages and regions many have different conventions for such special numbers.

- When this option is disabled, Calc will detect and convert only decimal numbers. The rest, including numbers formatted in scientific notation, will be imported as text. A decimal number string can have digits 0–9, thousands separators, and a decimal separator. Thousands separators and decimal separators may vary with the selected language and region.
- *Evaluate formulas* – when this option is enabled, fields that begin with an equals sign (=) will be imported and evaluated as a formula instead of as data.

Fields – shows how your data will look when it is separated into columns.

Column type – select a column in the preview window and select the data type to be applied to the imported data.

- *Standard* – Calc determines the type of data.
- *Text* – imported data are treated as text.
- Date – imported data are treated as dates in the selected format – "DMY", "MDY", or "YMD".
- *US English* – numbers formatted in US English are searched for and included regardless of the system language. A number format is not applied. If there are no US English entries, the Standard format is applied.
- *Hide* – the data in the column are not imported.

Saving spreadsheets

For information on how to save files manually or automatically, see Chapter 1, Introducing LibreOffice, in the *Getting Started Guide*. Calc can save spreadsheets in a range of formats and also export spreadsheets to PDF and XHTML file formats; see Chapter 7, Printing, Exporting, Emailing, and Signing, for more information.

Saving in other formats

If you need to send files to users who are unable to receive spreadsheet files in Open Document Format (ODF) (*.ods), which Calc uses as its default format, you can save a spreadsheet in another format.

1) Select **File > Save As** on the Menu bar, click the down arrow at the right of the **Save** icon on the Standard toolbar and select **Save As** from the drop-down menu, or press `Ctrl+Shift+S` to open the Save As dialog (Figure 11).
2) In *File name*, if you wish, enter a new file name for the spreadsheet and select the folder where you want to save the file.
3) In the *Save as type* field, select from the drop-down menu the type of spreadsheet format you want to use. If **Automatic file name extension** is selected, the correct file extension for the spreadsheet format you have selected will be added to the file name.
4) Click **Save**.

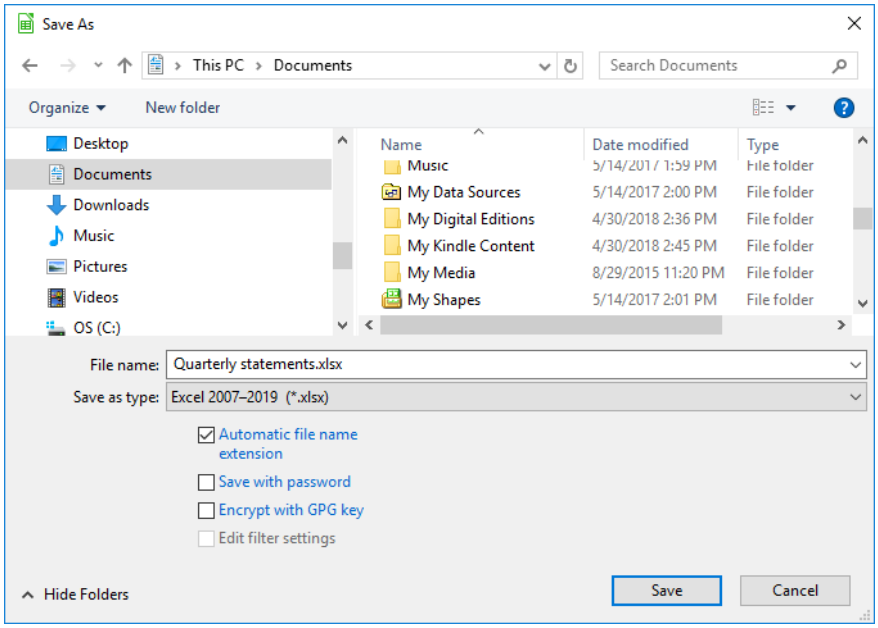


Figure 11: The Save As dialog

Each time a file is saved in a format other than ODF format, the Confirm File Format dialog opens (Figure 12). Click **Use [xxx] Format** to continue saving in the selected spreadsheet format or click **Use ODF Format** to save the spreadsheet in Calc's default format. If you disable **Warn when not saving in ODF or default format** on **Tools > Options > Load/Save > General** on the Menu bar, the Confirm File Format dialog will no longer appear. You can also clear the checkbox **Ask when not saving in ODF or default format** on the dialog to stop the dialog appearing.

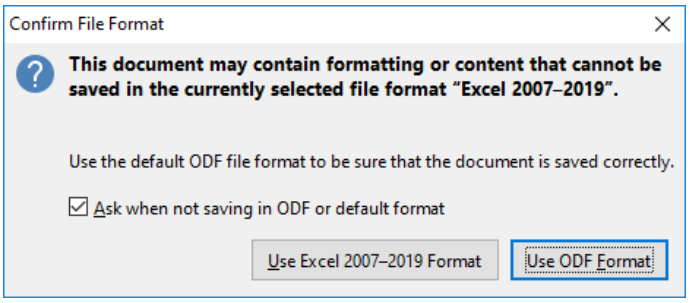


Figure 12: Confirm File Format dialog

If you select Text CSV format (*.csv), the Export Text File dialog (Figure 13) opens. Here you can select the character set, field delimiter, string delimiter, and so on to be used for the CSV file.

Note

Once you have saved a spreadsheet in another format, all changes you make to the spreadsheet will now occur only in the format you are using because you have changed the name and file type of your document. If you want to go back to working with an *.ods version, you must save the file as an *.ods file.

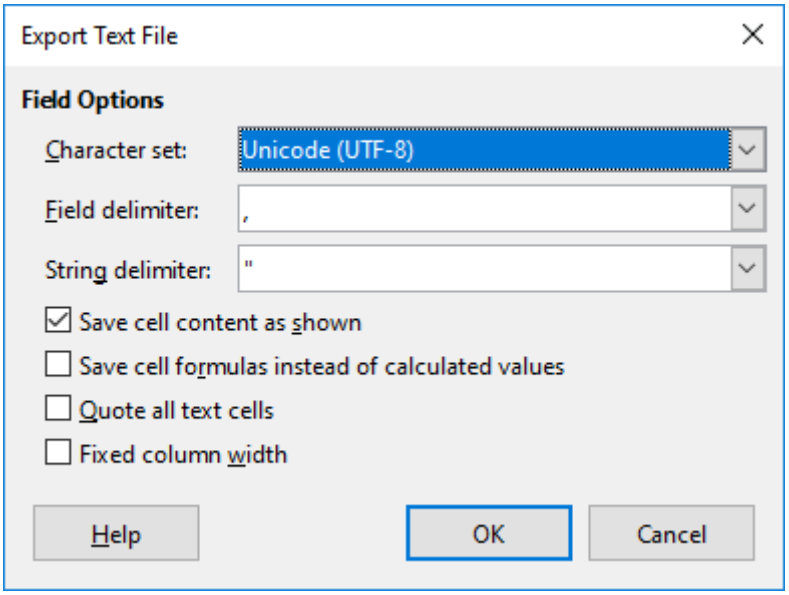


Figure 13: Export Text File dialog

Tip

To have Calc save documents by default in a file format other than the default ODF format, go to **Tools > Options > Load/Save > General**. In the section named *Default File Format and ODF Settings*, next to *Document type*, select **Spreadsheet**, then next to *Always save as*, select your preferred file format, for example one of the available Microsoft Excel options.

Password protection

To protect a spreadsheet and restrict who can open, read, and make changes to it, you have to use password protection. Password protection is common to all LibreOffice modules; for more information, see Chapter 1, Introducing LibreOffice, in the *Getting Started Guide*.

Navigating within spreadsheets

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

Cell navigation

When a cell is selected or in focus, the cell borders are emphasized. When a group of cells is selected, the cell area is colored. The color of the cell border emphasis and the color of a group of selected cells depends on the operating system being used and uses your system's highlight color.

- Using the mouse – place the mouse pointer over the cell and click the left mouse button. To move the focus to another cell using the mouse, move the mouse pointer to the cell and click the left mouse button.
- Using a cell reference – select or delete the existing cell reference in the Name Box on the Formula Bar (Figure 6 on page 27). Type the reference of the cell you want to move to and press the `Enter` key. Cell references are case insensitive. Thus, typing a3 or A3 will move the focus to cell A3.

- Using the Navigator – to open the Navigator (Figure 23), go to **View > Navigator** on the Menu bar, or press *F5*, or click the **Navigator** button on the Sidebar. Type the cell references into the *Column* and *Row* fields and press the *Enter* key.
- Using the *Enter* key – pressing *Enter* moves the cell focus down one cell (by default). You can change the direction of this focus movement as described in the "Customizing the Enter key" section on page 40.
- Pressing *Shift+Enter* moves the focus one cell in the opposite direction to that associated with the *Enter* key.
- Using the *Tab* key - pressing *Tab* moves the cell focus one cell to the right. Pressing *Shift+Tab* moves the focus one cell to the left.
- Using the arrow keys - pressing the arrow keys on the keyboard moves the cell focus in the direction of the arrow pressed.
- Using *Home*, *End*, *Page Up*, and *Page Down*
  - *Home* moves the cell focus to the start of a row. *Ctrl+Home* moves the cell focus to the first cell in the sheet, A1.
  - The result of pressing *End* or *Ctrl+End* depends on the data contained in the sheet. To explain these key presses, it is helpful to define Rmax as the highest numbered row in the sheet that contains any data and Cmax as the rightmost column in the sheet that contains any data. Press *End* to move the cell focus along the current row to the cell in column Cmax. Press *Ctrl+End* to move the cell focus to the cell at the intersection of row Rmax and column Cmax. Note that in either case, the newly focused cell may not contain any data.
  - *Page Down* moves the cell focus down one complete screen display.
  - *Page Up* moves the cell focus up one complete screen display.

Sheet navigation

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

- Using the Navigator - when the Navigator is open (Figure 23), double-clicking on any of the listed sheets selects the sheet.
- Using the keyboard - using key combinations *Ctrl+Page Down* moves one sheet to the right and *Ctrl+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.
- Using the menu – go to **Sheet > Navigate > To Previous Sheet / To Next Sheet** to navigate to previous or next sheet. **Sheet > Navigate > Go to Sheet** brings up a dialog box that allows you to select a sheet or to search for a sheet by name.

If there are many sheets in the spreadsheet, some of the sheet tabs may be hidden. If this is the case, use the four buttons to the left of the sheet tabs to move the tabs into view (Figure 14).

Note

The sheet tab arrows that appear on the left in Figure 14 are only active if there are more sheet tabs than can be displayed.

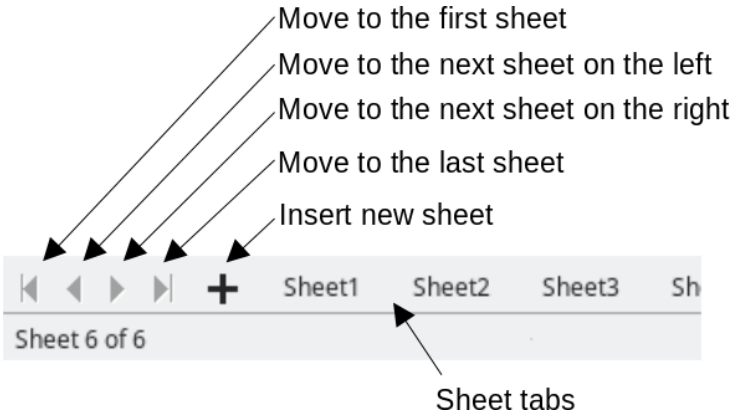


Figure 14: Navigating sheet tabs

Note

When you insert a new sheet into a spreadsheet, Calc automatically uses the next number in the numeric sequence as a name. Depending on which sheet is open when you insert a new sheet, your new sheet may not be in numerical order. It is recommended to rename sheets in a spreadsheet to make them more recognizable.

Keyboard navigation

You can navigate a spreadsheet using the keyboard, by pressing a key or a combination of keys at the same time. For example, `Ctrl+Home` moves the focus to cell A1. Table 3 lists the keys and key combinations you can use for spreadsheet navigation in Calc.

Table 3. Keyboard cell navigation

Keyboard shortcut	***Cell navigation***
→/←	Moves cell focus right/left one cell.
↑/↓	Moves cell focus up/down one cell.

Keyboard shortcut	*Cell navigation*
Ctrl+→ / Ctrl+←	If focus is on a blank cell, *Ctrl+→* moves focus along the current row to the first cell on the right that contains data. If there is no cell on the right containing data, it moves focus along the current row to the last cell at the right of the sheet. If focus is on a blank cell, *Ctrl+←* moves focus along the current row to the first cell on the left that contains data. If there is no cell on the left containing data, it moves focus along the current row to the cell in column A of the sheet. If focus is on a cell containing data, *Ctrl+→* normally moves focus along the current row to the cell at the right edge of the same data region. However, if there is a blank cell to the right of the original cell, focus is moved to the cell at the left edge of the next data region to the right. In this case, if there is no data region to the right, focus is moved along the current row to the last cell at the right of the sheet. If focus is on a cell containing data, *Ctrl+←* normally moves focus along the current row to the cell at the left edge of the same data region. However, if there is a blank cell to the left of the original cell, focus is moved to the cell at the right edge of the next data region to the left. In this case, if there is no data region to the left, focus is moved along the current row to the cell in column A of the sheet.
Ctrl+↑ / Ctrl+↓	If focus is on a blank cell, *Ctrl+↑* moves focus up the current column to the first cell that contains data. If there is no cell above containing data, it moves focus up the current column to the cell in row 1 of the sheet. If focus is on a blank cell, *Ctrl+↓* moves focus down the current column to the first cell that contains data. If there is no cell below containing data, it moves focus down the current column to the last cell at the bottom of the sheet. If focus is on a cell containing data, *Ctrl+↑* normally moves focus up the current column to the cell at the top edge of the same data region. However, if there is a blank cell above the original cell, focus is moved to the cell at the bottom edge of the next data region above. In this case, if there is no data region above, focus is moved up the current column to the cell in row 1 of the sheet. If focus is on a cell containing data, *Ctrl+↓* normally moves focus down the current column to the cell at the bottom edge of the same data region. However, if there is a blank cell below the original cell, focus is moved to the cell at the top edge of the next data region below. In this case, if there is no data region below, focus is moved down the current column to the bottom of the sheet.
Ctrl+Home / Ctrl+End	A detailed description of these shortcuts is given on Page 37.
Alt+Page Down / Alt+Page Up	Moves focus one screen to the right/left (if possible).
Ctrl+Page Down / Ctrl+Page Up	Moves focus to the next sheet to the right/left in sheet tabs if there are more sheets in that direction.
Tab / Shift+Tab	Moves focus to the next cell on the right/left.

Keyboard shortcut	Cell navigation
Enter / Shift+Enter	Moves focus down/up one cell (unless you have changed this action, as described in the following subsection).

Customizing the Enter key

You can choose the direction in which the Enter key moves the cell focus by going to **Tools > Options > LibreOffice Calc > General**. Use the first three options under Input Settings (Figure 15) to change the Enter key settings. Select the direction cell focus moves from the drop-down list. Depending on the file being used or the type of data being entered, setting a different direction can be useful. The Enter key can also be used to switch into and out of editing mode. In Calc, when the content of a cell is copied to the clipboard, you can paste the information in another cell by pressing the Enter key; here you can disable this feature.

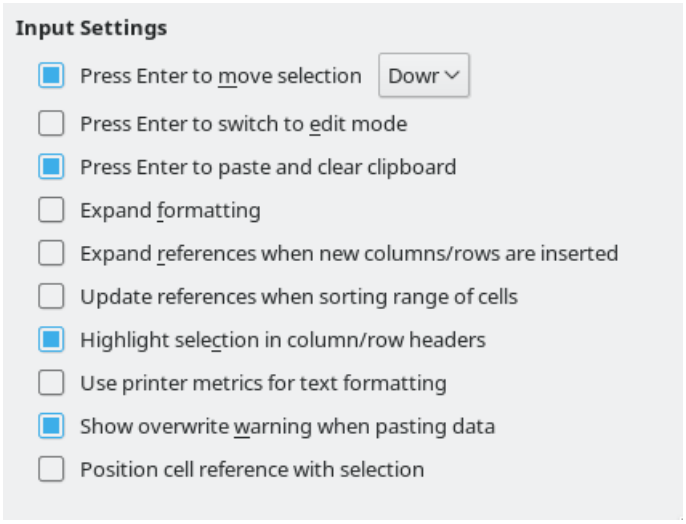


Figure 15: Customizing the Enter key

Selecting items in a spreadsheet

Selecting cells

Single cell

Click in the cell. You can verify the selection by looking in the Name Box on the Formula Bar (Figure 6).

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 pointer:

1) Click in a cell.
2) Press and hold down the left mouse button.
3) Move the mouse to highlight the desired block of cells, then 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.

To select a range of cells using Extending selection mode:

1) Click in the cell which is to be one corner of the range of cells.
2) Click in the Selection mode field on the Status Bar (Figure 7 on page 28) and select **Extending selection**.
3) Click in the cell in the opposite corner of the range of cells.

Tip

Make sure to change back to Standard selection mode or you may find yourself extending a cell 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.

To select a range of cells using the Name Box:

1) Click in the Name Box on the Formula Bar (Figure 6 on page 27).
2) Enter the cell reference for the upper left-hand cell, followed by a colon (:), and then the lower right-hand cell reference, then press the `Enter` key. For example, to select the range that would go from A3 to C6, enter A3:C6.

Range of non-contiguous cells

To select a range of non-contiguous cells using the mouse:

1) Select the first 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 `Ctrl` key and click or click-and-drag to select another range of cells to add to the first range.
4) Repeat as necessary.

To select a range of cells using Adding selection mode:

1) Click in the Selection mode field on the Status Bar (Figure 7 on page 28) and select **Adding selection**.
2) Click or click-and-drag to select ranges of cells to add to the selection.

Selecting columns and rows

Single column or row

To select a single column, click on the column header (Figure 4 on page 25). To select a single row, click on the row header.

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 *Ctrl* key.

3) Click on all of the subsequent columns or rows while holding down the *Ctrl* key.

Tip

You can also select rows and columns using options in the **Edit > Select** menu (**Select Row**, **Select Column**, **Select Visible Rows Only**, and **Select Visible Columns Only**).

Entire sheet

To select the entire sheet, click on the small box between the column headers and the row headers (Figure 16), use the key combination *Ctrl+A*, press *Ctrl*+*Shift*+*Space*, or go to **Edit** on the Menu bar and select **Select All**.

Selecting sheets

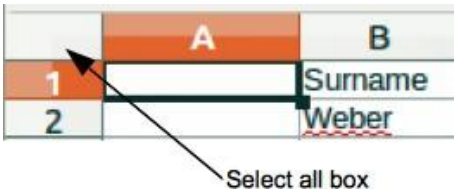


Figure 16: Select All box

You can select either one or multiple sheets in Calc. It can be advantageous to select multiple sheets, especially 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 tab for the selected sheet becomes highlighted.

Multiple contiguous sheets

To select multiple contiguous sheets:

1) Click on the sheet tab for the first desired sheet.

2) While holding down the *Shift* key, click on the sheet tab for the last desired sheet.

3) All tabs between these two selections will be highlighted. Any actions that you perform will now affect all highlighted sheets.

Multiple non-contiguous sheets

To select multiple non-contiguous sheets:

1) Click on the sheet tab for the first desired sheet.

2) While holding down the *Ctrl* key, click on the sheet tabs for other desired sheets.

3) The selected tabs will be highlighted. Any actions that you perform will now affect all highlighted sheets.

All sheets

Right-click a sheet tab and choose **Select All Sheets** in the context menu, or select **Edit > Select > Select All Sheets** on the Menu bar.

Tip

You can also select sheets using the Select Sheets dialog, accessed by selecting **Edit > Select > Select Sheets** on the Menu bar.

Working with columns and rows

Inserting columns and rows

When you insert columns or rows, the cells take the formatting of the corresponding cells in the column to the left or the row above.

Single column or row

Using the **Sheet** menu:

1) Select a cell, column, or row where you want the new column or row inserted.
2) Go to **Sheet** on the Menu bar. For columns, select **Sheet > Insert Columns** and then select **Columns Before** or **Columns After**. For rows, select **Sheet > Insert Rows** and then select **Rows Above** or **Rows Below**.

Using the context menu:

1) Select a column or row where you want the new column or row inserted.
2) Right-click the column or row header.
3) Select **Insert Columns Before / After** or **Insert Rows Above / Below** in the context menu.

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. The number of columns or rows highlighted will be inserted.

Hiding columns and rows

To hide columns or rows from view, select the columns or rows to hide and do one of the following:

- Right-click on the selected column or row headers and select **Hide Columns / Rows**.
- From the Menu bar, select **Format > Columns / Rows > Hide**.

Tip

For a visible indication of hidden rows and columns, enable the option from the Menu bar, **View > Hidden Row/Column Indicator**.

To unhide columns or rows, select the entire sheet or the columns or rows around the columns or rows you wish to unhide and do one of the following:

- Right-click on the selected column or row headers and select **Show Columns / Rows**.
- From the Menu bar, select **Format > Columns / Rows > Show**.

Deleting columns and rows

Single column or row

To delete a single column or row, do one of the following:

- Select a cell in the column or row you want to delete, right-click and select **Delete** in the context menu, select **Sheet > Delete Cells** on the Menu bar, or press `Ctrl+-` to open the Delete Cells dialog (Figure 17). Select **Delete entire column(s)** or **Delete entire row(s)** and click **OK**.
- Select a cell in the column or row you want to delete and select **Sheet > Delete Columns** or **Sheet > Delete Rows**.
- Right-click the header of the column or row that you want to delete and select **Delete Columns** or **Delete Rows** in the context menu.

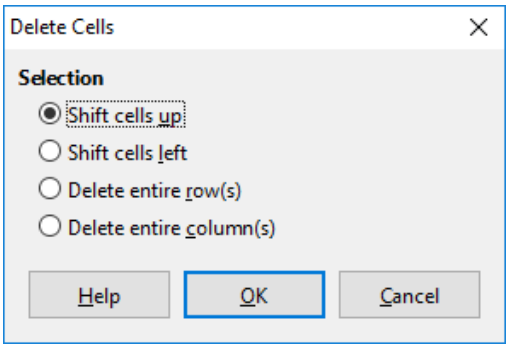


Figure 17: Delete Cells dialog

Multiple columns or rows

To delete multiple columns or rows, do one of the following:

- Select a range of cells across the columns or rows you want to delete, right-click and select **Delete** in the context menu, select **Sheet > Delete Cells** on the Menu bar, or press `Ctrl+-` to open the Delete Cells dialog. Select **Delete entire column(s)** or **Delete entire row(s)** and click **OK**.
- Select a range of cells across the columns or rows you want to delete and select **Sheet > Delete Columns** or **Sheet > Delete Rows**.
- Highlight the required columns or rows by holding down the left mouse button on the header of the first one and then dragging across the required number of headers. Then right-click on one of the selected column or row headers and select **Delete Columns** or **Delete Rows** in the context menu.

Deleting cells

1) Select the cell or cells you want to delete.
2) Select **Sheet > Delete Cells**, press `Ctrl+-`, or right-click on one of the selected cells and select **Delete** in the context menu.
3) Select the option you require from the Delete Cells dialog and click **OK**.

Working with sheets

Inserting new sheets

Click on the + symbol next to the sheet tabs to insert a new sheet after the last sheet in the spreadsheet without opening the Insert Sheet dialog. The following methods open the Insert Sheet dialog (Figure 18) where you can position the new sheet, create more than one sheet, name the new sheet, or select a sheet from a file.

- Select the sheet where you want to insert a new sheet, then select **Sheet > Insert Sheet** on the Menu bar.
- Right-click on the sheet tab where you want to insert a new sheet and select **Insert Sheet** in the context menu.
- Click in the empty space at the end of the sheet tabs.
- Right-click in the empty space at the end of the sheet tabs and select **Insert Sheet** from the context menu.

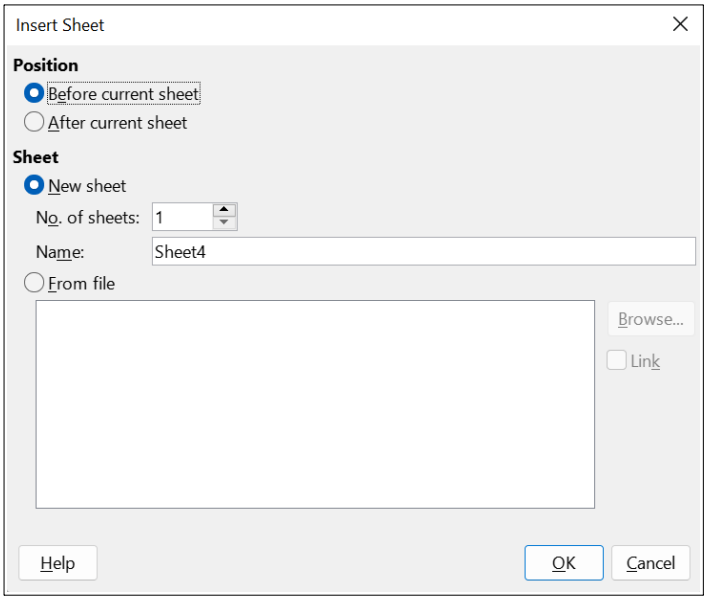


Figure 18: Insert Sheet dialog

Moving and copying sheets

You can move or copy sheets within the same spreadsheet by dragging and dropping or using the Move/Copy Sheet dialog (Figure 19). To move or copy a sheet into a different spreadsheet, use the Move/Copy Sheet dialog.

Dragging and dropping

To move a sheet to a different position within the same spreadsheet, click on the sheet tab and drag it to its new position before releasing the mouse button.

To copy a sheet within the same spreadsheet, hold down the `Ctrl` key then click on the sheet tab and drag it to its new position before releasing the mouse button. The mouse pointer may change to include a plus sign depending on the setup of your operating system.

Using Move/Copy Sheet dialog

The Move/Copy Sheet dialog allows you to specify exactly whether you want the sheet in the same or a different spreadsheet, its position within the spreadsheet, and the sheet name when it is moved or copied.

1) In the current document, right-click on the sheet tab you wish to move or copy and select **Move or Copy Sheet** in the context menu, or go to **Sheet > Move or Copy Sheet** on the Menu bar.
2) Select **Move** to move the sheet or **Copy** to copy the sheet.
3) Select the spreadsheet where you want the sheet to be placed from the *To document* drop-down list. This can be the same spreadsheet, another spreadsheet that is already opened, or you can create a new spreadsheet.
4) Select the position in *Insert before* where you want to place the sheet.
5) Type a name in the *New name* text box if you want to rename the sheet when it is moved or copied. When copying, Calc suggests a default name (Sheet1_2, Sheet2_2, and so on).
6) Click **Move or Copy** to confirm the move or copy and close the dialog.

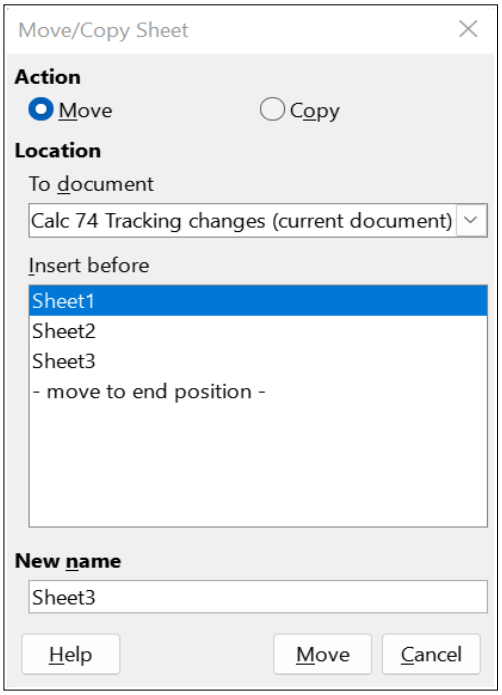


Figure 19: Move/Copy Sheet dialog

Caution

When you move or copy to another spreadsheet or to a new one, a conflict may occur if formulas are linked to sheets in the previous location.

Deleting sheets

To delete a single sheet, right-click on the sheet tab you want to delete and select **Delete Sheet** in the context menu, or go to **Sheet > Delete Sheet** on the Menu bar. Click **Yes** to confirm the deletion.

To delete multiple sheets, select the sheets (see “Selecting sheets” on page 42), then right-click one of the sheet tabs and select **Delete Sheet** in the context menu, or go to **Sheet > Delete Sheet** on the Menu bar. Click **Yes** to confirm the deletion.

Hiding and showing sheets

Sometimes you may want to hide the contents of a sheet to preserve data from accidental editing or because its contents are not important to display.

To hide a sheet or many sheets, select the sheet or sheets as above, right-click to open the context menu, and select **Hide Sheet**.

To show hidden sheets, right-click any sheet tab and select **Show Sheet** in the context menu. A dialog will open with all hidden sheets listed. Select the desired sheets and then click **OK**.

Note

LibreOffice Calc does not let you hide the last visible sheet.

Renaming sheets

By default, the name for each new sheet added is SheetX, where X is the number of the next sheet to be added. While this works for a spreadsheet with only a few sheets, it can become difficult to identify sheets when a spreadsheet contains many sheets.

You can rename a sheet using one of the following methods:

- Enter the name in the *Name* text box when you create the sheet using the Insert Sheet dialog (Figure 18 on page 45).
- Right-click on a sheet tab and select **Rename Sheet** in the context menu to open the Rename Sheet dialog
- Select **Sheet > Rename Sheet** on the Menu bar to access the Rename Sheet dialog.
- Double-click on a sheet tab to open the Rename Sheet dialog.

Note

Sheet names can contain almost any character. Some naming restrictions apply, the following characters are not allowed in sheet names: colon (:), back slash (\), forward slash (/), question mark (?), asterisk (*), left square bracket ([), or right square bracket (]). In addition a single quote (‘) cannot be used as the first or last character of the name.

Viewing a spreadsheet

Changing document view

Use the zoom function to show more or fewer cells in the window when you are working on a spreadsheet. For more about zoom, see Chapter 1, Introducing LibreOffice, in the *Getting Started Guide*.

Freezing rows and columns

Freezing is used to lock rows across the top of a spreadsheet or to lock columns on the left of a spreadsheet. Then, when moving around within a sheet, the cells in frozen rows and columns always remain in view.

Figure 20 shows some frozen rows and columns. The heavier horizontal line between rows 3 and 23 and the heavier vertical line between columns F and Q indicate that rows 1 to 3 and columns A to F are frozen. The rows between 3 and 23 and the columns between F and Q have been scrolled off the page. To freeze rows or columns:

1) Click on the row header below the rows you want the freeze or click on the column header to the right of the columns where you want the freeze. To freeze both rows and columns, select the cell (not a row or column) that is below the row and to the right of the column that you want to freeze

2) Go to **View** on the Menu bar and select **Freeze Rows and Columns**. A heavier line appears between the rows or columns indicating where the freeze has been placed.

	A	B	C	D	E	F	Q	R
1		Date	Sales Value	Category	Region	Employee		
2		04/13/08	$498	Sailing	North	Kurt		
3		02/07/08	$1,383	Sailing	South	Kurt		
23		03/27/08	$669	Sailing	South	Hans		
24		01/28/08	$155	Sailing	West	Brigitte		

Figure 20: Frozen rows and columns

Unfreezing

To unfreeze rows or columns, go to **View** on the Menu bar and click **Freeze Rows and Columns** to toggle it off. The heavier lines indicating freezing will disappear.

Splitting the screen

Another way to change the view is by splitting the screen displayed (also known as splitting the window). The screen can be split horizontally, vertically, or both, displaying up to four portions of the spreadsheet at the same time. An example of splitting the screen is shown in Figure 21 where a split is indicated by a gray line.

This could be useful for example, when a large spreadsheet has one cell with a number that is used by three formulas in other cells. Using the split-screen technique, the cell containing the number can be positioned in one section of the view and the cells with formulas can be seen in the other sections. This makes it easy to see how changing the number in one cell affects each of the formulas.

	A	B	C
1		Beta=	3.2000
2		A0=	0.1000
5			
6			
7	A1=	Beta*A0*(1-A0)	0.2880
8	A2=	Beta*A1*(1-A1)	0.6562
9	A3=	Beta*A3*(1-A2)	0.7219
10	A4=	Beta*A4*(1-A3)	0.6424
11	A5=	Beta*A5*(1-A4)	0.7351

Figure 21: Split screen example

Splitting horizontally or vertically

There are two ways to split a screen horizontally or vertically:

Method One:

1) Click on the row header below the rows where you want to split the screen horizontally or click on the column header to the right of the columns where you want to split the screen vertically.

2) Go to **View** on the Menu bar and select **Split Window** or right-click and choose **Split Window** in the context menu. A thick line appears between the rows or columns indicating where the split has been placed. An example of a split line is shown below Row 2 in Figure 21.

Method Two:

For a horizontal split, click on the thick black line at the top of the vertical scroll bar (Figure 22) and drag the split line below the row where you want the horizontal split positioned.

Similarly, for a vertical split, click on the thick black line at the right of the horizontal scroll bar (Figure 22) and drag the split line to the right of the column where you want the vertical split positioned.

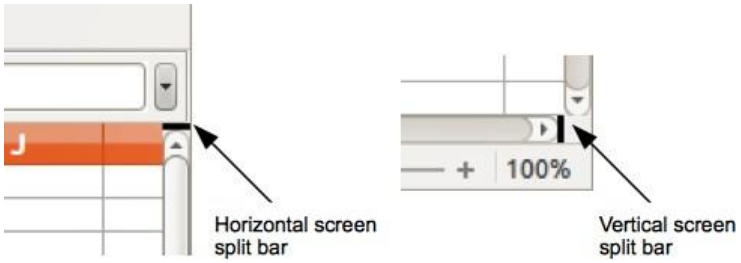


Figure 22: Split screen bars

Splitting both horizontally and vertically

Method One:

Position both the black horizontal and the black vertical lines as described above and as shown in Figure 22.

Method Two:

1) Click the cell that is immediately below the rows where you want to split the screen horizontally and immediately to the right of the columns where you want to split the screen vertically.
2) Go to **View** on the Menu bar and select **Split Window**. Thick lines appear between the rows and columns indicating where the splits have been placed.

Removing split views

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

- Double-click on each split line in turn.
- Click on and drag the split lines back to their places at the ends of the scroll bars.
- Go to **View** on the Menu bar and click **Split Window** to toggle it off.
- Right-click on a column or row heading and click **Split Window** in the context menu to toggle it off.

Using the Navigator

The Navigator (Figure 23) is available in all LibreOffice modules. It provides tools and methods to move quickly through a spreadsheet and find specific items.

The Navigator categorizes and groups spreadsheet objects which you can click on to move quickly to that object. If an indicator (plus sign or triangle, dependent on computer setup) appears next to a category, at least one object in this category exists. To open a category and see the list of items, click on the indicator. 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 spreadsheet.

To open the Navigator, do one of the following:

- Press the *F5* key.
- Select **View > Navigator** on the Menu bar.
- Click the **Navigator** icon on the Tab panel of the Sidebar.

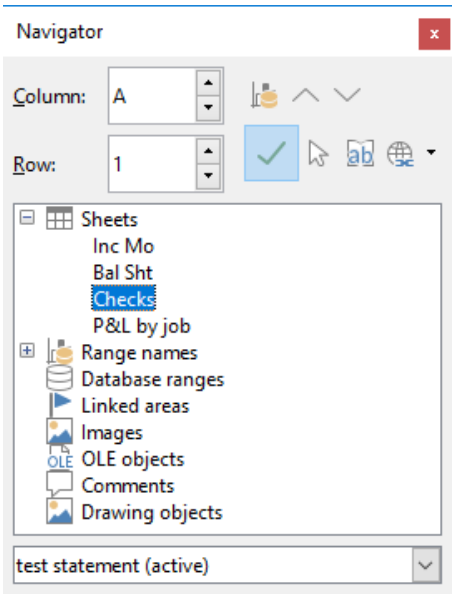


Figure 23: Navigator dialog in Calc

The controls and tools available in the Navigator are as follows:

- **Column** – type a column letter and press the *Enter* key to reposition the cell cursor to the specified column in the same row.
- **Row** – type a row number and press the *Enter* key to reposition the cell cursor to the specified row in the same column.
- **Data Range** – highlights the data range containing the cell in which the cursor currently lies. Calc checks the content of adjacent cells and determines the data range automatically. The data range can comprise one cell if there is no data in adjacent cells.
- **Start** – moves the cursor to the cell at the beginning of the current data range, which you can highlight using the **Data Range** icon.
- **End** – moves the cursor to the cell at the end of the current data range, which you can highlight using the **Data Range** icon.
- **Contents** – toggles on / off the display of the contents view in the lower part of the Navigator dialog, to temporarily reduce its size. There is no equivalent control needed on the Navigator deck of the Sidebar.
- **Toggle** – toggles the contents view. Only the selected category and its objects are displayed. Click the icon again to restore all elements for viewing.

- **Scenarios** – displays all available scenarios. See Chapter 10, Data Analysis, for more information about scenarios. Double-click a name to apply that scenario and the result is shown in the sheet. If the Navigator displays scenarios, you can access the following commands when you right-click a scenario entry:
  - *Delete* - deletes the selected scenario.
  - *Properties* - opens the Edit Scenario dialog, where you can edit the scenario properties.
- **Drag Mode** – opens a submenu for selecting which action is performed when dragging and dropping an object from the Navigator into a document. Depending on the mode you select, the icon indicates whether a hyperlink, a link, or a copy is created.
  - *Insert as Hyperlink* - hyperlinks the entire item.
  - *Insert as Link* - links the copied item to the original item so that when the original item is changed, that change will be reflected in the current document.
  - *Insert as Copy* - inserts a copy of the selected item.

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 the default Calc names, for example Scenario 1, Image 1, Image 2, Object 1, and so on. These default names may not correspond to the position of the object in the document.

Using document properties

To open the Properties dialog for a document, go to **File > Properties** on the Menu bar. The Properties dialog provides information about the spreadsheet and allows you to set some of its properties. The dialog is shown in Figure 24 and its tabs are described below.

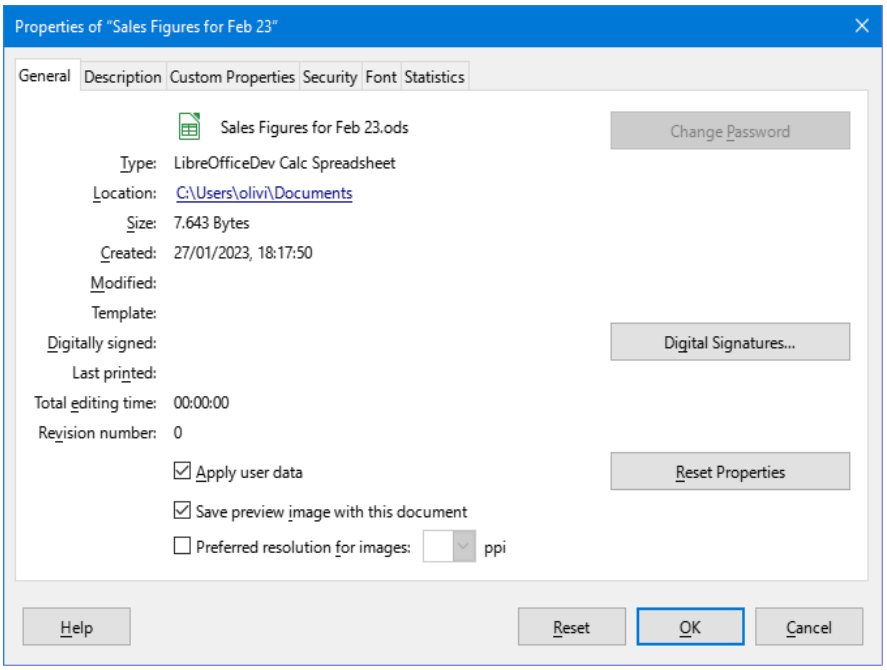


Figure 24: Properties dialog, General tab

General

Contains basic information about the current file.

- The text at the top of the dialog displays the file name.
- **Change Password** – opens a dialog to change the password. It is only active if a password has been set for the file.
- **Type** – displays the file type of the current document.
- **Location** – displays the path and the name of the directory where the file is stored. In the case of a local file, this is a clickable link that opens the file browser to view the folder. For remote content (shown as, for example, http://...), the link opens a web browser.
- **Size** – displays the size of the current document in bytes.
- **Created** – displays the date, time, and author when the file was first opened.
- **Modified** – displays the date, time, and author when the file was last saved in a LibreOffice file format.
- **Template** – displays the template that was used to create the file, if applicable.
- **Digitally signed** – displays the date and time when the file was last signed as well as the name of the author who signed the document.
- **Digital Signatures** – opens the Digital Signatures dialog where you can manage digital signatures for the current document.
- **Last printed** – displays the date, time, and user name when the file was last printed.
- **Total editing time** – displays the amount of time that the file has been open for editing since the file was created. The editing time is updated when you save the file.
- **Revision number** – displays the number of times that the file has been saved.
- **Apply user data** – saves the full name of the user with the file. You can edit the name by going to **Tools > Options > LibreOffice > User Data** on the Menu bar.
- **Save preview image with this document** – saves a thumbnail.png inside the document. These images may be used by a file manager under certain conditions.
- **Preferred resolution for images**: Check this box to select the preferred image resolution in points per inch, which is used as default when an image is inserted and resize it according to the value in the list box.
- **Reset Properties** – resets the editing time to zero, the creation date to the current date and time, and the version number to 1. The modification and printing dates are also deleted.

Description

Contains optional editable descriptive information about the spreadsheet.

- **Title** – enter a title for the spreadsheet.
- **Subject** – enter a subject for the spreadsheet. You can use a subject to group documents with similar content.
- **Keywords** – enter the words that you want to use to index the content of the spreadsheet. Keywords must be separated by commas. A keyword can contain white space characters or semicolons.
- **Comments** – enter comments to help identify the spreadsheet.

Custom Properties

Use this page to assign custom information fields to the spreadsheet. In a new spreadsheet, this page may be blank. If the new spreadsheet is based on a template, this page may contain fields. You can change the name, type, and contents of each row. The information in the fields will be exported as metadata to other file formats.

Click **Add Property** to add a new custom property. Use the red "X" button at the end of an entry to delete the custom property.

CMIS Properties

Only relevant for spreadsheets stored on remote servers. See the Help or the *Getting Started Guide* for more information.

Security

Enables two password-protected security options.

- **Open file read-only** – select to allow this document to be opened only in read-only mode. This file sharing option protects the document against accidental changes. It is still possible to edit a copy of the document and save that copy with the same name as the original.
- **Record changes** – select to require that all changes be recorded. To protect the recording state with a password, click **Protect** and enter a password. This is similar to **Edit > Track Changes > Record** on the Menu bar. However, while other users of this document can apply their changes, they cannot disable change recording without knowing the password.
- **Protect** or **Unprotect** - protects the change recording state with a password. If change recording is protected for the current document, the button is named **Unprotect**. Click **Unprotect** to disable the protection.

Font

When **Embed fonts in the document** is selected, any fonts used in the spreadsheet will be embedded into the document when it is saved. This may be useful if you are creating a PDF of the spreadsheet and want to control how it will look on other computer systems.

Only embed fonts that are used in documents – If fonts have been defined for the spreadsheet (for example, in the template), but have not been used, select this option to not embed them.

Font scripts to embed - You can choose which types of fonts are embedded: Latin, Asian, Complex. See the *Getting Started Guide* for more information.

Statistics

Displays statistics for the current file: the number of sheets, cells, pages, and formula groups.



Calc Guide 7.5

Chapter 2
Entering and Editing Data

Introduction

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

Entering data

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

Numbers

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

Negative numbers

To enter a negative number, either type a minus sign in front of the number or enclose the number in parentheses, for example (1234). The result for both methods of entry is the same; for example, -1234.

Leading zeroes

By default, if a number is entered with leading zeroes, for example 01481, Calc will drop the leading zeroes. To retain both the number format and a minimum number of characters in a cell when entering numbers, for example 1234 and 0012, use one of these methods to add leading zeroes.

Method 1

1) With the cell selected, go to **Format > Cells** on the Menu bar, or right-click on the cell and select **Format Cells** in the context menu, or use the keyboard shortcut `Ctrl+1,` to open the Format Cells dialog (Figure 25).
2) Make sure the *Numbers* tab is selected, then select **Number** in the *Category* list.
3) In the **Leading zeroes** field within the Options area, enter the minimum number of characters required. For example, for four characters, enter 4. Any number less than four characters will then have leading zeroes added, for example 12 becomes 0012.
4) Click **OK**. The number entered retains its number format and any formula used in the spreadsheet will treat the entry as a number in formula functions.

Method 2

1) Select the cell.
2) On the Sidebar, go to the Properties deck.
3) In the *Number Format* panel (Figure 26), select **Number** in the drop-down list, and enter 4 in the **Leading zeroes** field. Formatting is applied immediately.

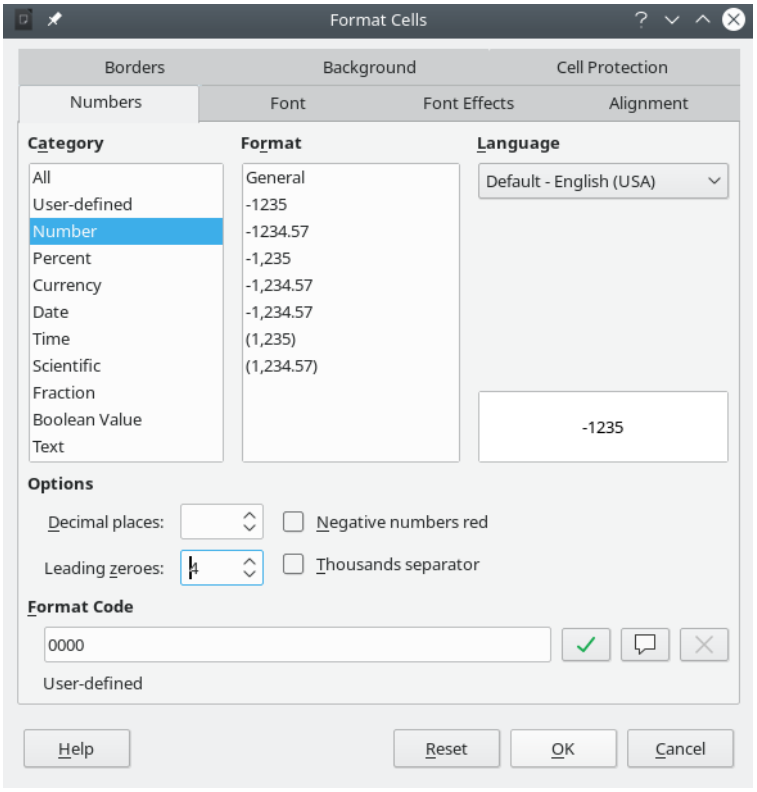


Figure 25: Format Cells dialog – Numbers tab

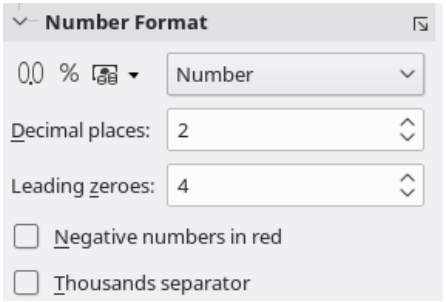


Figure 26: Set leading zeroes in Sidebar

Numbers as text

Numbers can also be converted into text using one of the following methods.

Method 1

1) With the cell selected, open the Format Cells dialog (Figure 25).
2) Make sure the *Numbers* tab is selected, then select **Text** from the *Category* list.
3) Click **OK**. The number is converted to text and, by default, is left-aligned. You can change the formatting and alignment of any text numbers just as you would with normal text.

Method 2

1) Select the cell.
2) On the Sidebar, go to the Properties deck.
3) In the *Number Format* panel (Figure 26), select **Text** in the drop-down list. Formatting is applied to the cell immediately.

Tip

If numerical characters do not need to be treated as numbers in calculations (for example when entering zip codes), you can type an apostrophe (') before the number, for example '01481. When you move the cell focus, the apostrophe is removed, the leading zeroes are retained, and the number is converted to left-aligned text.

Text

Click in a cell and type the text. The text is left-aligned by default. Cells can contain several lines of text. If you want to use paragraphs, press `Ctrl+Enter` to create another paragraph.

On the Formula Bar, you can extend the Input line if you are entering several lines of text. Click on the **Expand / Collapse Formula Bar** icon located on the right of the Formula Bar and the Input line becomes multi-line, as shown in Figure 27. You can drag the bottom of the Input line up and down to control its exact height. Click the **Expand / Collapse Formula Bar** icon again to return the Input line to its default single line height.

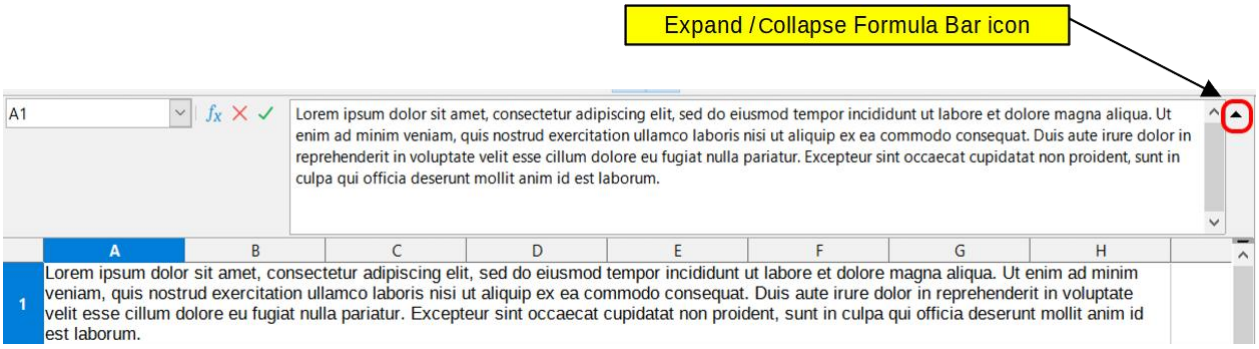


Figure 27: Expanded Input line on Formula Bar

Date and time

Select the cell and type the date or time. You can separate the date elements with a slash (/) or a hyphen (-) or use text, for example 10 Oct 2020. The date format automatically changes to the selected format used by Calc.

Note

Tools > Options > Language Settings > Languages > Formats > Date acceptance patterns defines the date patterns that will be recognized by Calc. In addition, every locale accepts input in an ISO 8601 YYYY-MM-DD pattern (for example, 2020-07-26).

When you enter a time, separate time elements with colons, for example 10:43:45. The time format automatically changes to the selected format used by Calc.

To change the date or time format used by Calc:

1) With the cell selected, open the Format Cells dialog (Figure 25).
2) Make sure the **Numbers** tab is selected, then select **Date** or **Time** in the *Category* list.
3) Select the date or time format you want to use from the *Format* list.
4) Click **OK** to save the changes and close the dialog.

Note

The date format will be influenced by the system or document language settings.

Special characters

A special character is a character not normally found on a standard keyboard; for example, © ¾ æ ç ñ ö ø ¢. To insert a special character:

1) Select a cell and place the cursor in the cell or in the Input line, at the point where you want the character to appear.
2) Go to **Insert > Special Character** on the Menu bar to open the Special Characters dialog (Figure 28).

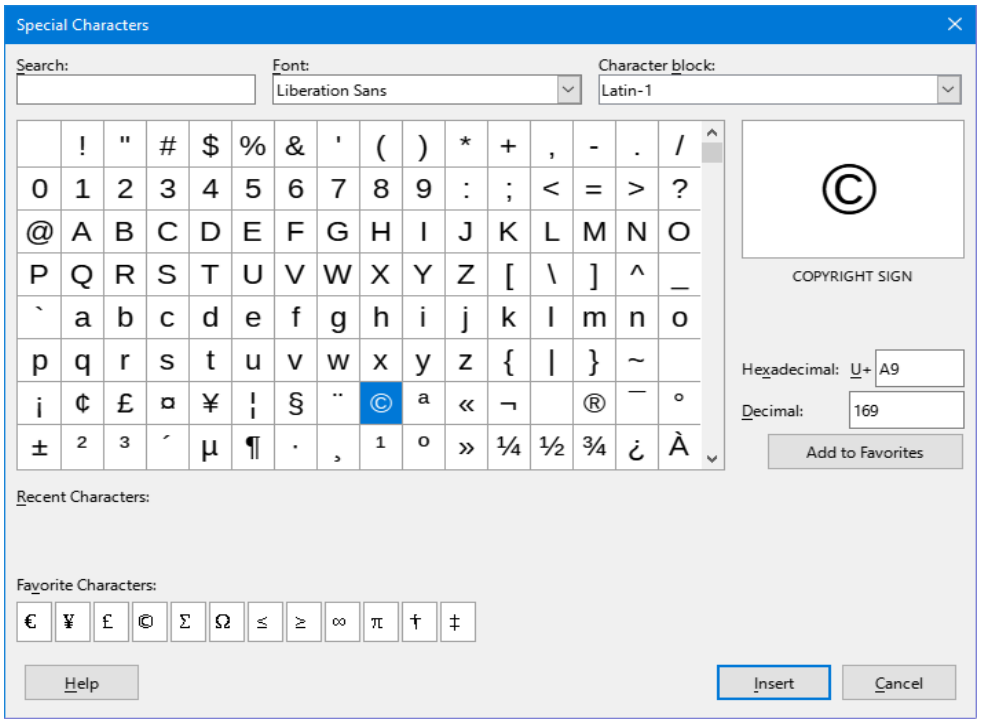


Figure 28: Special Characters dialog

3) From the grid of characters, select the required character. The last character selected is shown on the right of the Special Characters dialog along with its numerical code.
4) Any recently inserted characters are shown below the grid of characters and can be selected in the same way as any other character in the dialog.
5) At the bottom of the dialog there is provision for building a small collection of *Favorite Characters*. To add a new character to the collection, select the required character and click the **Add to Favorites** button. To remove an existing character from the collection, select the character and click the **Remove from Favorites** button.
6) Double-click a special character to insert it into the cell, without closing the dialog. Click **Insert** to insert a selected special character into the cell and close the dialog.

Tip

You can quickly insert one of your recent or favorite special characters by clicking the **Insert Special Characters** icon on the Standard toolbar and selecting the required character from the drop-down. Click **More Characters** on this drop-down to open the Special Characters dialog (Figure 28).

Note

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

AutoCorrect options

Calc automatically applies many changes during data input using AutoCorrect, unless you have deactivated any AutoCorrect changes. You can undo any AutoCorrect changes by selecting **Edit > Undo** on the Menu bar, pressing the keyboard shortcut `Ctrl+Z`, or manually going back to the change and replacing the autocorrection with what you actually want to see.

To change the AutoCorrect options, go to **Tools > AutoCorrect Options** on the Menu bar to open the AutoCorrect dialog (Figure 29).

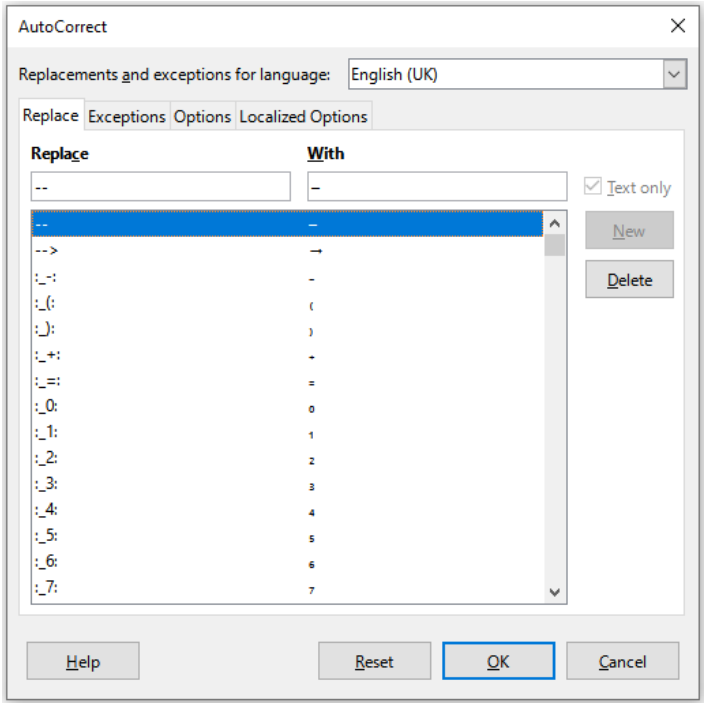


Figure 29: AutoCorrect dialog

- **Replace –** edit the replacement table for automatically correcting or replacing words or abbreviations.
- **Exceptions –** specify the abbreviations or letter combinations that you do not want corrected automatically.
- **Options –** select the options for automatically correcting errors as you type.
- **Localized Options –** specify the AutoCorrect options for quotation marks and for options that are specific to the language of the text.
- **Reset –** reset modified values back to their previous values.

Inserting dashes

Calc provides text shortcuts so that you can quickly insert dashes into a cell and these shortcuts are shown in Table 4.

Table 4: Inserting dashes

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)

Speeding up data entry

Entering data into a spreadsheet can be very labor-intensive, but Calc provides tools for removing some of the drudgery from input. These tools include drag and drop (to move or copy contents of one location to another using a mouse), an AutoInput tool, the Fill tool, and selection lists.

The Fill tool and selection lists automate input of repetitive material into cells. Calc also has the ability to input information into multiple sheets of the same spreadsheet at the same time.

AutoInput tool

The AutoInput function in Calc automatically completes entries, based on other entries in the same column.

When text is highlighted in a cell, AutoInput can be used as follows:

- Press *Enter* to accept the completion and move to the next cell. Press *F2* to accept the completion and move the cursor to the end of the text inside the cell. Clicking outside the cell will accept the completion and select the clicked cell.
- When multiple matches continue with the same letters they will appear in the cell after what has already been typed. Press → to accept the partial completion and move the cursor to the end of the text inside the cell.
- To view more completions that start with the same letters, use the key combinations *Ctrl+Tab* to scroll forward, or *Ctrl+Shift+Tab* to scroll backward.
- To see a list of all available AutoInput text items for the current column, use the keyboard combination *Alt+↓*. See “Selection lists” on page 68 for more information.

When typing formulas using characters that match function names, a Help tip will appear listing the available functions that start with matching characters.

AutoInput ignores the case sensitivity of any data you enter. If, for example, you have written “Total” in a cell, you cannot then use AutoInput to enter “total” in another cell of the same column without first deactivating AutoInput or entering “total” manually.

By default, AutoInput is activated in Calc. To turn it off, go to **Tools** on the Menu bar and deselect **AutoInput**.

Fill tool

You can use the Fill tool in Calc to duplicate existing content or create a series in a range of cells in the spreadsheet as shown by the examples in Figure 30.

1) Select the cell containing the contents you want to copy or start the series from.
2) Drag the mouse pointer in any direction or hold down the *Shift* key and click in the last cell you want to fill.
3) Go to **Sheet > Fill Cells** on the Menu bar and select the direction in which you want to copy or create data (**Down**, **Right**, **Up**, **Left**, **Sheets**, **Series**, or **Random Number**). A menu option will be grayed out if it is not available.

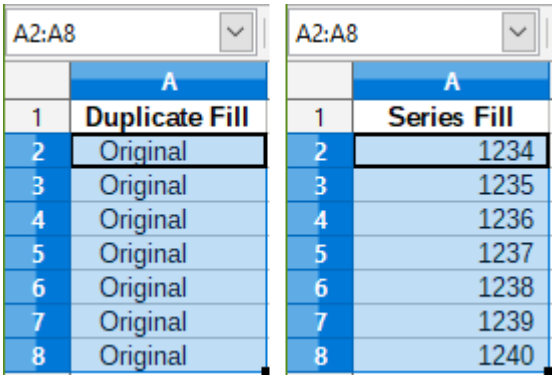


Figure 30: Examples of using the Fill tool

Tip

You can use the keyboard shortcut *Ctrl+D* as an alternative to selecting **Sheet > Fill Cells > Fill Down** on the Menu bar.

Alternatively, you can use a shortcut to fill cells:

1) Select the cell containing the contents you want to copy or start the series from.
2) Move the pointer over the small selection handle in the bottom right corner of the selected cell. The pointer will change shape.
3) Click and drag in the direction you want the cells to be filled, vertical or horizontal. If the original cell contained text, then the text will automatically be copied. If the original cell contained a number or text from a defined list (see “Defining a fill series” on page 68), a series will be created. To duplicate the number or text instead, hold *Ctrl* while dragging.

Caution

When you are selecting cells so you can use the Fill tool, make sure that none of the cells contain data, except for the cell data you want to use. When you use the Fill tool, any data contained in selected cells is overwritten.

Using a fill series

When you select a series fill from **Sheet > Fill Cells > Fill Series** on the Menu bar, the Fill Series dialog (Figure 31) opens. Here you can select the type of series you want or create your own list.

- **Direction** – determines the direction of series creation.
  - *Down* – creates a downward series in the selected cell range for the column using the defined increment to the end value.

- *Right* – creates a series running from left to right within the selected cell range using the defined increment to the end value.
- *Up* – creates an upward series in the selected cell range of the column using the defined increment to the end value.
- *Left* – creates a series running from right to left within the selected cell range using the defined increment to the end value.

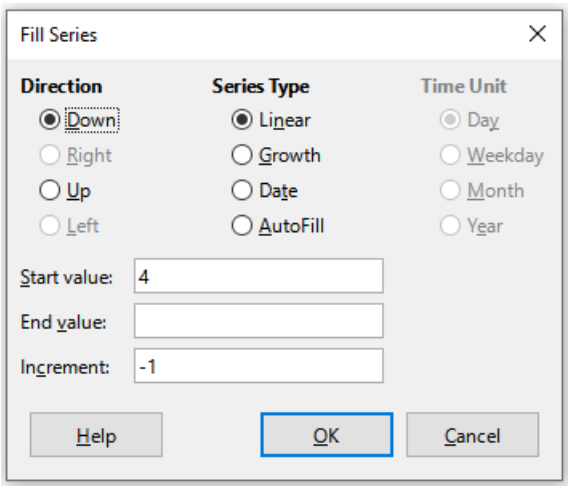


Figure 31: Fill Series dialog

- **Series Type** – defines the series type. These are:
  - *Linear* – creates a linear number series using the defined increment and end value.
  - *Growth* – creates a growth series using the defined increment and end value.
  - *Date* – creates a date series using the defined increment and end date.
  - *AutoFill* – forms a series directly in the sheet. The AutoFill function takes account of customized lists. For example, by entering January in the first cell, the series is completed using the list defined in **Tools > Options > LibreOffice Calc > Sort Lists**. *AutoFill* tries to complete a value series by using a defined pattern. For example, a numerical series using 1,3,5 is automatically completed with 7,9,11,13; a date and time series using 01.01.99 and 15.01.99, is completed using an interval of fourteen days.
- **Time Unit** – in this area you specify the desired unit of time. This area is only active if the **Date** option has been selected in *Series Type*. The options are:
  - *Day* – creates a series using seven days.
  - *Weekday* – creates a series of five day sets.
  - *Month* – creates a series from the names or abbreviations of the months.
  - *Year* – creates a series of years.
- **Start value** – determines the start value for the series. Use numbers, dates, or times.
- **End value** – determines the end value for the series. Use numbers, dates, or times.
- **Increment** – determines the value by which the series of the selected type increases by each step. Entries can only be made if the linear, growth, or date series types have been selected.

Defining a fill series

To define your own fill series:

1) Go to **Tools > Options > LibreOffice Calc > Sort Lists** to open the Sort Lists dialog (Figure 32). This dialog shows any previously defined series in the *Lists* box on the left and the contents of the highlighted list in the *Entries* box.
2) Click **New** and the *Entries* box is cleared.
3) Type the series for the new list in the *Entries* box, with one entry per line (Figure 33).
4) Click **Add** and the new list will now appear in the *Lists* box.
5) Click **OK** to save the new list and close the dialog.

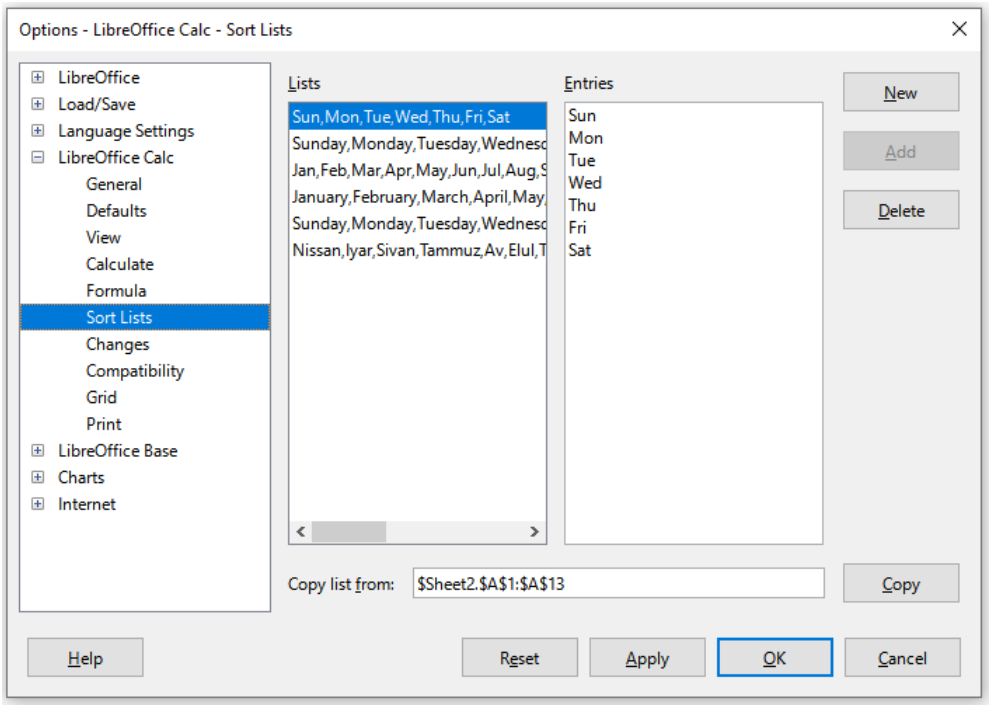


Figure 32: Sort Lists dialog

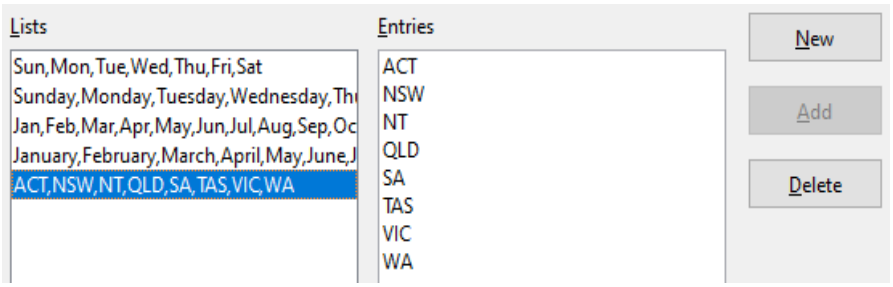


Figure 33: Creating a new sort list

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.

1) Select a blank cell in a column that contains cells with text entries.

2) Right-click and select **Selection List** in the context menu, or use the keyboard shortcut `Alt+↓`. A drop-down list appears listing any cell in the same column that either has at least one text character or whose format is defined as text.

3) Click on the text entry you require and it is entered into the selected cell.

Merging and splitting cells

Merging

You can select contiguous cells and merge them into one as follows:

1) Select the range of contiguous cells you want to merge.

2) Go to **Format > Merge Cells > Merge Cells** or **Merge and Center Cells** on the Menu bar, or click on the **Merge and Center Cells** icon on the Formatting toolbar, or right-click on the selected cells and select **Merge Cells** in the context menu. Using **Merge and Center Cells** will center align any contents in the cells.

3) If the cells contain any data, the Merge Cells dialog (Figure 34) opens, showing choices for moving or hiding data in the hidden cells.

4) Make your selection and click **OK.**

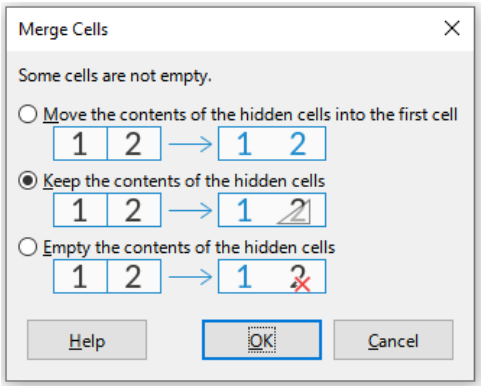


Figure 34: Merge choices for non-empty cells

Caution

Merging cells can lead to calculation errors in formulas used in the spreadsheet.

Splitting

You can reverse a merge operation by splitting a cell that was previously created by merging several cells.

1) Select a merged cell.

2) Go to **Format > Merge Cells > Split Cells** on the Menu bar, or click on the **Merge and Center Cells** icon on the Formatting toolbar, or right-click and select **Split Cells** in the context menu.

3) Any data in the cell will remain in the first cell. If the hidden cells did have any contents before the cells were merged, then you may have to manually move the contents to the correct cell.

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 information on each sheet individually, you can enter it in several sheets at the same time.

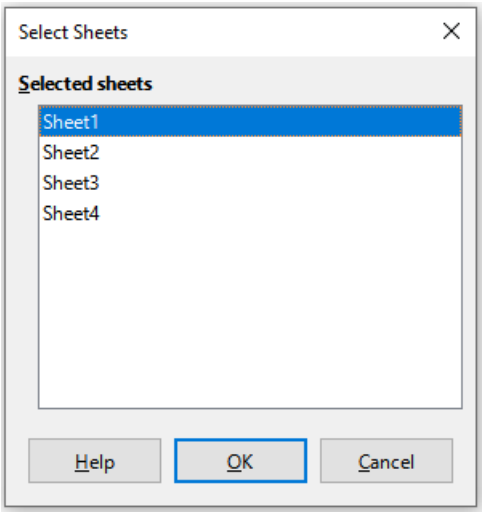


Figure 35: Select Sheets dialog

1) Go to **Edit > Select > Select Sheets** on the Menu bar to open the Select Sheets dialog (Figure 35).
2) Select the individual sheets where you want the information to be repeated.
3) Click **OK** to select the sheets and the sheet tabs will be highlighted.
4) Enter the information in the cells on the sheet where you want the information to first appear and the information will be repeated in the selected sheets.
5) Deselect the sheets when you have finished entering the information that you want repeated in the sheets.

Tip

You can select sheets with the mouse, as described in the “Selecting sheets” section of Chapter 1, Introduction.

Caution

This technique automatically overwrites, without any warning, any information that is already in the cells on the selected sheets. Make sure you deselect the additional sheets when you have finished entering the information to be repeated before continuing to enter data into the spreadsheet.

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 are limited to predefined information. For example, a cell may 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, it can also define the range of contents that can be entered, and provide help messages explaining the content rules 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 start a macro when an error is entered.

Defining validation

To validate any new data entered into a cell:

1) Select a cell and go to **Data > Validity** on the Menu bar to open the Validity dialog (Figure 36).

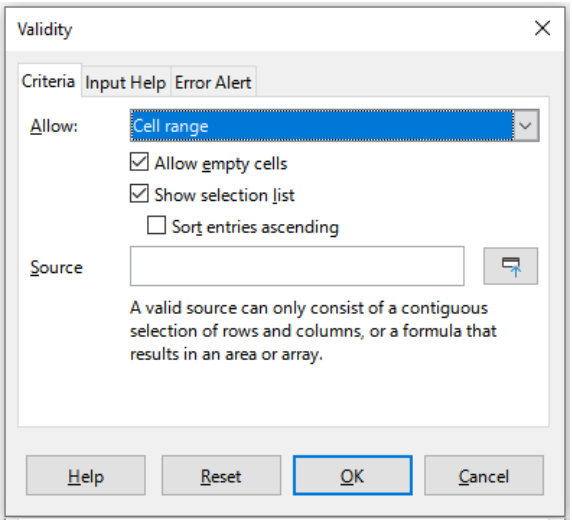


Figure 36: Validity dialog – Criteria tab

2) Define the type of contents that can be entered in that cell using the options given on the tabbed pages for *Criteria*, *Input Help*, and *Error Alert*. The options are explained below.

Criteria options

Specify the validation rules for the selected cells using the *Criteria* tab of the Validity dialog as shown in Figure 36. For example, you can define criteria such as numbers between 1 and 10, or texts that are no more than 20 characters.

The options available on the *Criteria* tab will depend on what has been selected in the *Allow* drop-down list.

- **Allow** – select a validation option for the selected cells from the drop-down list.
  - *All values* – no limitation.
  - *Whole Numbers* – only whole numbers allowed.
  - *Decimal* – all numbers correspond to decimal format.
  - *Date* – all numbers correspond to date format. The entered values are formatted the next time the dialog is called up.
  - *Time* – all numbers correspond to time format. The entered values are formatted the next time the dialog is called up.

- *Cell range* – allow only values that are given in a cell range. The cell range can be specified explicitly, or as a named database range, or as a named range. The range may consist of one column or one row of cells. If you specify a range of columns and rows, only the first column is used.
- *List* – allow only values or strings specified in a list. Strings and values can be mixed. Numbers evaluate to their value, so if you enter the number 1 in the list, the entry 100% is also valid.
- *Text length* – allow entries whose length matches the condition on the number of characters that has been set.
- *Custom* – allow entries that correspond to a formula entered in the *Formula* box.

- **Allow empty cells** – in conjunction with **Tools > Detective > Mark Invalid Data**, this defines that blank cells are shown as invalid data (disabled) or not shown (enabled).
- **Show selection list** – shows a list of all valid strings or values to select from. The list can be opened either by clicking the down arrow at the right of the cell, or by selecting the cell and pressing *Alt+↓*.
- **Sort entries ascending** – sorts the selection list in ascending order and filters duplicates from the list. If not checked, the order from the data source is taken.
- **Source** – enter the cell range that contains the valid values or text.
- **Entries** – enter the entries that will be valid values or text strings.
- **Data** – select the comparative operator that you want to use from the drop-down list. The available operators depend on what you have selected in the *Data* drop-down list. For example, if you select **valid range**, the *Minimum* and *Maximum* input boxes replace the *Value* box.
- **Value** – enter the value for the data validation option that you selected in the *Data* drop-down list.
- **Minimum** – enter the minimum value for the data validation option that you selected in the *Data* drop-down list.
- **Maximum** – enter the maximum value for the data validation option that you selected in the *Data* drop-down list.
- **Formula** – enter a formula that can be interpreted as true (non-zero) or false (zero) to provide a custom validation. For example, assuming cell A4 was selected before opening the dialog, you could enter `ISEVEN(A4)` to indicate that only even values should be entered in cell A4.

Input Help options

Enter the message to be displayed when the cell or cell range is selected in the spreadsheet (Figure 37).

- **Show input help when cell is selected** – displays the message that you enter in the *Title* and *Input help* boxes when the cell or cell range is selected in the sheet. If you enter text in the *Title* and *Input help* boxes and then deselect this option, the text will not be displayed.
- **Title** – enter the title to be displayed when the cell or cell range is selected.
- **Input help** – enter the message to be displayed when the cell or cell range is selected.

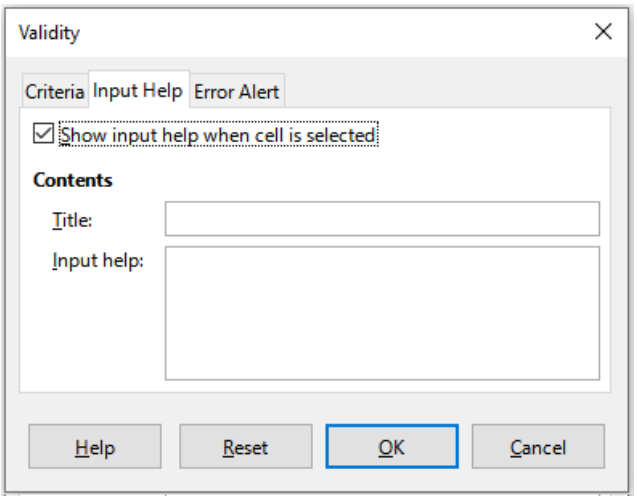


Figure 37: Validity dialog – Input Help tab

Error Alert options

Define the error message that is displayed when invalid data is entered in a cell (Figure 38).

- **Show error message when invalid values are entered** – when selected, displays the error message that you enter in the *Contents* area when invalid data is entered in a cell.
- **Action** – select the action that you want to occur when invalid data is entered in a cell.
  - *Stop* – rejects the invalid entry and displays a dialog that you have to close by clicking **OK**.
  - *Warning* and *Information* – displays a dialog that can be closed by clicking **OK** or **Cancel**. The invalid entry is only rejected when you click **Cancel**.
  - *Macro* – activates the **Browse** button to open the Macro Selector dialog where you can select a macro that is executed when invalid data is entered in a cell. The macro is executed after the error message is displayed.
- **Title** – enter the title of the macro or the error message that you want to display when invalid data is entered in a cell.
- **Error message** – enter the message that you want to display when invalid data is entered in a cell.

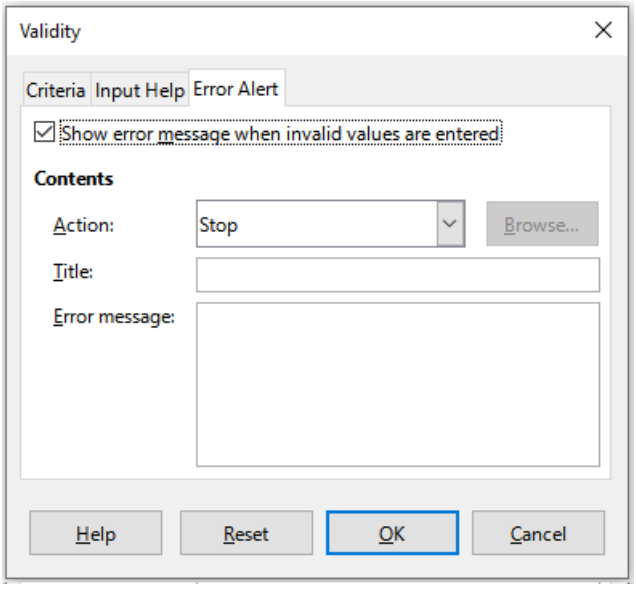


Figure 38: Validity dialog – Error Alert tab

Calc Detective

The Detective is a tool within Calc that you can use to locate any cells in a spreadsheet that contain invalid data if the cells are set to accept invalid data with a warning.

1) Go to **Tools > Detective > Mark Invalid Data** on the Menu bar to locate any cells containing invalid data. The Detective function marks any cells containing invalid data.
2) Correct the data so that it becomes valid.
3) Go to **Tools > Detective > Remove All Traces** on the Menu bar and any cells that were previously marked as containing invalid data have the invalid data mark removed.

Note

A validity rule is considered part of the format for a cell. If you select **Delete all** on the Delete Contents dialog (Figure 40), then it is removed. If you want to copy a validity rule with the rest of the cell, use **Edit > Paste Special > Paste Special** to open the Paste Special dialog (Figure 41), then select **Paste all** or **Formats** and click **OK**.

Editing data

Deleting data

Deleting cell data only

Data can be deleted from a cell without deleting any of the cell formatting. Select a cell or a range of cells and then press the `Delete` key.

Deleting cells

This option completely deletes selected cells, columns, or rows. The cells below or to the right of the deleted cells will fill the space.

1) Select a cell or a range of cells.

2) Select **Sheet > Delete Cells** on the Menu bar, or right-click inside the selected cells and choose **Delete** in the context menu, or press the *Ctrl*+– keys.

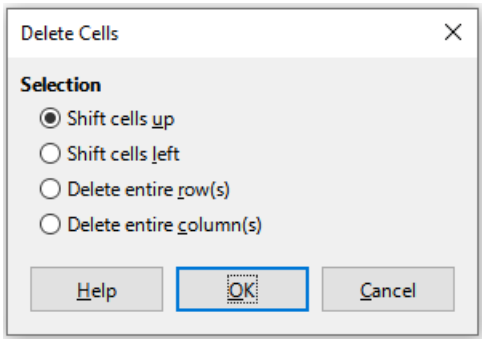


Figure 39: Delete Cells dialog

3) The Delete Cells dialog (Figure 39) provides four options to specify how sheets are displayed after deleting cells:
   - **Shift cells up**. Fills the resulting space with data from the cells underneath.
   - **Shift cells left**. Fills the resulting space with data from the cells to the right of the deleted cells.
   - **Delete entire row(s)**. After selecting at least one cell, deletes the entire row from the sheet.
   - **Delete entire column(s)**. After selecting at least one cell, deletes the entire column from the sheet.
4) To confirm the selection, click **OK**.

Note

The selected delete option is stored and reloaded when the dialog is next opened, until LibreOffice is closed. After opening LibreOffice again the delete option contains the default setting.

Deleting data and formatting

Data and cell formatting can be deleted from a cell at the same time. To do this:

1) Select a cell or a range of cells.
2) Select **Sheet > Clear Cells** on the Menu bar, or right-click inside the selected cells and choose **Clear Contents** from the context menu, or press the *Backspace* key.
3) In the Delete Contents dialog (Figure 40), choose any of the options or choose **Delete All**. Click **OK**.

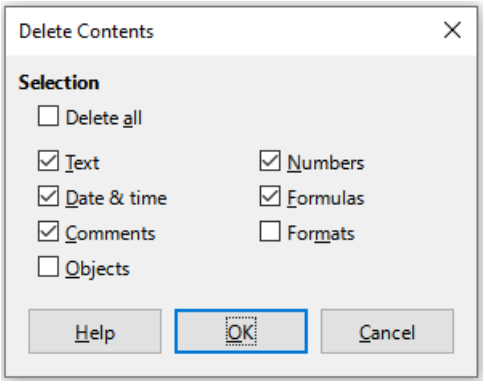


Figure 40: Delete Contents dialog

Replacing data

To completely replace data in a cell and insert new data, select the cell and type in the new data. The new data will replace the data already contained in the cell and will retain the original formatting used in the cell.

Alternatively, click in the Input line on the Formula Bar, then double-click on the data to highlight it completely and type the new data.

Editing data

Sometimes it is necessary to edit the contents of a cell without removing all of the data from the cell. For example, changing the phrase “Sales in Qtr. 2” to “Sales rose in Qtr” can be done as follows.

Using the keyboard

1) Click in the cell to select it.
2) Press the `F2` key and the cursor is placed at the end of the cell.
3) Press the `Backspace` key to delete any data up to the point where you want to enter new data.
4) Alternatively, use the keyboard arrow keys to reposition the cursor where you want to start entering the new data in the cell, then press the `Delete` key or `Backspace` key to delete any unwanted data before typing the new data.
5) When you have finished editing, press the `Enter` key to save the changes.

Tip

Each time you select a cell, the contents are displayed in the Input line on the Formula Bar. Using the Input line may be easier when editing data.

Using the mouse

1) Double-click on the cell to select it and place the cursor in the cell for editing.
2) Reposition the cursor to where you want to start editing the data in the cell.
3) Alternatively, single-click to select the cell, then move the cursor to the Input line on the Formula Bar and click at the position where you want to start editing the data in the cell.
4) When you have finished, click away from the cell to deselect it and the editing changes are saved.

Paste Special function

You can use the Paste Special function to paste into another cell selected parts of the data in the original cell or cell range, for example its format or the result of its formula.

Paste Special dialog

1) Select a cell or a cell range.
2) Go to **Edit > Copy** on the Menu bar, or click the **Copy** icon on the Standard toolbar, or right-click and select **Copy** in the context menu, or press `Ctrl+C`.
3) Select the target cell or cell range.
4) Go to **Edit > Paste Special > Paste Special** on the Menu bar, or right-click and select **Paste Special > Paste Special** in the context menu, or use the keyboard shortcut `Ctrl+Shift+V`, to open the Paste Special dialog (Figure 41).
5) Select the options for *Paste, Operations, Options,* and *Shift Cells*. The Paste Special options are explained below.
6) Click **OK** to paste the data into the target cell or range of cells and close the dialog.

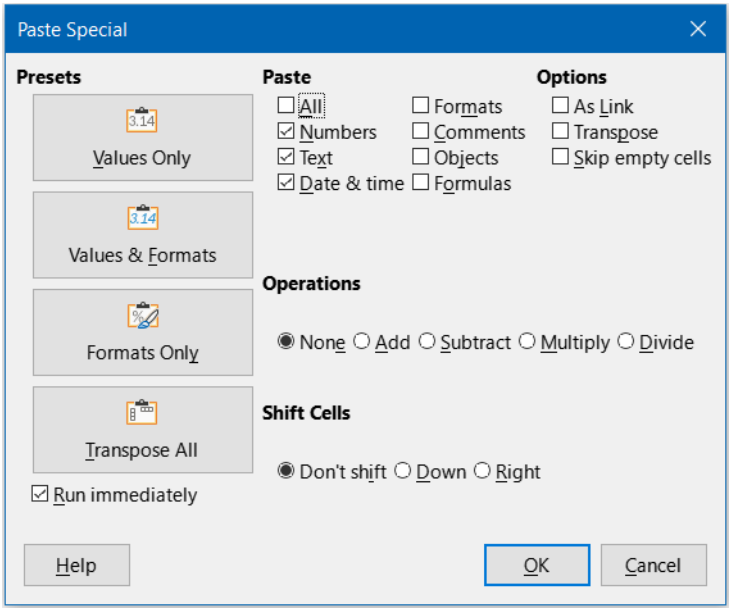


Figure 41: Paste Special dialog

Tip

Instead of steps 5) and 6) above, you can choose one of the four preset options at the left of the dialog – **Values Only**, **Values & Formats**, **Formats Only**, or **Transpose All**. With the **Run immediately** checkbox ticked, clicking one of these shortcut buttons actions the requested paste operation and closes the dialog.

Paste Special options

- **Paste** - select a format for the clipboard contents that you want to paste.
  - *All* - pastes all cell contents, comments, formats, and objects into the current document.
  - *Text* - pastes cells containing text.
  - *Numbers* - pastes cells containing numbers.

- *Date & time* – pastes cells containing date and time values.
- *Formulas* – pastes cells containing formulas.
- *Comments* – pastes comments that are attached to cells. If you want to add the comments to the existing cell content, select the *Add* operation.
- *Formats* – pastes cell format attributes.
- *Objects* – pastes objects contained within the selected cell range. These can be OLE objects, chart objects, or drawing objects.

- **Operations** – select the operation to apply when you paste cells into the sheet.
  - *None* – does not apply an operation when you insert the cell range from the clipboard. The contents of the clipboard will replace existing cell contents.
  - *Add* – adds the values in the clipboard cells to the values in the target cells. Also, if the clipboard only contains comments, adds the comments to the target cells.
  - *Subtract* – subtracts the values in the clipboard cells from the values in the target cells.
  - *Multiply* – multiplies the values in the clipboard cells with the values in the target cells.
  - *Divide* – divides the values in the target cells by the values in the clipboard cells.
- **Options** – sets the paste options for the clipboard contents.
  - *Skip empty cells* – does not replace target cells with empty cells from the clipboard. If you use this option in conjunction with the *Multiply* or the *Divide* operation, the operation is not applied to the target cell of an empty cell in the clipboard. If you select a mathematical operation and deselect *Skip empty cells*, empty cells in the clipboard are treated as zeroes. For example, if you apply the *Multiply* operation, the target cells are filled with zeroes.
  - *Transpose* – pastes the rows of the range in the clipboard as columns of the output range, and the columns of the range in the clipboard as rows.
  - *As Link* – inserts the cell range as a link, so that changes made to the cells in the source file are updated in the target file. To ensure that changes made to empty cells in the source file are updated in the target file, ensure that **All** is also selected in the *Paste* area. You can also link sheets within the same spreadsheet. When you link to other files, a DDE link is automatically created. A DDE link is inserted as a matrix formula and can only be modified as a whole.
- **Shift Cells** – set the shift options for the target cells when the clipboard content is inserted.
  - *Don't shift* – replaces target cells with inserted cells.
  - *Down* – shifts target cells downward when you insert cells from the clipboard.
  - *Right* – shifts target cells to the right when you insert cells from the clipboard.

Paste Only options

If you only want to copy text, numbers, or formulas to the target cell or cell range:

1) Select the source cell or cell range and copy the data.
2) Select the target cell or cell range.
3) Right-click on the target cell or cell range and select **Paste Special** in the context menu, then select **Text**, **Number**, or **Formula**.

4) Alternatively, use the **Paste Only Text**, **Paste Only Numbers**, or **Paste Only Formula** options in the **Edit > Paste Special** menu on the Menu bar.

Insert cell fields

You can insert a field linked to the date, sheet name, or document name in a cell.

1) Select a cell and double-click to activate edit mode.
2) Right-click and select **Insert Field > Date**, **Time**, **Sheet Name** or **Document Title** in the context menu.
3) Alternatively use the similar options in the **Insert > Field** menu on the Menu bar.

Note

The **Insert Field > Document Title** command inserts the name of the spreadsheet and not the title defined on the *Description* tab of the Properties dialog for the file.

Tip

The fields are refreshed when the spreadsheet is saved or recalculated when using the `Ctrl+Shift+F9` shortcut.

Group and outline

You can create an outline of your data and group rows or columns together so that you can collapse a group to hide it or expand a group to show it using a single click.

The basic controls for grouping and outlining show plus (+) or minus (-) signs on the group indicator to show or hide rows or columns. However, if there are groups nested within each other, the basic controls have numbered buttons so you can hide the different levels of nested groups.

Grouping

To group rows or columns:

1) Select the cells you want to group in the spreadsheet.
2) Go to **Data > Group and Outline > Group** on the Menu bar, or press the `F12` key.
3) On the Group dialog that opens, select either **Rows** or **Columns** and click **OK**. A group indicator appears to the left of any rows grouped or above any columns grouped. Figure 42 shows a group indicator on the left of the first two rows of the spreadsheet showing that they have been grouped.

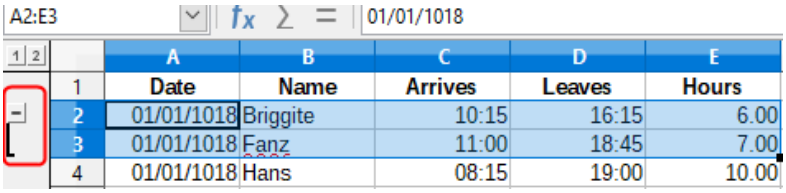


Figure 42: Group indicator

Hiding details

To hide the details of any group of rows or columns:

1) Click on the minus (-) sign on the group indicator.

2) Alternatively, select a cell within the group and go to **Data > Group and Outline > Hide Details** on the Menu bar.

3) The rows or columns are hidden and the minus (-) sign becomes a plus (+) sign on the group indicator.

Showing details

To show the details of any hidden groups of rows or columns:

1) Click on the plus (+) sign on the group indicator.

2) Alternatively, select a cell on each side of the hidden group and go to **Data > Group and Outline > Show Details** on the Menu bar.

3) The hidden rows or columns are displayed and the plus (+) sign becomes a minus (-) sign on the group indicator.

Ungrouping

To ungroup any groups of rows or columns:

1) Make sure the grouped rows or columns are displayed and click on a cell within the group.

2) Go to **Data > Group and Outline > Ungroup** on the Menu bar, or use the keyboard combination `Ctrl+F12`.

3) If only rows or only columns are grouped, they are ungrouped. If both rows and columns are grouped, select either **Rows** or **Columns** on the Ungroup dialog and click **OK**.

Caution

Any hidden groups of rows or columns must be displayed. If they are hidden, then the grouped rows or columns are deleted from the spreadsheet.

Note

If there are nested groups, only the last group of rows or columns created is ungrouped.

AutoOutline

If a selected cell range contains formulas or references, Calc can automatically outline the selection. For example, in Figure 43 the cells for the 1st and 2nd quarters each contain a sum formula for the three cells to their left. If you apply the **AutoOutline** command, the columns are grouped into two quarters.

To apply the AutoOutline function, go to **Data > Group and Outline > AutoOutline** on the Menu bar. Calc will then check for cells that contain formulas or references and automatically group the cells as necessary.

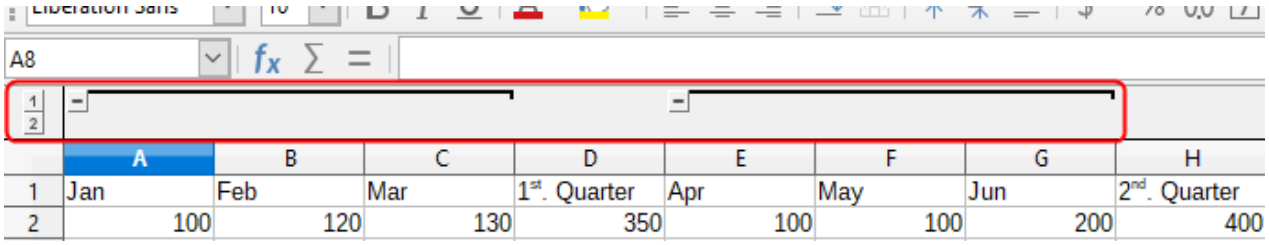


Figure 43: Example of AutoOutline

Removing

To remove any cell groups of rows or columns, go to **Data > Group and Outline > Remove Outline** on the Menu bar and any groups are removed.

For any cell group of rows or columns that are hidden, the grouping is removed from the cells and the cells are displayed in the spreadsheet.

Filtering

A filter is a list of conditions that each entry has to meet to be displayed. Calc provides three types of filters:

- **Standard** - specifies the logical conditions to filter the data.
- **AutoFilter** – filters data according to a specific value or string. Automatically filters the selected cell range and creates one-row list boxes where you can choose the items that you want to display.
- **Advanced** - uses filter criteria from specified cells.

Applying a standard filter

A standard filter is more complex than the AutoFilter. You can set as many as eight conditions as a filter, combining them with the operators AND or OR. Standard filters are mostly useful for numbers, although a few of the conditional operators can also be used for text.

1) Select a cell range in the spreadsheet.
2) Go to **Data > More Filters > Standard Filter** on the Menu bar to open the Standard Filter dialog (Figure 44).
3) Specify the filter criteria and filtering options that you want to use.
4) Click **OK** to carry out standard filtering and close the dialog. Any records that match the filter criteria and options that you specified are shown.

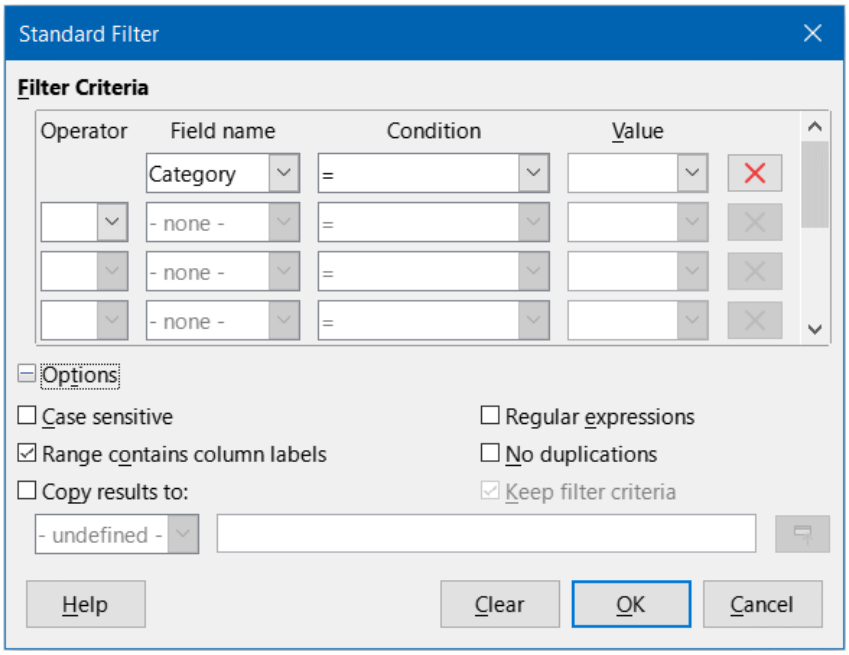


Figure 44: Standard Filter dialog

Use the Standard Filter dialog to define the filter conditions to be combined to form the overall filter criteria. Each filter condition is specified by indicating the type of logical operator, the name of a field, a logical condition, and a value.

- **Operator** – for the following arguments, you can choose between the logical operators AND and OR. No logical operator is specified for the first filter condition in the list.
- **Field name** – specifies the field names from the current table to set them in the argument. You will see the column identifiers if no text is available for the field names.
- **Condition** – specifies the comparative operators through which the entries in the *Field name* and *Value* fields can be linked.
- **Value** – specifies a value to filter the field. The *Value* list box contains all possible values for the specified *Field name*. Select a value to be used in the filter, including **Empty** and **Not Empty** entries.
- **Remove** – deletes the associated filter criterion from the *Filter Criteria* area.
- **Case sensitive** – distinguishes between uppercase and lowercase letters when filtering the data.
- **Range contains column labels** – includes the column labels in the first row of a cell range.
- **Copy results to** – select the check box and then select the cell range where you want to display the filter results. You can also select a named range from the list.
- **Regular expressions** – select to use regular expressions in the filter definition. If selected, you can use regular expressions in the *Value* field of the Standard Filter dialog if the *Condition* field is set to "=" (equal) or "<>" (not equal). For more information about regular expressions, see the section entitled "Regular expressions" in Chapter 1, Introduction.
- **No duplications** – excludes duplicate rows from the list of filtered data.
- **Keep filter criteria** – select **Copy results to** and then specify the destination range where you want to display the filtered data. If this box is checked, the destination range remains linked to the source range. You must have defined the source range under **Data > Define Range** as a database range. You can also reapply the defined filter at any time by clicking into the source range and then going to **Data > Refresh Range**.

Applying an AutoFilter

An AutoFilter adds a drop-down list to the top row of one or more data columns which lets you select the rows to be displayed. The list includes every unique entry in the selected cells sorted into lexical order (see https://www.dictionary.com/browse/lexical-order for an explanation of lexical order). AutoFilter can be used on multiple sheets without first defining a database range.

1) Click in a cell range on the spreadsheet. If you want to apply multiple AutoFilters to the same sheet, you must first define database ranges, then apply the AutoFilters to the database ranges.
2) Go to **Data > AutoFilter** on the Menu bar, click the **AutoFilter** icon on the Standard toolbar, or press *Ctrl*+*Shift*+*L*. An arrow button is added to the head of each column in the database range and the size of these buttons scales according to the sheet's zoom level.
3) Click the arrow or small triangle in the column that contains the value or string that you want to set as the filter criteria (shown in Figure 45).

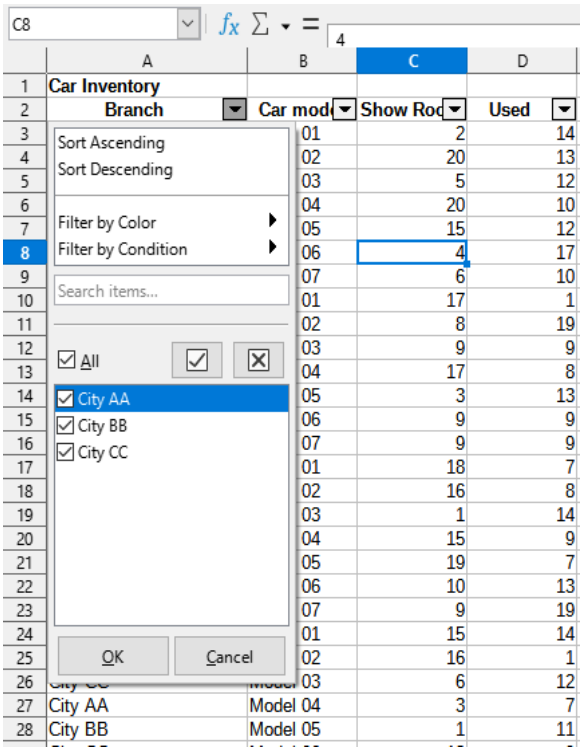


Figure 45: AutoFilter example

4) Select one or more values or enter a string to be used as the filter criteria in the Search items box. After clicking **OK** only the records matching the filter criteria will be visible. Rows affected by the AutoFilter will have their numbers displayed in blue. Columns where filtering conditions were created will display the arrow button in blue.

Filtering by color

You can filter data by the colors used in the cells. For cell background colors, a list of background colors used in the range appears. Select the desired color for filtering. The **No Fill** options is used if the cells don't have a background color set.

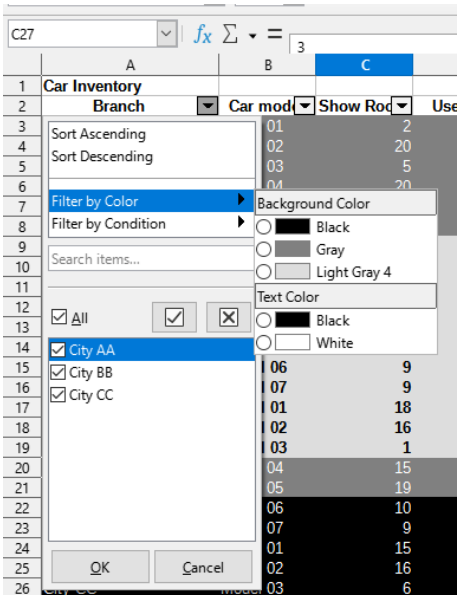


Figure 46: Filtering by font and background colors

Similarly, select the desired font color to filter the data.

In either case, there are no provisions to filter by a combination of different colors.

Filtering by Condition

An additional set of conditions is available for filtering:

- **Empty / Not Empty**: Cell data to filter either contains data or not.
- **Top 10**: Filter cells that has numeric values in the top 10 values of the filtered range.
- **Bottom 10**: similarly, filter cell data that has numeric values in the bottom 10 values of the filtered range.

Applying an advanced filter

An advanced filter has a structure similar to a standard filter. The difference is that the advanced filter arguments are not entered in a dialog. Instead, filters can be entered in a blank area of a spreadsheet, then referenced by the filter dialog to apply the filters.

1) Select a cell range in the spreadsheet.
2) Go to **Data > More Filters > Advanced Filter** on the Menu bar to open the Advanced Filter dialog (Figure 47).
3) In *Read Filter Criteria From*, select the named range, or enter the cell range that contains the filter criteria that you want to use.
4) Click **OK** to carry out advanced filtering and close the dialog. Any records that match the filter criteria and options that you specified are shown.

Note

The options for advanced filtering are the same as those used for standard filtering, see “Applying a standard filter” on page 81 for more information.

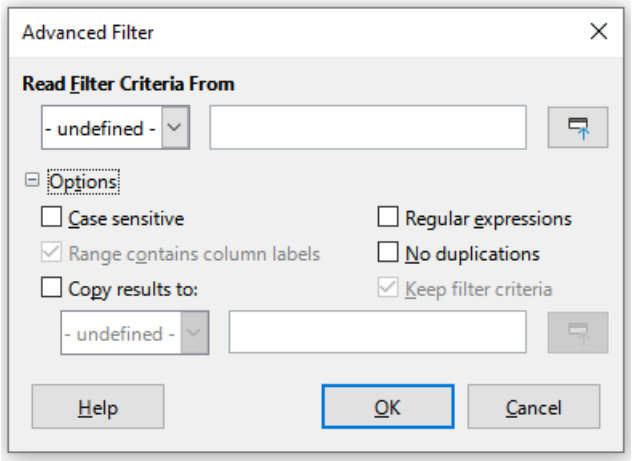


Figure 47: Advanced Filter dialog

For an example of an advanced filter, see the Help page entitled “Filter: Applying Advanced Filters”.

Sorting records

Sorting within Calc arranges the cells in a sheet using the sort criteria that you specify. Several criteria can be used and a sort applies each criteria consecutively. Sorts are useful when you are searching for a particular item and become even more useful after you have filtered data.

Also, sorting is useful when you add new information to a spreadsheet. When a spreadsheet is long, it is usually easier to add new information at the bottom of the sheet, rather than adding rows in their correct place. After you have added information, you can then sort the records to update the spreadsheet.

Sort dialog

To sort cells in a spreadsheet using the Sort dialog:

1) Select the cells, rows, or columns to be sorted.
2) Go to **Data > Sort** on the Menu bar, or click the **Sort** icon on the Standard toolbar, to open the Sort dialog.
3) On the *Options* tab (Figure 48), choose options including whether to sort on rows or columns. See “Sort options” on page 86 for details.
4) On the *Sort Criteria* tab (Figure 49), select the criteria in the drop-down lists. The selection lists are populated from the selected cells.
5) Select either **Ascending** order (A-Z, 0-9) or **Descending** order (Z-A, 9-0).
6) Headers – omits the first column/row in the selection from the sort.
7) Direction – setting defines the name and function of this check box: if top to bottom, then column labels; if left to right, then row labels.
8) Click OK and the sort is carried out on the spreadsheet.

Note

If any of the cells that you select for sorting are protected and the sheet is protected, then Calc cannot modify those cells and the sort will not be executed. An error message will be displayed to indicate that protected cells cannot be modified. However, it is possible to sort a range containing a row of column labels that are protected, since these are not modified by the sort.

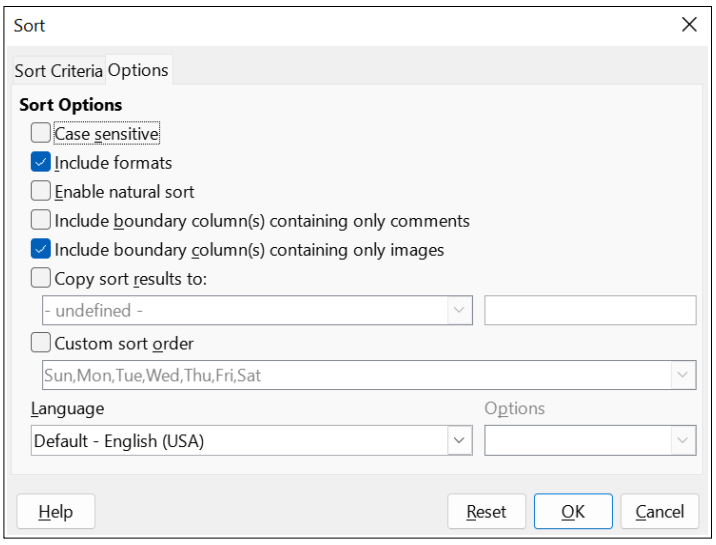


Figure 48: Sort dialog – Options tab

Sort options

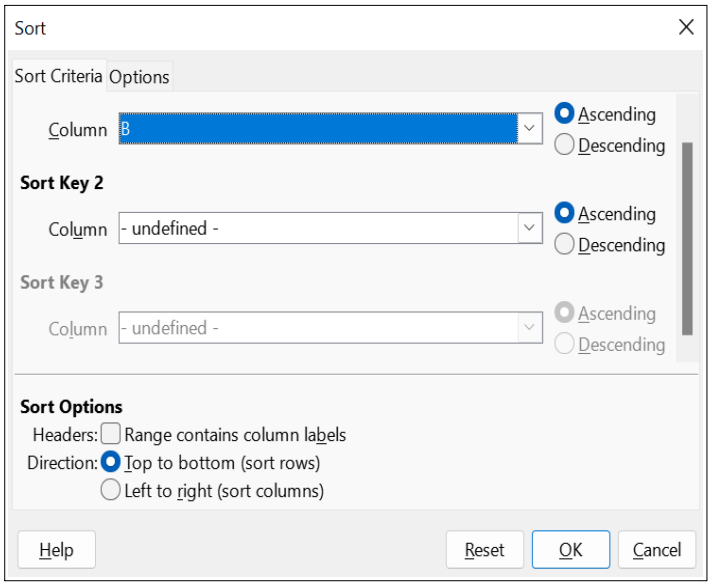


Figure 49: Sort dialog – Sort Criteria tab

On the *Options* tab of the Sort dialog (Figure 48), you can set these options:

- **Case sensitive** – sorts first by uppercase letters and then by lowercase letters. For Asian languages, special handling applies.

Note

For Asian languages, select **Case sensitive** to apply multi-level collation. With multi-level collation, entries are first compared in their primitive forms with their cases and diacritics ignored. If they evaluate as the same, their diacritics are taken into account for the second-level comparison. If they still evaluate as the same, their cases, character widths, and Japanese Kana difference are considered for the third-level comparison.

- **Include formats** – preserves the current cell formatting.

- **Enable natural sort** – natural sorting is an algorithm that sorts string-prefixed numbers based on the value of the numerical element in each sorted number, instead of the traditional way of sorting them as ordinary strings. For instance, assume you have a series of values such as, A1, A2, A3, A4, A5, A6, ..., A19, A20, A21. When you put these values into a range of cells and run the sort, it will become A1, A11, A12, A13, ..., A19, A2, A20, A21, A3, A4, A5, ..., A9. With natural sorting selected, values such as these are sorted correctly.
- **Include boundary column(s) containing only comments** - keeps these cells associated with the cells being sorted.
- **Include boundary column(s) containing only images** - keeps these cells associated with the cells being sorted.
- **Copy sort results to** – copies the sorted list to the cell range that you specify. Select a named cell range where you want to display the sorted list, or enter a cell range in the input box.
- **Custom sort order** – select this option and then select the custom sort order that you want to apply. The available selections are defined as "fill series" in **Tools > Options > LibreOffice Calc > Sort Lists**. See "Defining a fill series" on page 68.
- **Language** - select the language for the sorting rules.
- **Options** – select a sorting option for the language. For many languages this selection is grayed out but for some languages options are available. For example, for German the default choice is **Alphanumeric**, but you can also select the **Phone book** option to include the umlaut special character in the sorting.

Quick sort

If the columns in the spreadsheet have a header with a text format, you can use a quick sort.

1) Select a cell or a cell range to be sorted.
2) Select **Data > Sort Ascending** or **Data > Sort Descending** on the Menu bar, or click the **Sort Ascending** or **Sort Descending** icon on the Standard toolbar.

Find and replace

Calc has two ways to find text within a document: the Find toolbar and the Find and Replace dialog. The toolbar is quick and easy to use, but its functions are more limited than using the dialog.

Find toolbar

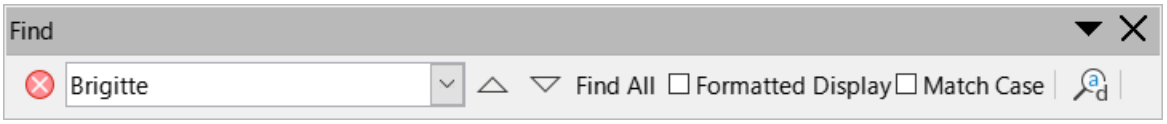


Figure 50: Find toolbar

1) Go to **View > Toolbars > Find** or **Edit > Find** on the Menu bar, or use the keyboard shortcut `Ctrl+F`, to open the Find toolbar (Figure 50). By default this toolbar is docked in the lower left of the Calc window. You can undock the toolbar and move it.
2) Type a search term in the *Find* text box.

3) To refine the search, you can select the **Match Case** option. For example, if Owner is the search term, selecting **Match Case** will find *Owner* but not *owner*. You can also select the **Find All** or **Formatted Display** options.

4) Click the **Find Next** or **Find Previous** icon. To find other occurrences of the same term, continue clicking the icon.

Find and Replace dialog

To open the Find and Replace dialog (Figure 51), go to **Edit > Find and Replace** on the Menu bar, or click the **Find and Replace** icon on the Standard toolbar or the Find toolbar, or use the keyboard shortcut `Ctrl+H`.

Finding

1) In the Find and Replace dialog enter the search criteria in the *Find* box.
2) Select basic options from those located directly under the *Find* box.
3) If necessary, click on *Other options* to increase the number of search filters.
4) Click **Find Next** to locate the first instance of the search criteria.
5) Click **Find Next** again to locate the next instance of the search criteria. Repeat as needed.
6) Or, click **Find All** to locate all cells containing the search criteria. These cells will be highlighted in the spreadsheet. A Search Results dialog will pop up, listing the cell locations.

Replacing

1) In the Find and Replace dialog enter the search criteria in the *Find* box.

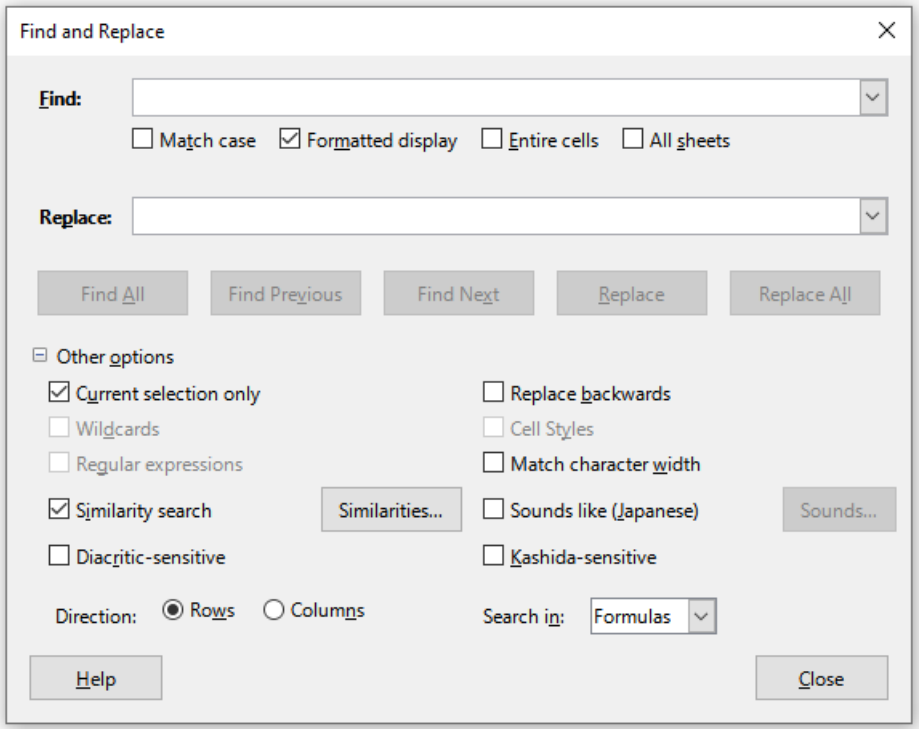


Figure 51: Find and Replace dialog

2) Select basic options from those located directly under the *Find* box.
3) Enter the replacement contents in the *Replace* box.

4) If necessary, click on *Other options* to increase the number of search filters.

5) To step through the cells and choose whether to replace the contents:

6) Click **Find Next** to locate the first instance of the search criteria.

7) If necessary, click **Replace** to replace the search criteria with the contents of the *Replace* box.

8) Repeat as required.

9) Or, to locate and replace all instances of the search criteria without stopping at each one, click **Replace All**. A Search Results dialog will pop up, listing the affected cells.

Tip

To replace the first instance of the search criteria you can simply press **Replace** without pressing **Find Next** first.

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.

Find and Replace options

The options available to refine your find and replace are as follows:

- **Find** – enter the text that you want to search for, or select a previous search in the list.
- **Match case** – distinguishes between uppercase and lowercase characters.
- **Formatted display** – searches for cell contents in a particular format. For example, if a cell has a currency value, say $123.45 and another has the same contents but default formatting (123.45), then searching for "$123.45" will find the currency cell but not the default-formatted cell.
- **Entire cells** – searches for cells with contents that are identical to the search text.
- **All sheets** – Searches through all of the sheets in the current spreadsheet.
- **Replace** – enter the replacement text, or select a recent replacement text or style from the list.
- **Current selection only** – searches only the selected text or cells.
- **Replace backwards** – search starts at the current cursor position and goes backwards to the beginning of the spreadsheet.
- **Wildcards** – select to use wildcards in the search. A wildcard is a special character that represents one or more unspecified characters. Wildcards make text searches more powerful, but often less specific. The following wildcards are available:
  - ? (question mark) matches any single character. For example, `b?g` finds "bag", "beg", "big", "bog", and "bug".
  - * (asterisk) matches any sequence of characters, including an empty string. For example, `*cast` finds "cast", "forecast", and "outcast".
  - ~ (tilde) escapes the special meaning of a question mark, asterisk, or tilde character that follows immediately after the tilde character. For example, `why~?` finds "why?".

- **Regular expressions** – select to use regular expressions in the search. Regular expressions offer the most powerful method of searching for text strings. For more information about regular expressions, see the “Regular expressions” section in Chapter 1, Introduction.
- **Similarity search** – find terms that are similar to the **Find** text. Select this option, and then click the **Similarities** button to define the similarity options on the Similarity Search dialog.
- **Cell Styles** – searches for cell content formatted with the style that you specify. Select this option and then select a style from the **Find** list. To specify a replacement style, select a style from the **Replace** list.
- **Diacritic-sensitive** – include diacritics and accents in the search.
- **Direction** – determines the *Rows* or *Columns* order for searching the cells.
- **Search in** – select either **Formulas**, **Values**, or **Comments** to search for the characters that you specify in the results of formulas, in values, or in comments.

Other options may appear depending on your language settings on the **Tools > Options > Language Settings > Languages** page (for example, **Match character width**, **Sounds like (Japanese)**, **Kashida-sensitive**). See the Help system for more information about these options.

Note

The **Wildcards**, **Regular expressions**, and **Similarity search** options are mutually exclusive; only one can be selected.

Search Results dialog

After you select **Find All** on the Find toolbar, or **Find All** or **Replace All** on the Find and Replace dialog, Calc’s initial default behavior is to display the Search Results dialog (Figure 52) after it has completed the operation. This dialog summarizes the results. In addition, affected cells are highlighted in the spreadsheet.

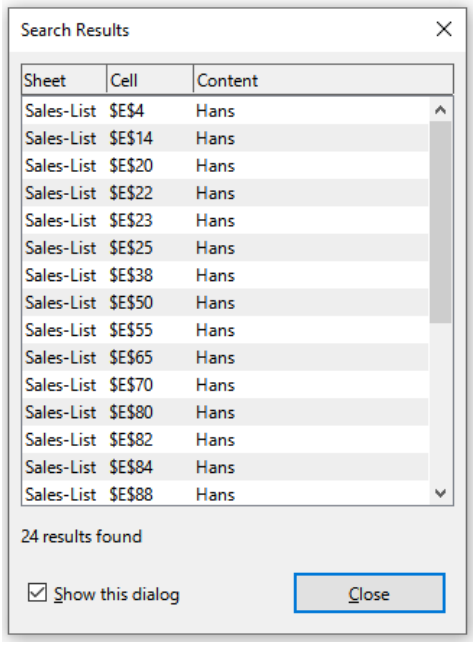


Figure 52: Search Results dialog

The Search Results dialog lists the affected cells and their current content (after any replacement). It also states the number of affected cells. If you deselect the **Show this dialog** checkbox on the Search Results dialog before pressing the **Close** button, then the dialog will not be displayed after future uses of **Find All** or **Replace All**. The display of the Search Results dialog can also be controlled by enabling or disabling the **Tools > Options > LibreOffice Calc > View > Window > Summary on search** option.

Searching and Filtering with Regular Expressions

Support for regular expressions (often known as regex or regexp) is a hidden gem within Calc. Regular expressions are very powerful and enable users to define complex search patterns for locating data of interest within a spreadsheet. Some users may find the syntax used to define a regular expression daunting and inexperienced users may make mistakes. However a small investment in time to learn the basic concepts and some of the syntax will pay rich dividends in the future. We recommend that you do not try to memorize the full syntax but just concentrate on discovering a few aspects that will help you in your everyday work. As you see the benefits of using regular expressions, you will certainly be motivated to learn more.

A regular expression is a string of characters defining a pattern of text that is to be matched. More detailed, general background information can be found on Wikipedia at https://en.wikipedia.org/wiki/Regular_expression.

Regular expressions are widely used in many domains and there are multiple regular expression processors available. Calc utilizes the open source Regular Expressions package from the International Components for Unicode (ICU), see https://unicode-org.github.io/icu/userguide/strings/regexp.html for further details, including a full definition of the syntax for ICU Regular Expressions.

Regular expressions appear in three areas of Calc's functionality, as follows:

- Searching with the Find and Replace dialog, accessed by selecting **Edit > Find and Replace** on the Menu bar, by clicking the **Find and Replace** icon on the Find toolbar, or by pressing *Ctrl+H*.
- Filtering using the Standard Filter and Advanced Filter dialogs, accessed by selecting **Data > More Filters > Standard Filter** and **Data > More Filters > Advanced Filter**.
- Functions. Many of Calc's functions can use regular expressions in search criteria. However these only operate correctly if the **Tools > Options > LibreOffice Calc > Calculate > Formulas wildcards > Enable regular expressions in formulas** option has been selected. We also recommend that you enable the **Tools > Options > LibreOffice Calc > Calculate > General Calculations > Search criteria = and <> must apply to whole cells** option so that search criteria in formulas must match the whole of the cell contents. See Chapter 8, Using Formulas and Functions, for more information.

To illustrate the use of regular expressions we can use a sales data spreadsheet, the first few rows of which are shown in Figure 53.

	A	B	C	D	E
1	Date	Sales Value	Category	Region	Employee
2	02/01/08	$410	Tennis	North	Kurt
3	02/01/08	$1,508	Golf	East	Bridget
4	02/01/08	$2,340	Sailing	South	Brigid
5	03/01/08	$4,872	Tennis	East	Brigitte
6	06/01/08	$3,821	Tennis	South	Fritz
7	06/01/08	$2,623	Tennis	East	Fritz
8	07/01/08	$3,739	Golf	South	Fritz
9	08/01/08	$4,195	Golf	West	Brigid
10	10/01/08	$2,023	Golf	East	Bridget
11	14/01/08	$2,804	Tennis	West	Bridget
12	15/01/08	$1,858	Tennis	North	Kurt
13	15/01/08	$579	Sailing	West	Brigid
14	17/01/08	$4,842	Golf	North	Brigid
15	17/01/08	$2,827	Tennis	East	Bridget

Figure 53: Spreadsheet data for example regular expressions

Unfortunately the data entry clerks do not know the sales personnel well and so the spreadsheet contains a number of misspellings of Brigitte's name. On inspecting the data, we notice that if we could find all cells containing a string that begins with the characters "Bri" and then replace the entire contents of each such cell with the string "Brigitte", then the data in the spreadsheet would be corrected. This can be achieved easily with a simple regular expression, as follows:

1) Select **Edit > Find and Replace** on the Menu bar. Calc opens the Find and Replace dialog (Figure 54).
2) Type `^Bri.*` into the *Find* field. The character "`^`" means match at the beginning; "`.`" means match any character; and "`*`" means match 0 or more times.
3) Type `Brigitte` into the *Replace* field.
4) If necessary, click the icon to expand the *Other options* area of the dialog.
5) Make sure that the **Regular expressions** checkbox is checked.
6) Click **Replace All**. Calc updates the spreadsheet data, replacing all occurrences of "Bridget" and "Brigid" with "Brigitte".
7) Click **Close** to close the Find and Replace dialog.

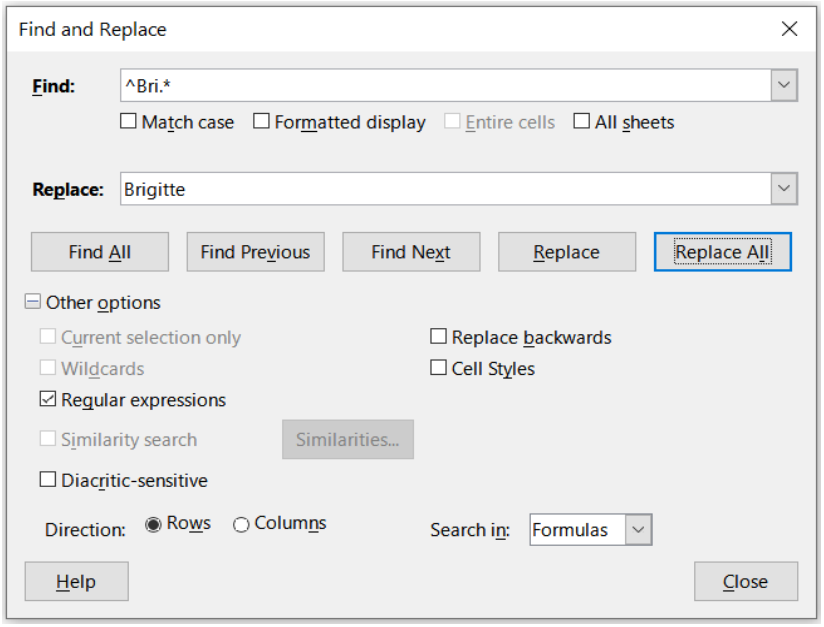


Figure 54: Using a regular expression on the Find and Replace dialog

Suppose we want to filter the same spreadsheet (Figure 53) to show only data relating to the *Tennis* and *Golf* categories, from the *North* and *East* regions. This is easily achieved using regular expressions, using the following steps:

1) Click a cell within the sales data.
2) Select **Data > More Filters > Standard Filter** on the Menu bar. Calc opens the Standard Filter dialog (Figure 55).
3) Select **Category** from the first drop-down menu in the *Field name* column.
4) Select = from the first drop-down menu in the *Condition* column.
5) Type `Tennis|Golf` in the first text box in the *Value* column.
6) Select **AND** from the first drop-down menu in the *Operator* column.
7) Select **Region** from the second drop-down menu in the *Field name* column.
8) Select = from the second drop-down menu in the *Condition* column.
9) Type `North|East` in the second text box in the *Value* column.
10) If necessary, click the icon to expand the *Options* area of the dialog.
11) Make sure that the **Regular expressions** checkbox is checked.
12) Click **OK** and Calc updates the data displayed in accordance with the specified filter criteria.

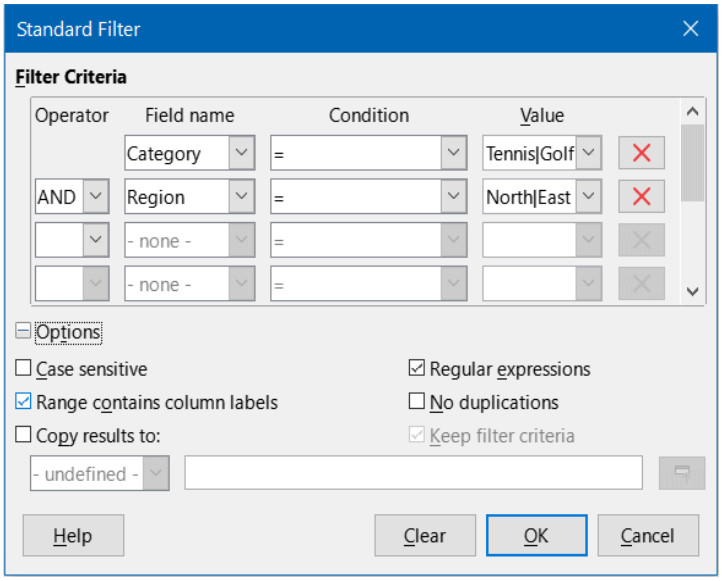


Figure 55: Using regular expressions on the Standard Filter dialog

The data shown in Figure 56 can be used to show a simple example of a function call that incorporates a regular expression. Suppose we wanted to calculate the revenue from the sale of pencils, pencil cases, and pens. This can be achieved by entering the following formula into an empty cell `=SUMIFS(C2:C6; A2:A6; "^pen.*")`, where the regular expression matches the name of any product that starts with the characters “pen”. Alternatively we could calculate the revenue from the sale of books and notebooks using the formula `=SUMIFS(C2:C6; A2:A6; ".*book$")`, where the regular expression matches the name of any product that ends with the characters “book”.

	A	B	C
1	**Product Name**	**Sales**	**Revenue**
2	Pencil	20	65
3	Pen	35	85
4	Notebook	20	190
5	Book	17	180
6	Pencil case	12	96

Figure 56: Stationery sales and revenue data

In Calc there are 26 functions that support the use of regular expressions and these are listed in Chapter 8, Using Formulas and Functions. The REGEX function is particularly powerful, matching and extracting, or optionally replacing, text using regular expressions. For example the formula `=REGEX("123456ABCDEF";"[126]";"";"g")` returns "345ABCDEF", where any occurrence of "1", "2" or "6" is replaced by the empty string and is thus deleted.

Tip

The online help describes many more regular expressions and their uses.

Note

If interoperability with Microsoft Excel is important for your spreadsheet, then you may not be able to fully utilize Calc's regular expression facilities because Excel does not provide equivalent facilities. Hence, when you export a Calc spreadsheet to Excel format, information relating to regular expressions will not be usable within Excel. In this case you can use the less powerful wildcards facility provided by Calc because spreadsheets that utilize wildcards can be exported to Excel format without loss of data. See Chapter 8, Using Formulas and Functions, for more information about wildcards.

There are numerous websites that include examples of regular expressions and these provide an endless source of inspiration and ideas to help improve your data analysis skills.

Additional information about regular expressions in Calc can be found in the Help system and on The Document Foundation's wiki starting at https://wiki.documentfoundation.org/Documentation/HowTo/Calc/Regular_Expressions.



Calc Guide 7.5

Chapter 3
Creating Charts and Graphs

Presenting information visually

Introduction

Charts and graphs can be powerful tools for conveying information and Calc offers a variety of ways to present data. They can be customized to a considerable extent, enabling information to be shown in the clearest manner.

For readers 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).

Chart Wizard

Use the Chart Wizard to create an initial chart using data in a spreadsheet. Then use the Chart Wizard options to change the type of chart, adjust data ranges, and edit some chart elements. Each change is immediately seen in the underlying chart.

Overview of Chart Wizard

	A	B	C	D
1	**Equipment Rentals**			
2		Canoes	Boats	Motors
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

Figure 57: Example data for creating a chart

To demonstrate the process of using the Chart Wizard to create charts, the data shown in Figure 57 is used in the following sections. Here is an overview of the basic steps:

1) Select the cells containing all of the data–including names, categories, and labels–to be included in the chart. The selection can be a single block, individual cells, or groups of cells (columns or rows). In this example, it may be best to select the cell range A2:D8, which will intentionally omit the overall title "Equipment Rentals" from the chart.

Tip

When the data is in one place, the Chart Wizard can guess the range and create an initial chart even if all of the data is not selected. Before opening the Chart Wizard, just place the cursor or select a cell anywhere in the area of the data.

2) To place a chart on the spreadsheet as an object (Figure 58) and open the Chart Wizard dialog (Figure 59), do one of the following.
   - Go to **Insert > Chart** on the Menu bar.
   - Click the **Insert Chart** icon on the Standard toolbar.
3) Choose the chart type and make any other selections desired. The options are explained below.
4) Click **Finish** to save the selections and close the Chart Wizard.

The following sections provide further details about using the Chart Wizard.

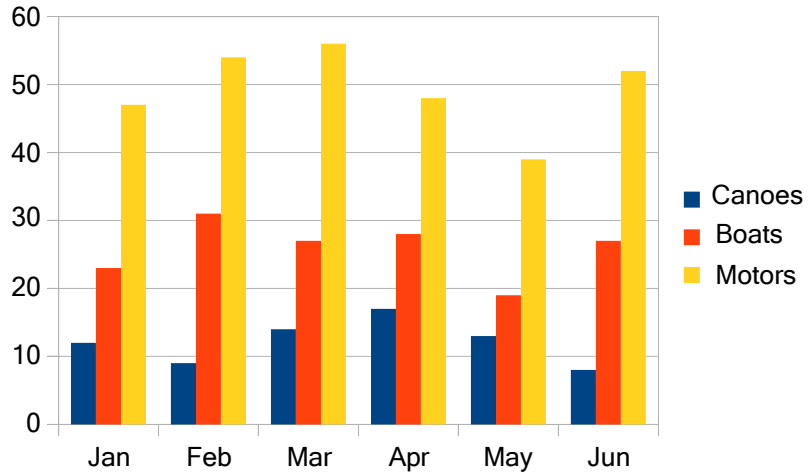


Figure 58: Example chart automatically created using the Chart Wizard

Selecting chart type

Calc offers a choice of ten basic chart types. Further options vary according to the type of chart selected. For more information about the different chart types, see “Gallery of chart types” on page 164.

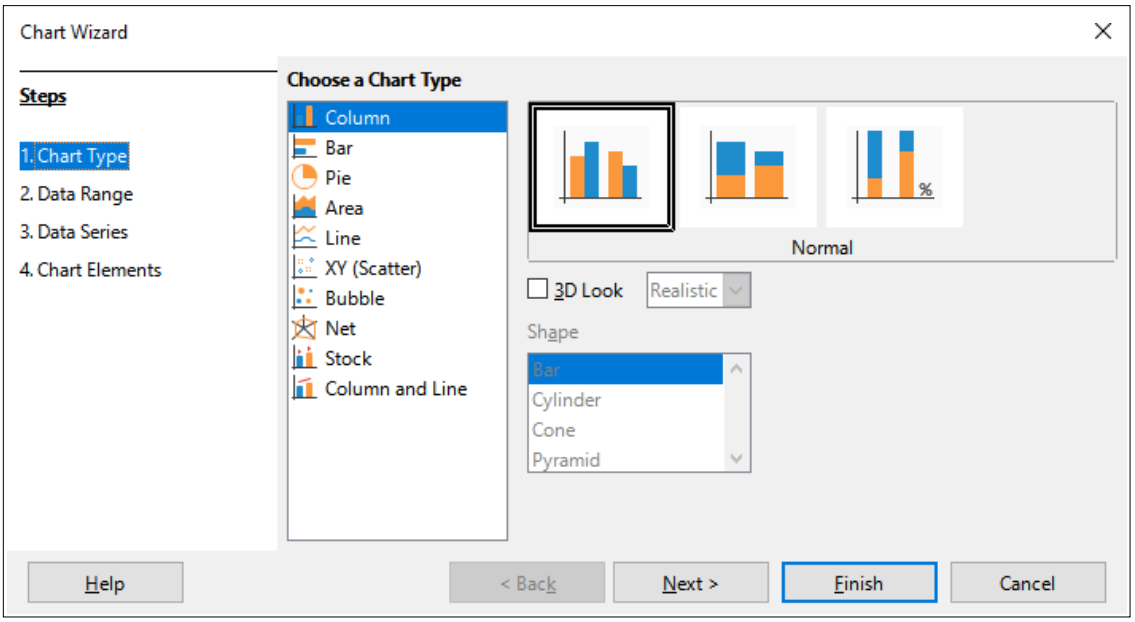


Figure 59: Chart Wizard dialog – selecting chart type

The initial chart created using the Chart Wizard is a 2D column chart. A small preview of the selected variant is highlighted with a surrounding border, as shown in Figure 59. The name of the variant (*Normal* in Figure 59) is shown below the preview.

To change chart types and options:

1) Select the type of chart from the list under *Choose a Chart Type*.
2) If needed, select a chart variant in the preview box by clicking on it. The options available depend on the type of chart selected. The chart changes instantly to reflect the selection.
3) To use a 3D chart, select the checkbox **3D Look** and select the type of 3D view (**Realistic** or **Simple**). This option is available only for column, bar, pie, or area charts.

4) Click **Next** to make changes to data range, data series, and chart elements, explained in greater detail below.

5) When satisfied with the chart, click **Finish** to close the Chart Wizard.

Note

To recreate many of the charts shown in the following sections, select the **Column** chart type, **Normal** variant, with the **3D Look** option unchecked.

Selecting data range

The data range contains all of the cells with data (including labels and categories) that should be included in the chart. In the Data Range step of the Chart Wizard (Figure 60), manually correct any mistakes in data selection for the chart.

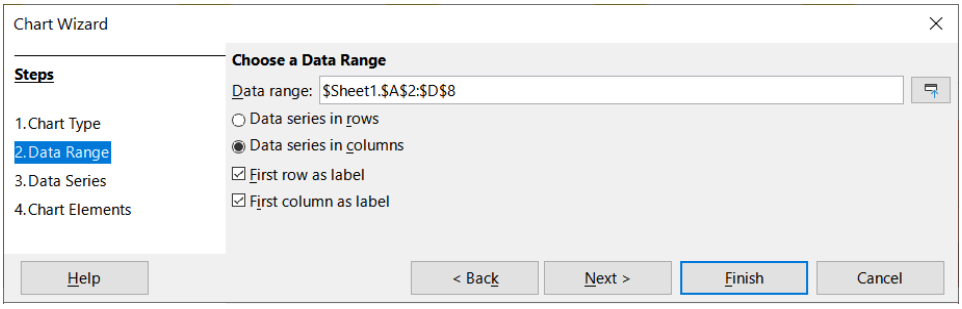


Figure 60: Chart Wizard dialog – selecting data range

To use the Data Range page:

1) If necessary, change the rows and columns used as data for the chart by editing the cell references in the *Data range* text box. Edit the cell references in one of these two ways:
   - Directly modify the text in the *Data range* text box.
   - Click the **Select data range** button to the right of the *Data range* box. Then use the pointer to select the data range(s) on the spreadsheet.
2) Specify whether the data series are arranged in rows or in columns. In the example data, shown in Figure 57, the data series are in columns.
3) Select whether to use the first row, or first column, or both, as labels.
4) Click **Next** to move to making changes to the data series (Figure 61).
5) When satisfied with the chart, click **Finish** to close the Chart Wizard.

Note

If the syntax for a data range is not correct, Calc highlights the *Data range* text box to indicate the error and disables the **Back**, **Next**, and **Finish** buttons.

Selecting non-adjacent data

To create a complete data range from multiple cells that are not next to each other, use a delimiter between individual ranges. For example, the English (USA) locale uses a comma as a delimiter and "`$Sheet1.A1:A5,$Sheet1.D1:D5`" is a valid data range. A semi-colon is another commonly used delimiter.

The appropriate delimiter depends on the option selected in the *Locale setting* menu on the *Formats* section at **Tools > Options > Language Settings > Languages**. See or change the default delimiter for a locale at **Tools > Options > LibreOffice Calc > Formula**. In the *Separators* section, *Array column* shows the default delimiter.

Note

The options under **Tools > Options** may not be available when the chart is in edit mode. If desired, click outside the chart to leave edit mode and see the options. Click the chart twice to enter edit mode again.

To select non-adjacent data, do one of the following while in step 1)) above:

- Manually enter the data ranges in the text box with delimiter(s) between them.
- Select the data with the mouse pointer by first clicking the **Select data range** button to the right of the *Data range* box. Place the pointer at the end of the first data range in the text box (otherwise the first range is selected and then deleted) and enter the delimiter. Then drag the pointer in the spreadsheet to select the next data range.

Note

When the data is in the same document as the chart, changes to the data are instantly reflected in the chart.

Linking to external data

Calc offers several options for linking data to external sources. This enables data (and the chart using the data) to automatically update when the external data changes. The following types of files can be linked: HTML, Calc, Base, CSV, Excel, and registered data sources. For further information, refer to Chapter 11, Linking Data.

Selecting data series

The Data Series page of the Chart Wizard (Figure 61) enables fine tuning of the data. Each data series contains a set of data that have something in common, such as the types of rental equipment listed in Figure 57. Use the Data Series page to change the source range of each data series and to organize how the data is presented in the chart. This includes removing unnecessary data and specifying how data is plotted along the axes.

Organizing data series

Tip

The Chart Wizard makes initial assumptions about how the data should be displayed, but the assumptions could be incorrect. If a chart does not look as expected, the first thing to check is if all data series are defined correctly.

Also, check the settings on the Data Range page that define whether the data are in rows or columns and whether the first row or first column should be considered labels.

The names of each data series appear in the *Data series* list box (the middle box in Figure 61). To organize the data series, select an entry in the *Data series* list and do one or more of the following:

- To change the name of the data series, select **Name** in the *Data ranges* list on the right. Edit the cell references in the *Range for Name* text box below.

- To change the cell references for data series categories, edit the cell references in the *Categories* text box below the *Data ranges* box.
- Click **Add** to add another data series below the selected entry. The data ranges for the new data series will then need to be defined.
- Click **Remove** to remove the selected entry from the *Data series* list.
- Click the **Up** or **Down** button to move the selected entry up or down in the *Data series* list. This does not change the order in the data source table, but changes the arrangement in the chart.

Note

Different data series must be in separate columns or rows. Otherwise Calc will assume that they are the same data series.

Setting data series ranges

To understand how Calc treats data in charts, it is important to understand the distinction between values and categories. Values are numeric data that vary continuously. By contrast, categories have no mathematical relationship with each other. For example, the categories for the chart data referred to in Figure 61 and the chart shown in Figure 58 are months of the year.

Most Calc charts require both value and category data, with values plotted along the Y axis and categories plotted along the X axis. The exceptions are XY (scatter) charts and bubble charts, which use value data along both axes.

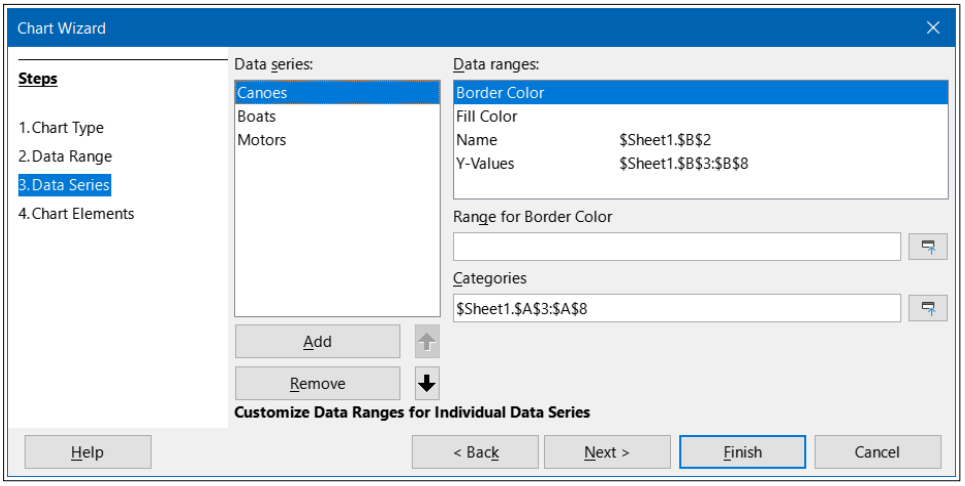


Figure 61: Chart Wizard dialog - selecting data series

Data ranges that may be defined for a specific chart type appear in the *Data ranges* box on the right side of the Data Series page, shown in Figure 61. Not all data ranges may need to be filled in.

The data ranges may include:

Border Color and Fill Color

Border and fill colors for each data point in the data series can be specified here using numeric values for the RGBA color system. If not specified here, Calc will use default colors. Conditional formatting can also be used. This enables data point colors to vary, depending on whether they meet certain conditions or values. For further information, refer to “Assigning colors” on page 128.

Name

When **Data series in columns** and **First row as label** are selected on the Data Range page, Calc assumes that the column labels of the selected data are the data series names. Thus, Calc assumes that the data series names of the data in Figure 57 are “Canoes”, “Boats”, and “Motors”. Similarly, when **Data series in rows** and **First column as label** are selected, Calc assumes that the row labels of the selected data are the data series names.

The only way to change a data series name is by selecting **Name** in the *Data ranges* box in the upper right of the Data Series page (Figure 61). To change it enter a different cell range in the *Range for Name* box that appears below the *Data ranges* box. (Note that the data series name is often contained in a single cell, rather than a range of cells.)

Y-Values

These are numeric values that are often plotted along the vertical axis. However, this is not always the case. For example, while Y-values are plotted on the vertical axis in column charts, they are plotted along the horizontal axis in bar charts.

Categories

The range for category data is defined in a separate *Categories* box below the *Data ranges* box. Note the difference between categories and data series names. For the data in Figure 57, the categories are the row labels while the data series names are the column labels.

Note

XY (scatter) and bubble charts are unlike other chart types because they use value data for their X axis rather than category data. For the XY (scatter) and bubble chart types, the *Data Series* page of the Chart Wizard includes a *Data labels* box instead of the *Categories* box displayed for other chart types. To create a set of data labels (one for each data point), enter the required text strings into a range of spreadsheet cells and then enter details of that cell range into the *Data labels* box. The labels can then be displayed on the chart by selecting the **Show category** option on the Data Labels dialog (see Figures 91 and 92).

Depending on the type of chart, other data ranges may need to be defined in addition to those shown in Figure 61.

Selecting chart elements

On the Chart Elements page of the Chart Wizard dialog (Figure 62), add or change the title, subtitle, axes names, and grids. Use titles that draw the attention of viewers to the purpose of the chart and describe what they should focus on.

The chart elements for 2D and 3D charts are illustrated in Figure 63.

- The chart wall contains the graphic displaying the data.
- The chart area is the background of the entire chart.
- The chart title and subtitle, chart legend, axes labels, and axes names are in the chart area.
- The chart floor is only available for 3D charts.

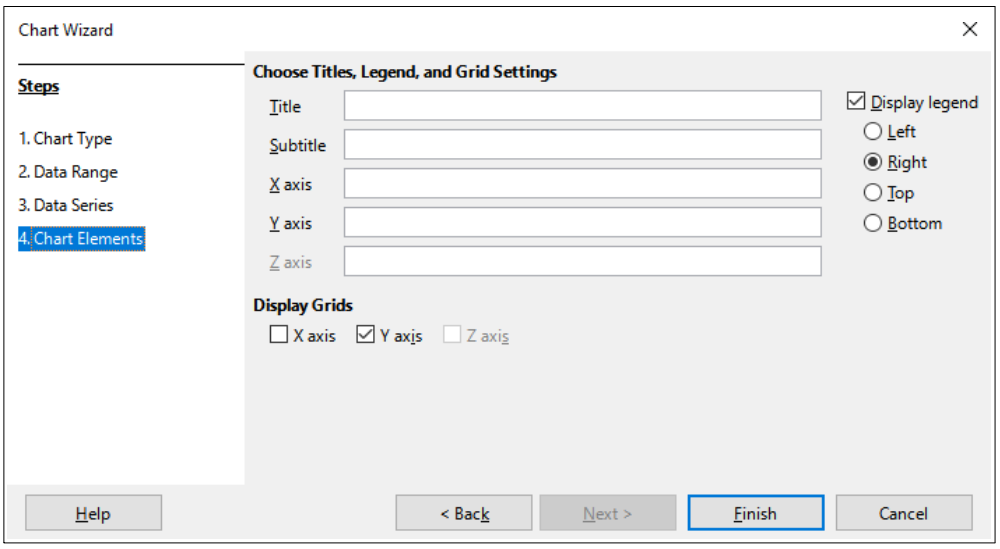


Figure 62: Chart Wizard dialog – selecting and changing chart elements

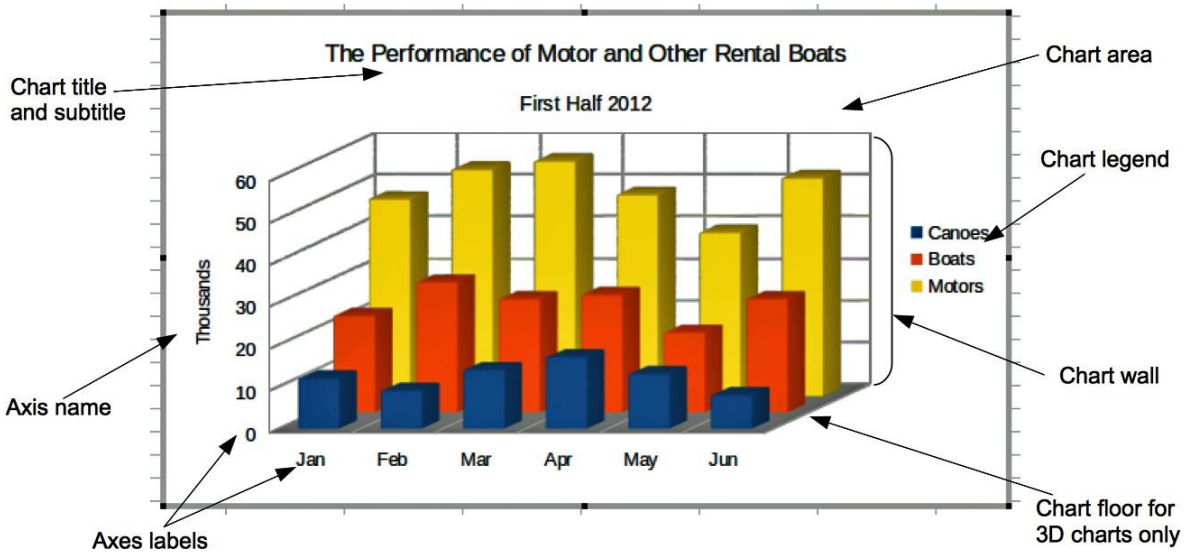


Figure 63: Chart elements

To add elements to a chart, do one or more of the following on the Chart Elements page (Figure 62):

- Enter a title and subtitle (if desired) in the *Title* and *Subtitle* text boxes.
- Enter names to be used in the *X axis* and *Y axis* text boxes. The *Z axis* text box is only active if creating a 3D chart.
- Select the **Display legend** checkbox (turned on by default) and choose where to display the legend – **Left**, **Right**, **Top**, or **Bottom**. The names in the legend are the data series names. Specify the names in the *Range for Name* field on the Data Series page.
- Under *Display Grids*, select the **Y axis** or **X axis** check boxes to display horizontal or vertical grid lines respectively. For some charts, the axis grids are displayed by default. Grids are not available for pie charts. The **Z axis** checkbox is only active when creating a 3D chart. For further information about grids, refer to Grids on page 143.

Note

While clicking **Finish** closes the Chart Wizard, the chart remains in edit mode, indicated by gray borders, and can still be modified. Click outside the chart in any cell to exit the edit mode.

Using the Sidebar to change chart settings

The Properties deck of the Sidebar (Figure 64) makes some basic options readily available for specifying the appearance of charts. To open the Sidebar, first click outside the chart to deselect it, then go to **View > Sidebar** on the Menu bar or press `Ctrl+F5`. By default, the Sidebar opens on the right side of the screen.

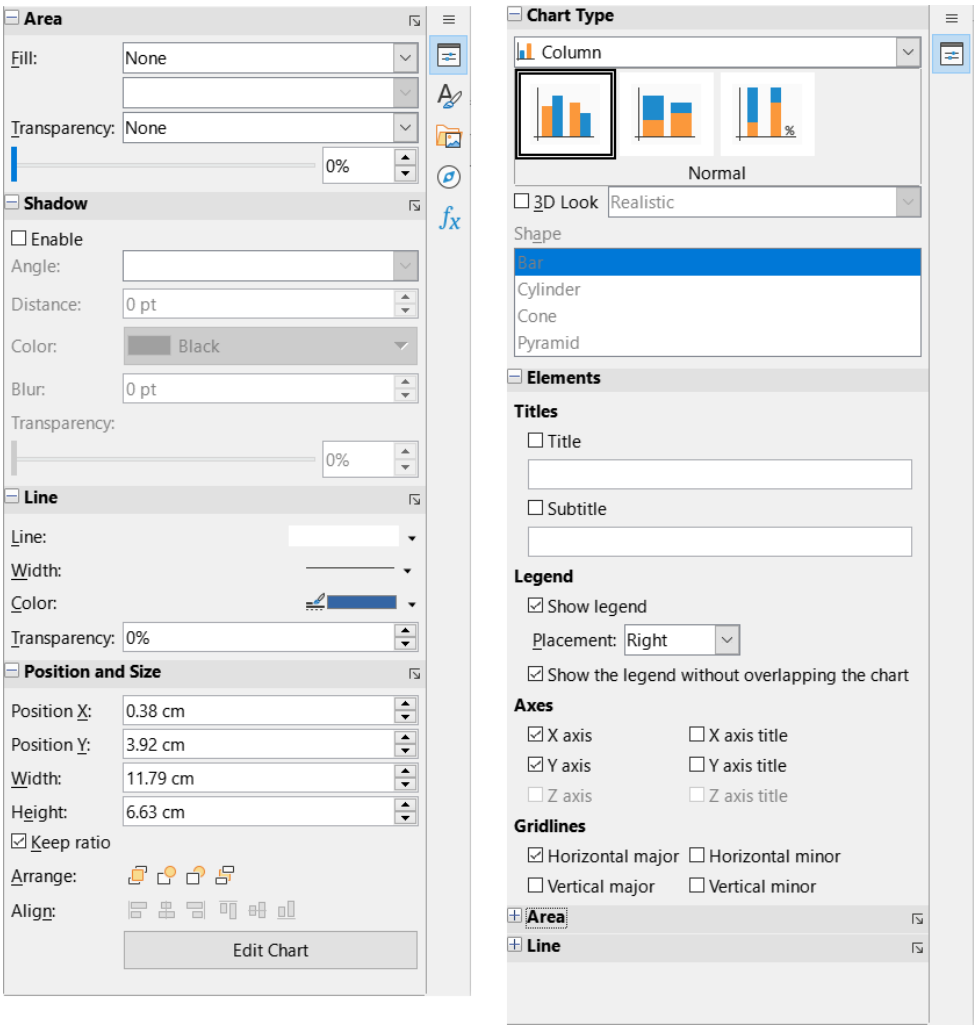


Figure 64: Properties deck of the Sidebar when chart is selected (left) and when chart is in edit mode (right)

The contents of the Sidebar depend on whether the chart is selected or is in edit mode. The Sidebar on the left in Figure 64 shows the Properties deck when a chart is selected (by clicking on it once). When a chart is in edit mode (by clicking on it twice), the Properties deck on the right in Figure 64 appears.

Tip

If you follow the directions above and the Properties deck of the Sidebar does not appear, click the **Properties** icon on the upper right of the Sidebar.

The options available on the Properties deck of the Sidebar are also available elsewhere. They may be found in the Menu bar, the Formatting toolbar, or context menus (made available by right-clicking a chart element).

Note

The Sidebar can be quite useful. However, because the options are easy to see and are available elsewhere, further references to it are not included in this chapter.

Modifying charts

The Chart Wizard establishes basic features of a chart. After using it, you may want to change data ranges or modify the look of the chart. Calc provides many options for formatting and fine-tuning the appearance of charts. This includes tools for editing the chart type, chart elements, data ranges, fonts, colors, and many other options.

Modify charts in one of two ways, depending on what you want to change.

Edit object properties
Click on a chart once to edit its object properties. These include size, position on the page, alignment, outer borders, copying, exporting, and more. See the sections starting with “Resizing, moving, and positioning charts” on page 157 for more information.

Use edit mode
Use edit mode to change data selection and chart type as well as elements such as axes, titles, backgrounds, grids, data series, data labels, trend lines, and more.

Overview of using edit mode

Here are some general ways to modify charts in edit mode. These are discussed in greater detail in the following sections.

- To add an element not already in the chart, use the **Insert** menu on the Menu bar. Insert titles, legends, axis labels, grids, data labels, trend lines, mean value lines, error bars, and special characters.
- To move or change the size of titles, axis names, chart walls, and legends, click on them once. The pointer changes to a move icon (appearance depends on the system). Drag the element to the new location. To change the size, drag the selection handles.
- Modify elements in a few basic ways. The following methods may open the appropriate dialog or menu. Not all of these methods will work for every element:
  - Double-click the element (see an exception below).
  - Select the element from the **Insert** menu (Figure 65) or from the **Format** menu (Figure 66) on the Menu bar.
  - Click the element once, then click on the **Format Selection** icon on the Formatting toolbar (Figure 67).
  - Select the element from the *Select Chart Element* drop-down list, then click the **Format Selection** icon next to it on the Formatting toolbar.

– Right-click the element to open the context menu.

- Double-click titles and axis names to change their spelling. To modify the spelling of other text, such as categories, data labels, and legend entries, change the text in the data on the spreadsheet.
- Click once on a data point (such as a column or bar) to select and edit the associated data series.
  – With a data series selected, double-click a single data point to edit its properties (for example, a single column in a column chart).

Entering edit mode

To edit or format charts, double-click on the chart to place it in edit mode. The chart is now surrounded by a gray border. In edit mode, the Menu bar changes and the Formatting toolbar contains a number of formatting options and icons, as discussed in the following sections.

Note

The next several sections (until “Resizing, moving, and positioning charts” on page 157) require a chart to be in edit mode.

Insert menu

In edit mode, the **Insert** menu on the Menu bar displays the options shown in Figure 65.

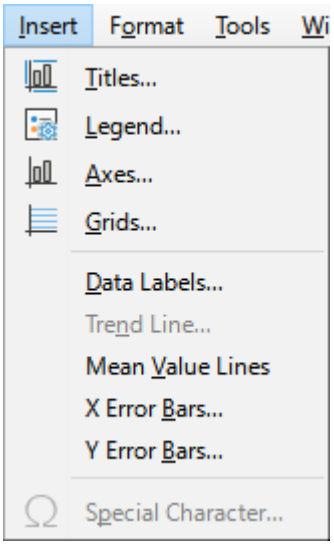


Figure 65: Insert menu when chart is in edit mode

Titles
Provides text boxes for entering chart title and subtitle as well as titles for X-, Y-, and Z-axes, including secondary axes. For more information, see “Titles, subtitles, and axis names” on page 117.

Legend
Specifies if a legend should be included and if so, where. For more information, see “Legends” on page 119.

Axes
Provides options for showing or not showing axis labels. The Chart Wizard shows the labels by default. For more information, see “Axes” on page 130.

Grids

Provides options for showing or not showing major and minor grids for X, Y, and Z axes. To format grids, see “Grids” on page 143.

Data Labels

Provides options for text attributes, whether to show categories, and the position and rotation of the labels. These labels appear on each data point. For more information, see “Data labels” on page 137.

Trend Line

Specifies the type of regression line to be used, options for extrapolation, where the axes should intersect, the name of the trend line, and whether and how the equation should be displayed. The option is grayed out until a data series is selected. For more information, see “Trend and mean value lines” on page 148.

Mean Value Lines

Displays mean value lines for selected or all data series. For more information, see “Mean value lines” on page 152.

X Error Bars and Y Error Bars

Specifies the error category to be used, parameters, and display options for positive and negative indicators. For more information, see “Error bars” on page 153.

Special characters

Enables the input of special characters in text strings (for example, title and subtitle). The option is disabled if not relevant for the selected chart element. See Chapter 2, Entering and Editing Data, for more information about inserting special characters.

Format menu

In edit mode, these settings appear on the **Format** menu (Figure 66) of the Menu bar.

Title

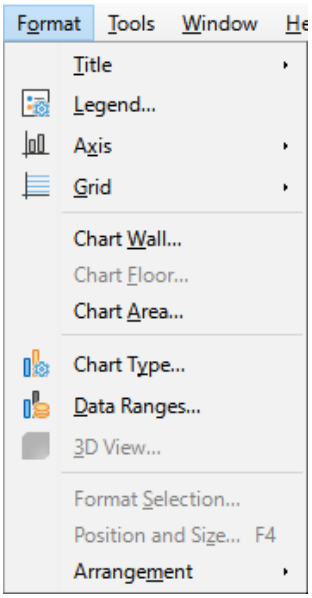


Figure 66: Format menu when chart is in edit mode

Formats the title and subtitle for the chart as well as axis names. The text must first be entered on the Chart Elements page of the Chart Wizard or by going to **Insert > Titles**.

Legend

Formats the appearance and position of the legend. The legend must first be turned on by using the Chart Elements page of the Chart Wizard or by going to **Insert > Legend**.

Axis
Formats properties such as where the axes cross each other, the scale of units, and formatting of the axis labels.

Grid
Formats the grid lines. Use the Chart Elements page of the Chart Wizard to turn on grids or go to **Insert > Grids** to turn grids on or off.

Chart Wall, Chart Floor, or Chart Area
Formats borders, area, and transparency of these elements. Note that the chart floor is available only for 3D charts. See “Formatting chart backgrounds” on page 121 for more information.

Chart Type
Changes the type of chart and whether it is a 2D or 3D chart. The various chart types are explained in “Gallery of chart types” starting on page 164.

Data Ranges
Sets ranges for all data in the chart and for individual data series, as explained in “Selecting data range” on page 106 and “Selecting data series” on page 107.

3D View
Formats 3D charts and is only available for 3D charts. Note that only column, bar, pie, and area charts can be displayed as 3D charts. See “3D charts” on page 145 for information.

Format Selection
Opens a dialog with settings for whatever element is selected. Options may include area fill, borders, positioning, transparency, fonts, labels, scale, and other attributes.

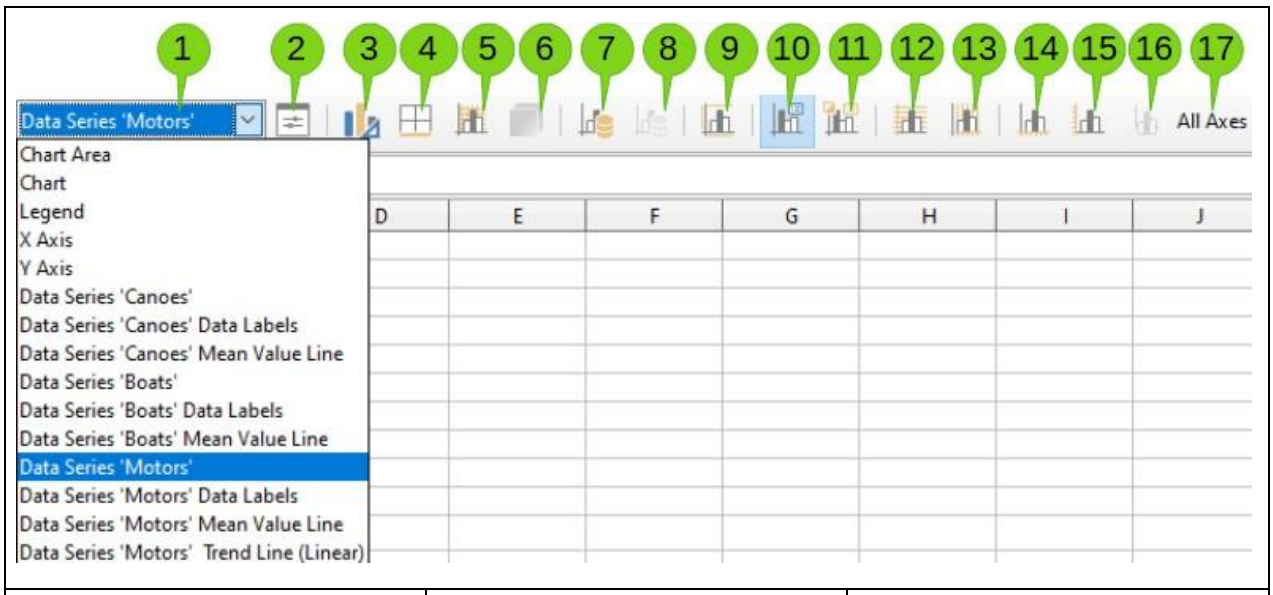
Position and Size
Enables precise specification of the position and size of a selected element. The position is defined in relationship to the chart. See “Position and Size dialog” on page 158 for more information.

Arrangement
Provides two options: **Bring Forward** and **Send Backward**. Only one option may be active for some items. Use these options to arrange overlapping data series.

Formatting toolbar

In edit mode, the Formatting bar appears as in Figure 67. Click one of the icons to open a dialog or turn an option on or off. The **Insert** and **Format** menus on the Menu bar, described above, contain the same options, with one exception.

The option *Select Chart Element* drop-down list does not appear elsewhere. Use it to easily select individual chart elements. It can be especially helpful when the chart is crowded or it is otherwise difficult to select elements using the pointer. Note that options such as **Data Labels** or **Trend Line** do not appear on this list unless they have already been inserted using the **Insert** menu.



1. Select Chart Element	7. Data Ranges	13. Vertical Grids
2. Format Selection	8. Data Table	14. X Axis
3. Chart Type	9. Titles	15. Y Axis
4. Chart Area	10. Legend On/Off	16. Z Axis
5. Chart Wall	11. Legend	17. All Axes
6. 3D View	12. Horizontal Grids	

Figure 67: Formatting toolbar when chart is in edit mode

Selecting and moving chart elements

Selecting chart elements

After double-clicking on the chart to enter edit mode, select chart elements using one of the following methods:

- Click once on the element in the chart (to select individual data points, click twice–but not too quickly–after clicking once on the data series).
- Select the element from the *Select Chart Element* drop-down list that appears on the left of the Formatting toolbar, as shown in Figure 67.

When selected, the chart element will be highlighted with square selection handles.

Tip

When you hover the pointer over an element, Calc will display the element name, making it easier to select the correct element. The name of the selected element also appears in the Status Bar and it is displayed in the Select Chart Element area of the Formatting toolbar.

Moving chart elements

You may wish to move individual elements of a chart, independent of other chart elements. For example, you may wish to reposition the title or axis names. To do so:

1) Select the element as described above.
2) Keep pressing the mouse button. The pointer changes to the move icon (appearance depends on computer setup).
3) Drag the pointer to move the element.
4) Release the mouse button when the element is in the desired location.

Alternatively, use the Position and Size dialog for some elements, as described on page 158.

Individual points or data series cannot be moved, with the exception of pie charts. Individual wedges of a pie can be moved or the entire pie can be exploded. See “Pie charts“ on page 166 for information.

To move axis labels, see “Positioning axis, labels, and interval marks” on page 133. To move data labels, see “Adding and formatting data labels for a data series” on page 137.

Tip

For some chart elements (such as title, subtitle, axis name, and legend), press the arrow keys to move the object in small steps.

Note

When a 3D chart element is selected, round selection handles may appear. These handles control the 3D angle of the element. You cannot resize or reposition the element while they are showing. Click again to obtain the square selection handles that allow you to resize and reposition the 3D chart graphic.

Changing chart type

To change the type of chart (bar, column, pie, line, and so on):

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Open the Chart Type dialog using one of these methods:
   - Go to **Format > Chart Type** on the Menu bar.
   - Click the **Chart Type** icon on the Formatting toolbar.
   - Right-click on the chart and select **Chart Type** in the context menu.

   The dialog is the same as the first page of the Chart Wizard dialog shown in Figure 59 on page 105.
3) Select the chart type and variant desired.
4) Click **OK** to close the dialog. If desired, click outside the chart to leave edit mode.

For further information about the types of charts, please refer to the “Gallery of chart types” on page 164.

Titles, subtitles, and axis names

Creating or changing text

To create or change the text of a chart title, subtitle, or axis name:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Use one of these methods to open the Titles dialog (Figure 68):
   - Go to **Insert > Titles** on the Menu bar.
   - Click on the **Titles** icon on the Formatting toolbar.
   - Right-click in the chart area and select **Insert Titles** in the context menu.
3) Enter or edit the text in the appropriate text box.
4) Click **OK** to close the dialog. If desired, click outside the chart to leave edit mode.

Tip

The text of a title (but not formatting) can be modified directly. With the chart in edit mode, double-click on the text to directly change it. Use `Shift+Enter` at the end of the line to create an additional line that splits the text.

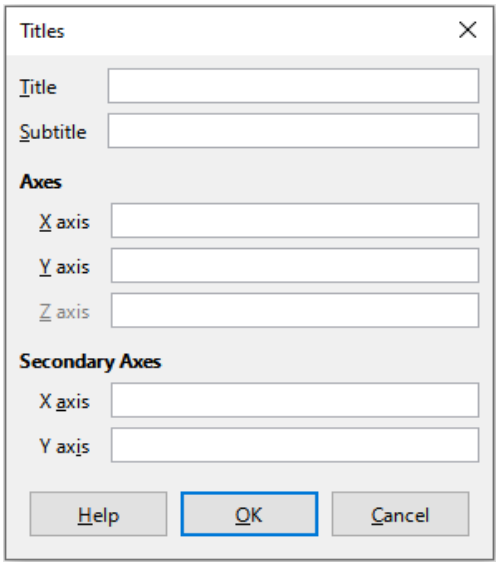


Figure 68: Titles insertion dialog

Formatting text

Use a more extensive Titles dialog to format the appearance of a chart title, subtitle, or axis name. To access this dialog:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Do one of the following to open the Titles dialog for formatting (Figure 69):
   - Click **Format > Title** and select the desired type of title or the **All Titles** option.
   - Click on the element in the chart, right-click, and select **Format Title** (or appropriate element) from the context menu.
   - Click on the element in the chart or select it in the *Select Chart Element* drop-down list on the Formatting toolbar. Then select **Format > Format Selection** on the Menu bar or click on the **Format Selection** icon on the Formatting toolbar.
3) Format titles or names as needed. The options are self-explanatory or easily researched.

4) Click **OK** to close the dialog. If desired, click outside the chart to leave edit mode.

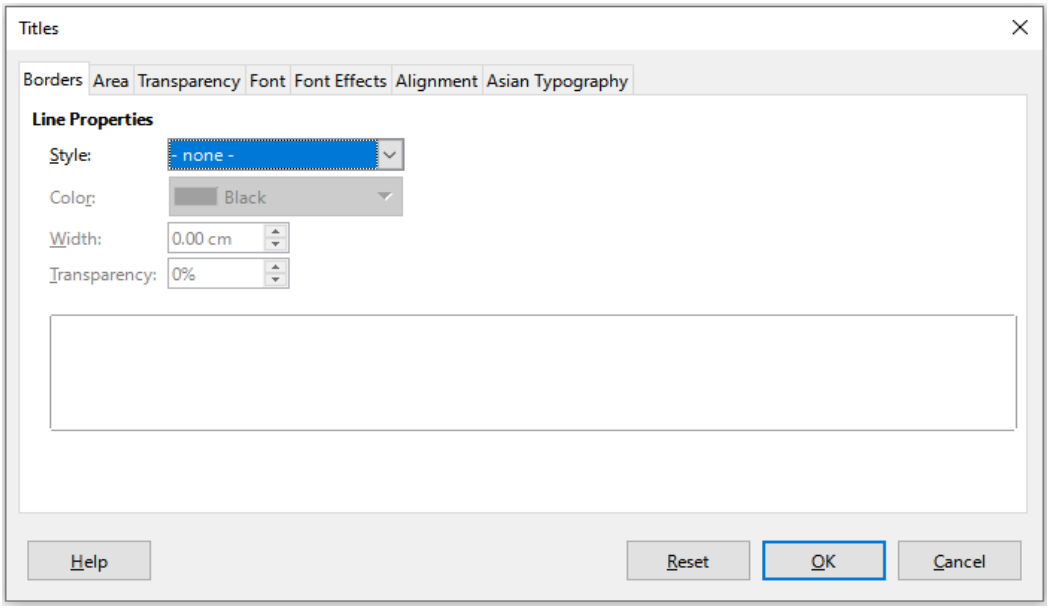


Figure 69: Titles formatting dialog (after selecting All Titles option)

Legends

When a legend is displayed, it shows data series names along with their graphical representations, such as bars, lines, or points. It will also show trend and mean lines when those are turned on, as shown in Figure 70.

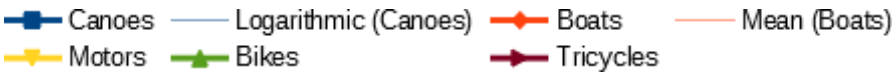


Figure 70: Example of a chart legend at the bottom of a chart

Positioning, inserting, or deleting legends

Inserting or deleting only

To only insert or delete a legend:

1) Enter edit mode by double-clicking the chart. The chart should now be surrounded by a gray border.
2) Do one of the following:
   - Click on the **Legend On/Off** icon on the Formatting toolbar. The default position for inserting a legend is on the right side of the chart.
   - Right-click in the chart area and select **Insert Legend** or **Delete Legend** in the context menu.
3) If desired, click outside the chart to leave edit mode.

Note

The names in the legend are the data series names. They are taken from the *Name* data range, discussed in “Selecting data series” on page 107. Change a legend name by changing the text in the spreadsheet.

Positioning, inserting, and deleting

To position a legend using the Legend dialog (Figure 71) as well as insert or delete it:

1) Enter edit mode by double-clicking the chart. The chart should now be surrounded by a gray border.
2) Go to **Insert > Legend** on the Menu bar to open the basic Legend dialog.

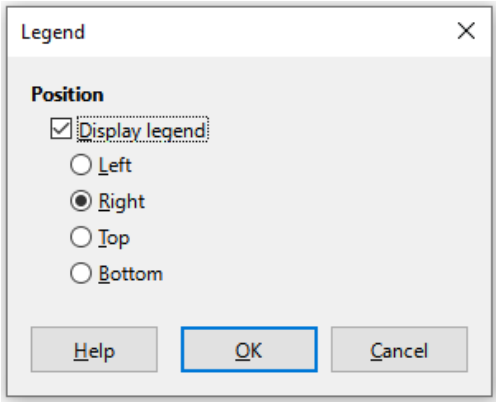


Figure 71: Legend insertion dialog

3) Select or deselect the **Display legend** checkbox to either display or not display the legend.
4) Select the desired location for the legend – **Left**, **Right**, **Top**, or **Bottom**.
5) Click **OK** to close the dialog.
6) If desired, click outside the chart to leave edit mode.

Tip

For finer positioning of the Legend, use one of the methods described in “Moving chart elements” on page 116.

Formatting legends

For advanced editing of a legend’s appearance, a more extensive Legend dialog (Figure 72) has several options for formatting borders, fill, fonts, transparency, and position.

1) Enter edit mode by double-clicking the chart. The chart should now be surrounded by a gray border.
2) Do one of the following to open the Legend dialog (Figure 72):
   - Click on the **Legend** icon on the Formatting toolbar.
   - Select **Format > Legend** on the Menu bar.
   - Right-click on the legend and select **Format Legend** in the context menu.
   - Click on **Legend** in the *Select Chart Element* drop-down list on the Formatting toolbar or click the legend in the chart to select it. Then click on the **Format Selection** icon on the Formatting toolbar or select **Format > Format Selection**.
3) Make any desired changes. The options are self-explanatory or easily researched.
4) Click **OK** to close the dialog. If desired, click outside the chart to leave edit mode.

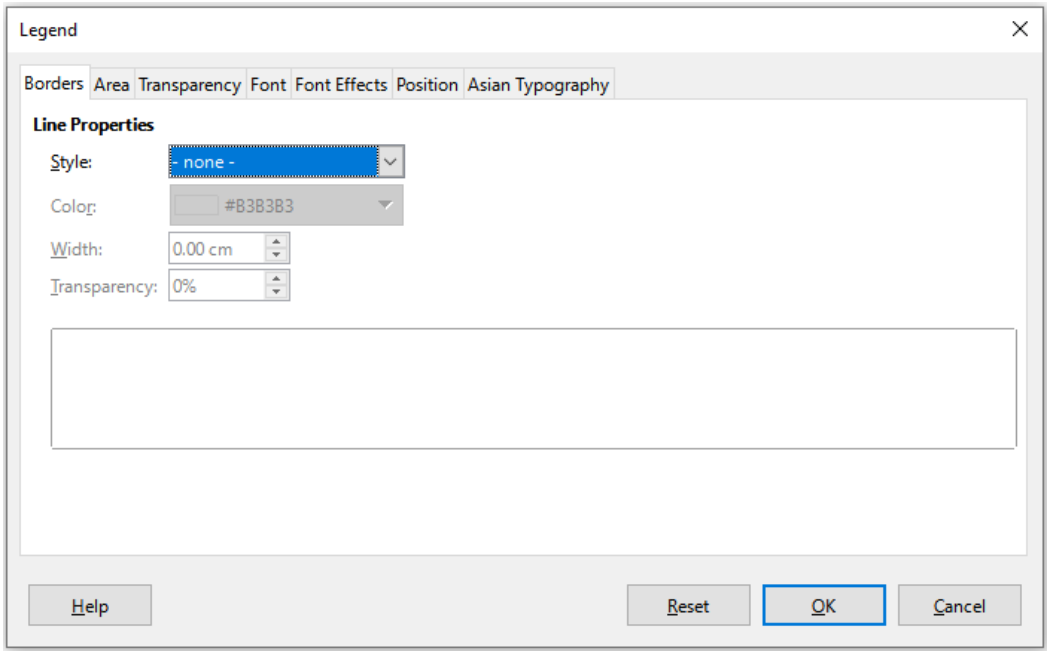


Figure 72: Legend formatting dialog

Formatting chart backgrounds

The background of a chart is divided into chart area, chart wall, and chart floor, as shown in Figure 63 on page 110. To set border, area, and transparency options for these areas:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Do one of the following to open the appropriate dialog (such as Figure 73):
   - Go to **Format** on the Menu bar and select **Chart Wall**, **Chart Floor**, or **Chart Area**.
   - Right-click the chart wall, chart floor, or chart area in the chart and select **Format Wall**, **Format Floor**, or **Format Chart Area** in the context menu. (For help with selecting these areas, see “Selecting chart elements” on page 116.)
   - On the Formatting toolbar, click on the **Chart Area** icon or the **Chart Wall** icon (there is no icon for chart floor).
   - Click on **Chart Area**, **Chart Wall**, **Chart Floor**, or **Chart** in the *Select Chart Element* drop-down list on the Formatting toolbar. Then click the adjacent **Format Selection** icon or select **Format > Format Selection**.
   - Double-click on the chart area, chart wall, or chart floor.
3) Select the desired settings from the *Borders*, *Area*, and *Transparency* tabs.
4) Click **OK** to save the changes and close the dialog. If desired, click outside the chart to leave edit mode.

In the steps above, references to the chart floor are only applicable for 3D charts.

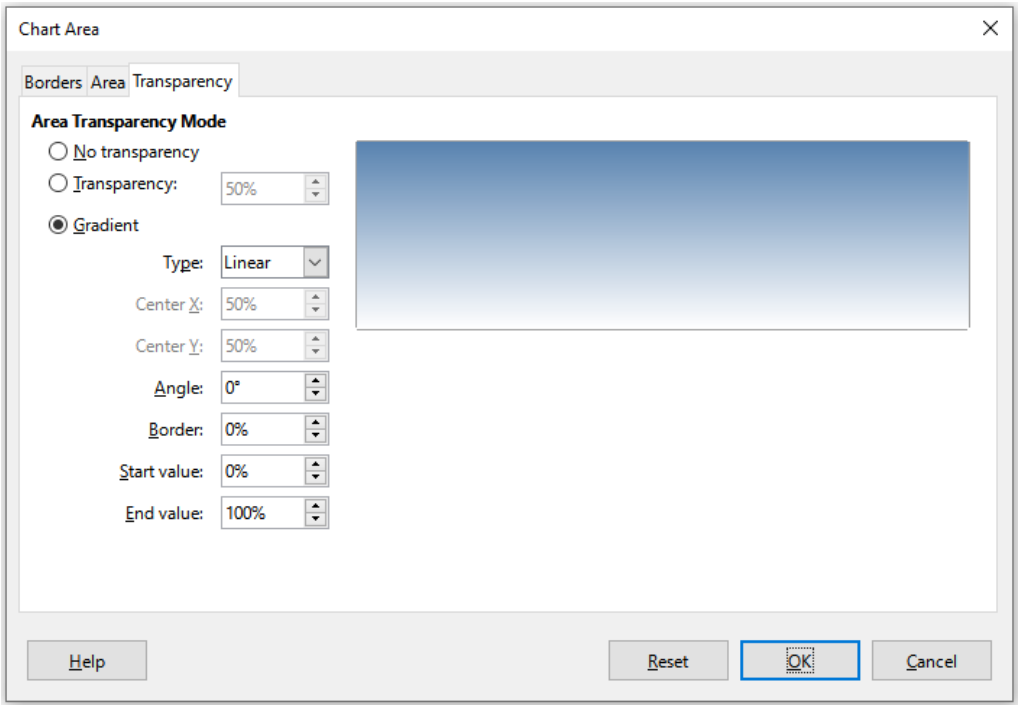


Figure 73: Chart Area dialog – Transparency tab

Data range and series

The goal of making a chart is to clearly present one or more data series and Calc provides a number of ways to define and present those data. The following sections discuss topics such as defining and changing data ranges, aligning data to a secondary Y axis, and formatting the appearance of the data series.

Changing data ranges

When data ranges change in the spreadsheet, modify the chart settings to reflect those changes. Use one of the following methods.

Note

The chart automatically reflects changes in the spreadsheet data. Thus, changing a number from 5 to 50 in the data will instantly show the new number in the chart.

Replacing data by dragging

It is easy to manually replace one set of data with another set of data. Do this in the following way:

1) Use the mouse to select all of the new data.
2) Drag the data over the chart, then release the mouse. This opens the Change Source Data Range dialog shown in Figure 74.
3) Specify whether or not the first column or row contains labels, then click **OK**.

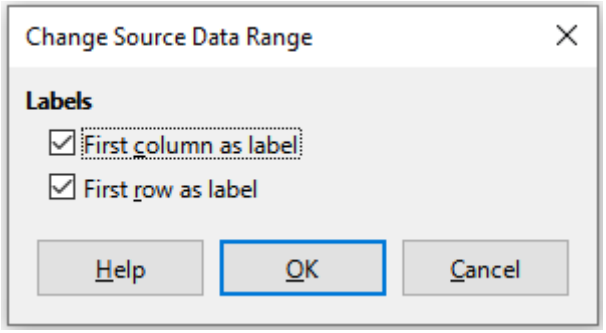


Figure 74: Change Source Data Range dialog

Modifying the data range and data series

To change the data range or data series, do the following:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Open the Data Ranges dialog using one of these methods:
   - Go to **Format > Data Ranges** on the Menu bar.
   - Click on the **Data Ranges** icon on the Formatting toolbar.
   - Right-click on the chart and select **Data Ranges** from the context menu.
3) Edit the data range on the *Data Range* tab, which is similar to the *Choose a Data Range* area shown in Figure 60 on page 106.
4) Edit data series on the *Data Series* tab, which is similar to the *Customize Data Ranges for Individual Data Series* area shown in Figure 61 on page 108.
5) Click **OK** to save changes and close the dialog. If desired, click outside the chart to leave edit mode.

Tip

If Calc is taking a significant amount of time to process a large amount of data for a chart, try this: Select only limited data for each data series to initially organize the chart. Adjust the settings until the chart looks as desired, then select all of the data.

For further information, see “Selecting data range” on page 106 and “Selecting data series” on page 107.

Opening the Data Series dialog

The Data Series dialog offers several options for presenting data in the chart. Note that only one data series can be selected at a time.

To open the Data Series dialog (Figure 75):

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Do one of the following to select the data series:
   - Click on the data series in the chart.
   - Click the data series name in the *Select Chart Element* drop-down list on the Formatting toolbar.

3) Do one of the following to open the Data Series dialog:
   - Go to **Format > Format Selection** on the Menu bar.
   - Click on the **Format Selection** icon on the Formatting toolbar.
   - Right-click on the data series and select **Format Data Series**.
4) Click on the tab of the appropriate page to make the changes needed. The options for each page are explained below.
5) Click **OK** to save changes and close the dialog. If desired, click outside the chart to leave edit mode.

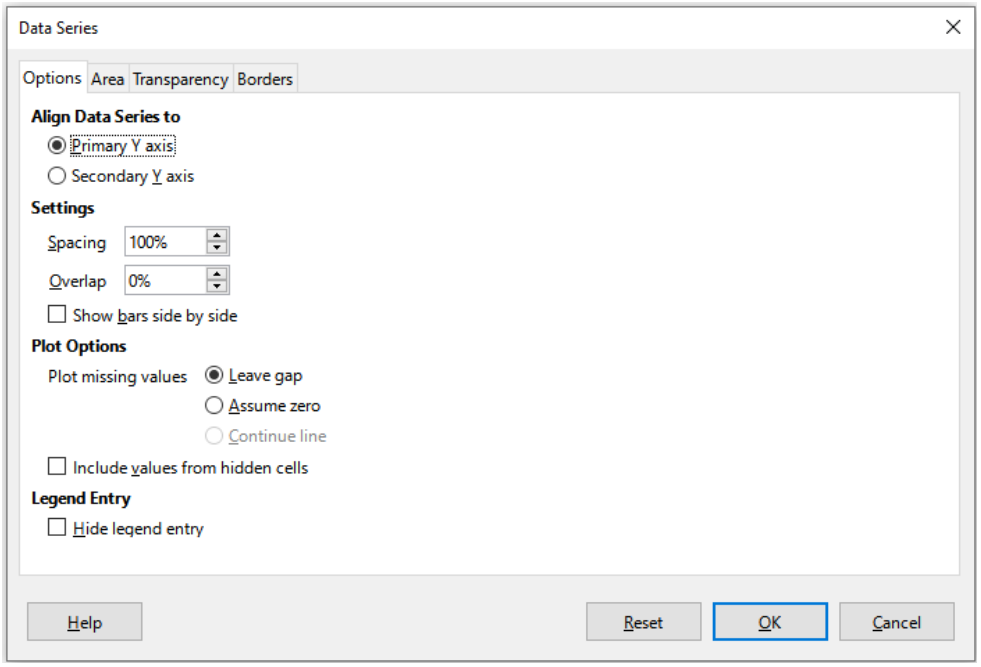


Figure 75: Data Series dialog – Options tab

Note

The tabs that appear on the Data Series dialog depend on the type of chart selected. Similarly the controls that appear on each tab may differ depending on the type of chart.

Alignment, spacing, and plot options

Aligning data to secondary Y axis

A secondary axis may be helpful when data differ in units or scale, as in Figure 76. In our example, one of the data series (kayaks) has considerably larger numbers than the others. To plot all three data series on the same chart, and keep the plotted lines close to each other, the kayak data series is aligned to a secondary Y axis, which has a wider scale. The color of the secondary Y axis and the axis titles help to show this relationship.

Note

A data series can be associated with a secondary Y axis only after the Chart Wizard has finished creating the chart.

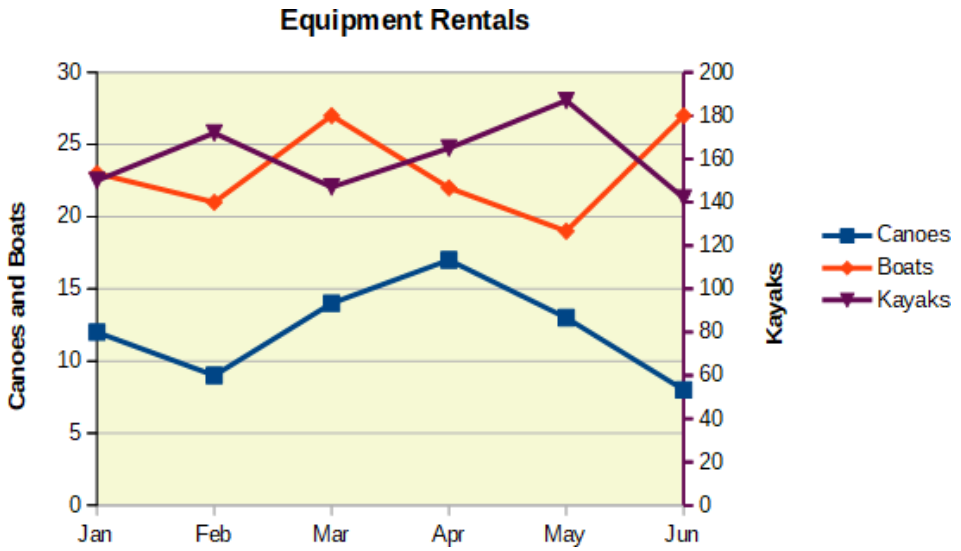


Figure 76: Data series aligned to a secondary Y axis

To align a data series to a secondary Y axis:

1) Select the data series and open the Data Series dialog as described in the previous section.
2) On the *Options* tab, under *Align Data Series to*, select **Secondary Y axis**.
3) Click **OK** to close the dialog. If desired, click outside the chart to leave edit mode.

Aligning data series to a secondary Y axis is not possible for pie and net charts.

Data can only be aligned to a secondary Y axis, not a secondary X axis. However, it is possible to create secondary X and Y axes that duplicate the primary axes on the opposite sides of a chart. This is described in “Add or remove axis labels” on page 130. It is also possible to show different units or scales on the secondary axis (with or without aligning data to it), as described under “Defining scales” on page 132.

Spacing and plot options

The *Options* tab of the Data Series dialog (Figure 75) contains additional settings that depend on the type of chart. These include:

Spacing
: Sets the spacing interval of columns or bars between category settings, such as time. Values above 100% increase the spacing while values below 100% decrease the spacing. Maximum spacing is 600%.

Overlap
: Sets overlap of columns or bars within the same category setting, such as a specific time. The higher the percentage, the greater the overlap (maximum of 100%). Negative percentages increase the separation (minimum of -100%).

Show bars side by side
: When checked, shows no gap in columns or bars in the interval between categories. When this option is not checked, data aligned to a secondary Y axis may hide other data. Enable the option to prevent this.

Connection lines
: For stacked and percent column (vertical bar) charts, mark this checkbox to connect the column layers that belong together with lines.

Plot missing values
Specifies handling of missing values, with options depending on the type of chart.

Include values from hidden cells
Enables data from hidden cells to be included or not included.

Hide legend entry
Enables the name of the selected data series to be included or removed from the legend.

For pie or donut charts, in addition to the **Include values from hidden cells** option, two more are available (not shown in Figure 75):

Orientation
Specifies the order of the pie sections (data points) – clockwise or counterclockwise. The default direction is counterclockwise.

Starting Angle
Specifies the starting angle of the first pie section (data point), in the range 0 to 359 degrees. Drag the small dot around the circle or enter a number for the degrees. Use 0 degrees to start the first section at the 3 o'clock position and 90 degrees to start the first section at 12 o'clock.

Area, transparency, and borders

For chart types other than line and scatter, the Data Series dialog (Figure 77) contains tabs for formatting the fill and borders of graphical representations such as columns and bars. The *Area* tab offers options for selecting color by clicking directly on a color in a palette, adding a custom palette, specifying the RGB or Hex color codes, or by selecting a custom color using the **Pick** button. Other pages contain options for gradient, bitmap, pattern, hatch, transparency, and borders. The options are self-explanatory or can be readily researched.

Tip

If applying a gradient does not work as expected, do this: After selecting the desired options on the Gradient page, click **Add**, provide a name for the gradient (or accept the default), and click **OK**.

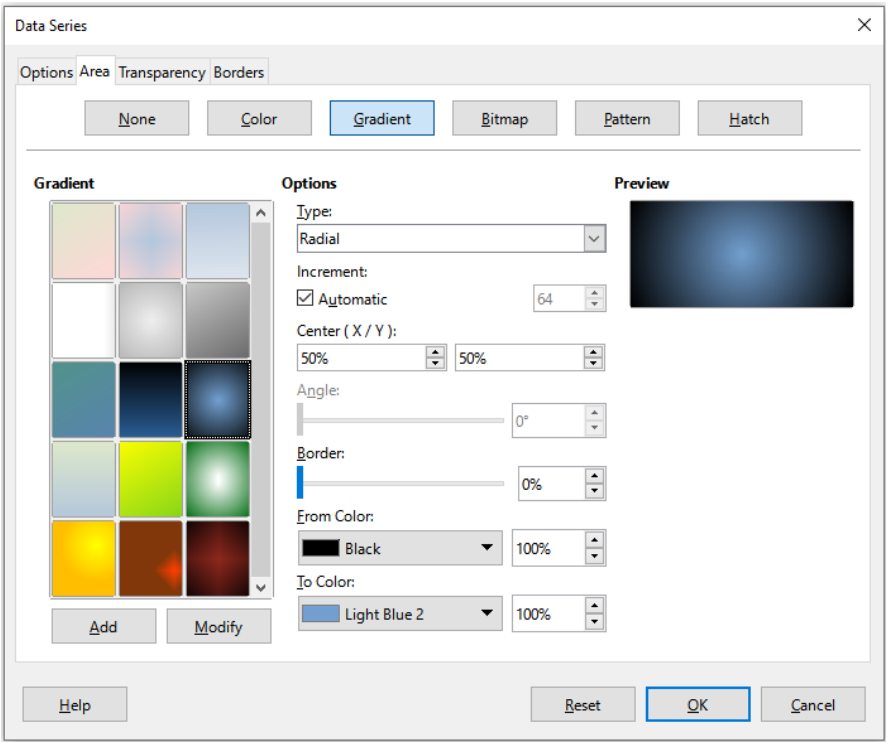


Figure 77: Data Series dialog – Area tab, Gradient page

Lines, areas, and data point icons

For some chart types (such as line charts and xy (scatter) charts), the Data Series dialog contains only an *Options* tab and a *Line* tab (Figure 78).

Specify style, color, width, and transparency of the line in the *Line Properties* section on the left side of the *Line* tab. In the *Icon* section, select an option for the symbol from the drop-down list: **No Symbol**, **Automatic**, **From file**, **Gallery**, or **Symbols**.

- **From file** opens a browser for selecting the file that contains the desired symbol.
- **Gallery** opens a list of available graphics that can be selected.
- **Symbols** opens a list showing available symbols that can be selected.

A preview of the selection is shown in the preview box at the bottom of the dialog. Enter the desired width and height of the symbol. Select **Keep ratio** if the ratio of width to height of the symbol should be maintained.

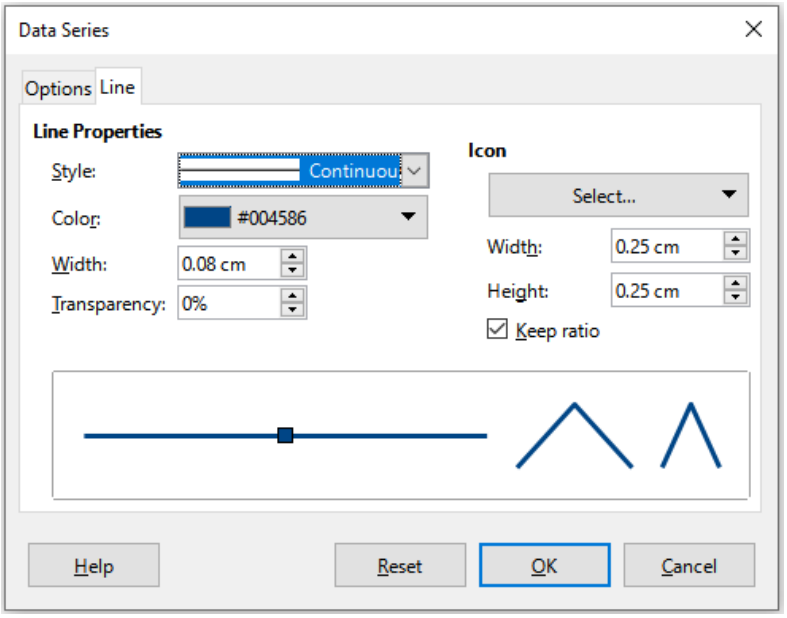


Figure 78: Data Series dialog for line and scatter charts – Line tab

Assigning colors

Colors for the display of data series can be specified in three ways: changing the default color scheme, using the Data Series dialog, or using data ranges to set colors for border and fill.

Changing default color scheme

To modify the default color scheme for data series, go to **Tools > Options > Charts > Default Colors** to specify colors for each data series. Changes made here affect the default colors for any future chart.

Using Data Series dialog

As discussed in the previous section, the Data Series dialog has options for assigning colors for lines, areas, and borders. Available options depend on the type of chart.

Using data ranges to assign colors

Use the COLOR function in the Function Wizard (described in Chapter 8, Using Formulas and Functions) to specify colors with numbers based on combined RGB values. Then assign the numbers to data ranges for border and fill colors in the *Data Series* page of the Chart Wizard (see “Selecting data series” on page 107) or in the *Data Series* tab of the Data Ranges dialog (see “Changing data ranges” on page 122).

For example, using the COLOR function in the Function Wizard, enter 255 for R (red), 0 for G (green), and 255 for B (blue). The COLOR function calculates a combined RGB value of 16711935. Then, when defining data ranges, enter the RGB value(s) in the cell range for border or fill color. Optionally, include a value for the alpha channel (A) in the COLOR function. The value of A can range from 0 (fully transparent) to 255 (fully opaque).

Note

Data ranges for border color and fill can only be specified for column, bar, pie, bubble, and column and line charts.

In addition to directly assigning colors, you can use conditional formatting to define criteria for when specific colors will be used. (Conditional formatting is described in Chapter 4, Formatting Data.)

Figure 79 shows an example of using conditional formatting to specify colors. The COLOR function in the Formula Wizard was used to create the conditional formula `=IF(B2>100,COLOR(240,240,0,20),COLOR(150,0,150,20))`

This formula says that when the value in column B is over 100, the first RGB setting is used to color that data point in the chart. When the value in column B is 100 or less, the default color (150, 0, 150) is used. This formula is in all cells of column C. The numbers appearing in column C are the RGB values calculated using the conditional formula (with cell references changed accordingly).

Temperature	Number	Color
20	67	345374870
25	78	345374870
30	90	345374870
35	101	351334400
40	111	351334400
45	106	351334400
50	98	345374870
55	87	345374870

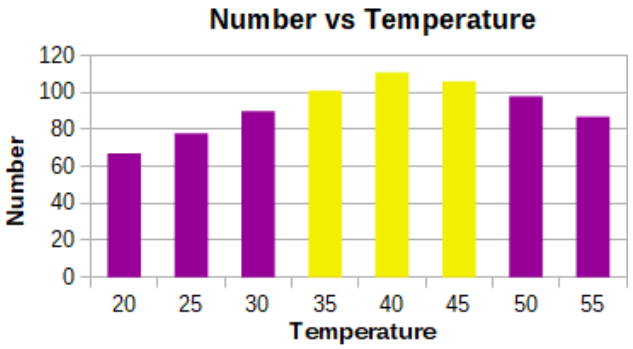


Figure 79: Using the COLOR function and a conditional formula to specify colors

The chart on the right in Figure 79 shows how the colors change to reflect the conditional formatting.

Formatting data points

Modify the appearance of an individual data point such as a column or bar using the Data Point dialog. For most chart types, the dialog contains the same *Area*, *Transparency*, and *Borders* tabs as the Data Series dialog shown in Figure 77 on page 127. For line, scatter, net, and stock charts, the dialog contains the same options as the *Line* tab of the Data Series dialog shown in Figure 78 on page 128.

To format data points:

1) Enter edit mode by double-clicking the chart. The chart should now be surrounded by a gray border.
2) Click two times (but not too quickly) on the data point to be formatted. The data point will show square selection handles.
3) To open the Data Point dialog, do one of the following:
   - Go to **Format > Format Selection**.
   - Right-click on the data point and select **Format Data Point** in the context menu.
   - Click the **Format Selection** icon on the Formatting toolbar.
4) Apply formatting options as desired.
5) Click **OK** to close the dialog. If desired, click outside the chart to leave edit mode.

Tip

As shown in Figure 80, hover the pointer over a data point to show the number of the data point, the number of the series, and the X and Y values of the data point.

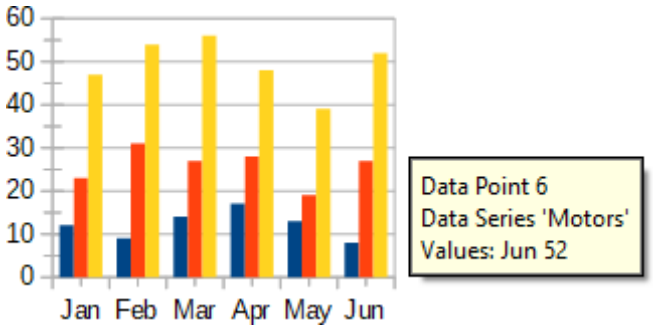


Figure 80: Tooltip showing information about a data point

Axes

Add or remove axis labels

Use the Axes dialog shown in Figure 81 to add or remove axis labels, such as numbers or categories. (To change the name of an axis, see “Titles, subtitles, and axis names” on page 117).

To use the Axes dialog:

1) Enter edit mode by double-clicking the chart. The chart should now be surrounded by a gray border.
2) Open the Axes dialog by doing one of the following:
   - Go to **Insert > Axes** on the Menu bar.
   - Right-click on the chart and select **Insert/Delete Axes** in the context menu.
3) Select or deselect the check boxes for axis labels. The **Z-axis** checkbox is only active when editing a 3D chart.
4) Click **OK** to close the dialog. If desired, click outside the chart to leave edit mode.

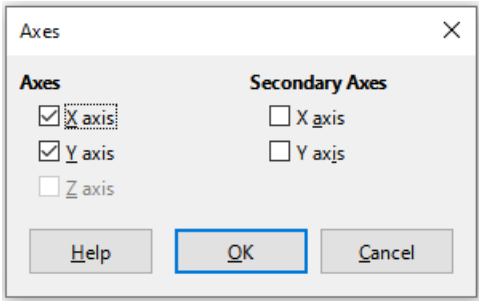


Figure 81: Axes insertion dialog

Selecting a secondary X axis or a secondary Y axis in this dialog creates duplicate labels on the opposite side of the chart, as shown in Figure 82. To specify different units or intervals for the secondary axis, use the *Scale* tab of the more extensive Axis dialog described in the following section.

It is also possible to align one or more data series to the secondary Y axis. Do this using the Data Series dialog, described in “Aligning data to secondary Y axis” on page 124.

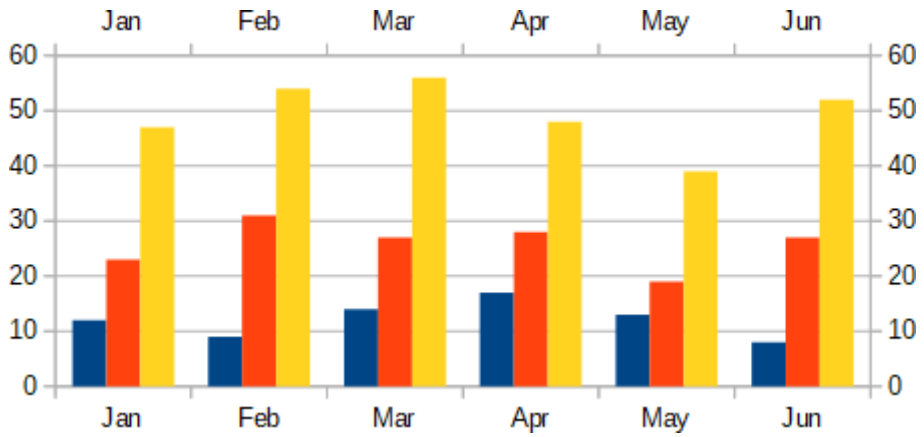


Figure 82: Both secondary axes enabled

Edit and format axes

In addition to the simple dialog above, a more extensive Axis dialog contains options for grid intervals, positioning the axis, formatting the axis line and axis labels, and defining the scale, among other settings. Use a dialog for a specific axis, or use a dialog that applies to all axes. The options in the dialog depend on which axis was selected, type of chart, and whether the chart is 2D or 3D.

To open the more extensive Axis dialog:

1) Enter edit mode by double-clicking the chart. The chart should now be surrounded by a gray border.
2) Open a specific axis dialog (Figure 83) by doing one of the following (some options do not allow choosing all axes):
   - Go to **Format > Axis** on the Menu bar and select the desired axis (**X Axis**, **Y Axis**, **Z Axis**, **Secondary X Axis**, **Secondary Y Axis**, or **All Axes**).
   - Right-click on the desired axis in the chart to open the context menu. Then select **Format Axis**.
   - Click the axis on the chart or select the axis in the *Select Chart Element* drop-down list on the Formatting toolbar and click the adjacent **Format Selection** icon or select **Format > Format Selection** on the Menu bar.
   - Click on the icon for **X Axis, Y Axis,** or **Z Axis** on the Formatting toolbar. Or click on the **All Axes** option to the right of the other icons.
3) Click the tab of the appropriate page to make the changes needed. The options for each page are explained below.
4) Click **OK** to save changes and close the dialog. If desired, click outside the chart to leave edit mode.

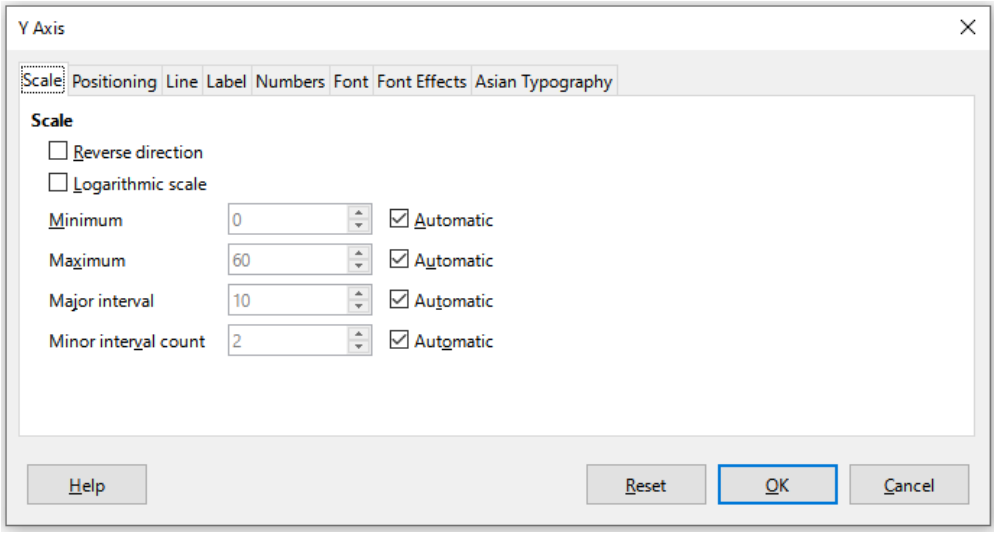


Figure 83: Y Axis formatting dialog – Scale tab

Defining scales

Use the *Scale* tab to modify the automatically generated scale for a primary axis. In addition, use the *Scale* tabs for secondary axes to specify scales that are different from the scales for primary axes. This can be quite useful for showing Celsius and Fahrenheit scales on the same chart, for example, or for when data are aligned to a secondary Y axis (see “Aligning data to secondary Y axis” on page 124).

The contents of the *Scale* tab (Figure 83) vary with chart type but may contain the following options:

Reverse direction

Defines the order of lower and higher values along the axis. When not selected, the X axis shows the lower values on the left and the Y axis shows the lower values at the bottom. When selected, the orientation of the data display is reversed, as shown in the Y axis in Figure 84.

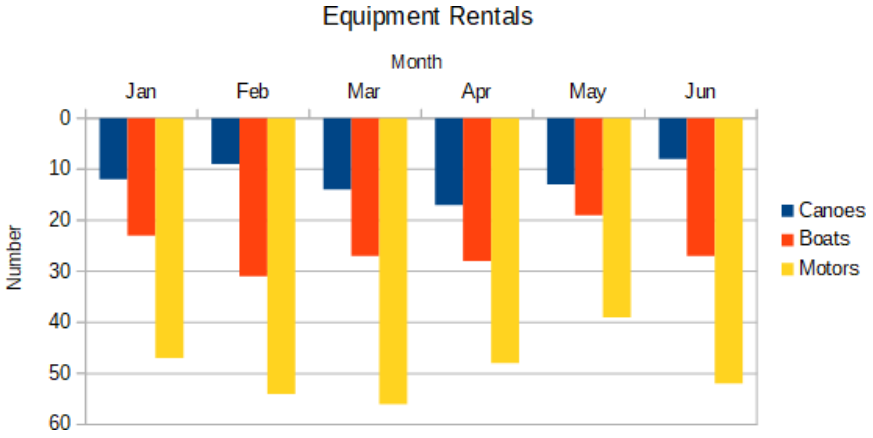


Figure 84: Result when direction is reversed on the Y axis

Logarithmic scale

Specifies that the axis is to be subdivided logarithmically. Logarithmic scaling makes the grid lines of the axis equidistant from each other, but the values between the lines are not equal. Use this option when working with values that differ sharply from each other.

Minimum/Maximum
Sets the first/last value for the axis. **Automatic** must be deselected to set this option manually.

Major interval
Defines the intervals between major divisions of the axis. These intervals will be used for interval marks (specified on the *Positioning* tab of the Axis dialog) and gridlines. **Automatic** must be deselected to set this option manually.

Minor interval count
Defines the number of intervals (not the values between intervals) that subdivide the major intervals. The same as for major intervals, the interval count defined here will be used for interval marks (specified on the *Positioning* tab of the Axis dialog) and gridlines. **Automatic** must be deselected to set this option manually.

For some types of charts, additional options may be available:

Type
Specifies whether the labels are text, date, or should be detected automatically.

Resolution
For dates, specifies that the interval steps should be days, months, or years.

Tip

If the X axis is not displaying time as expected, manually entering the minimum and maximum times on the *Scale* tab may solve the problem.

Positioning axis, labels, and interval marks

The *Positioning* tab (Figure 85) controls the position of axis labels and interval marks.

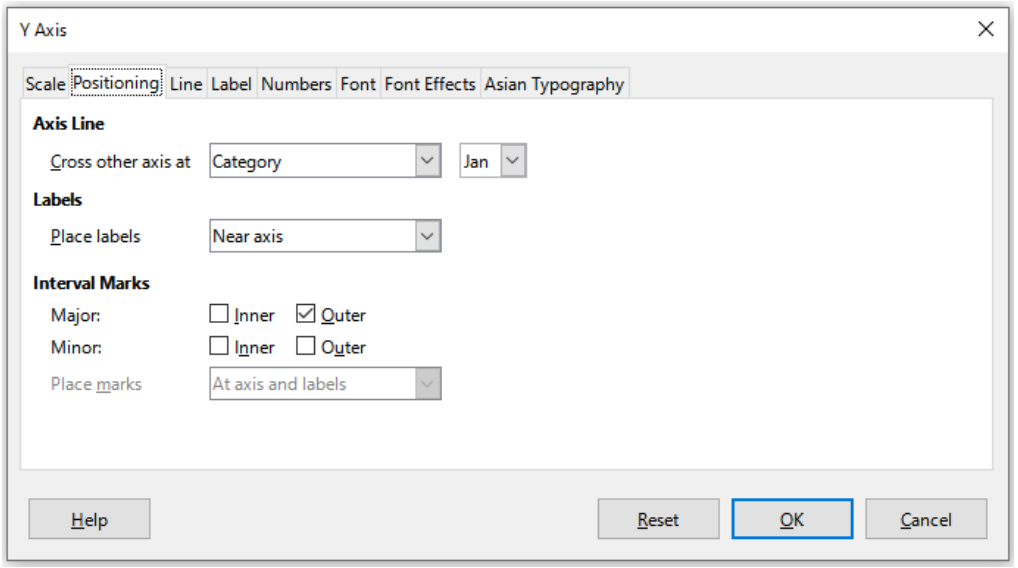


Figure 85: Axis formatting dialog – Positioning tab

Axis Line
Sets where the axis crosses the other axis, as shown in Figure 86. The options on the drop-down list are **Start**, **End**, or **Category**. If **Category** is selected, a further drop-down menu is displayed enabling selection of the value required.

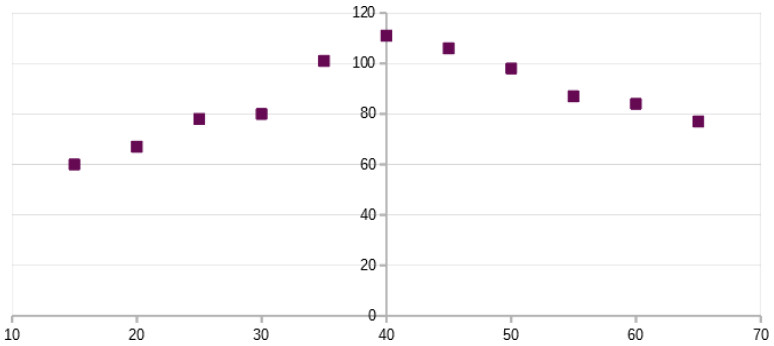


Figure 86: Y axis set to cross X axis at specified value

Labels

Sets where axis labels are placed, using the *Place labels* drop-down list. The **Outside end** and **Outside start** options are useful for positioning labels on axes with negative numbers, as shown in Figure 87.

Interval Marks

- **Major/Minor** – specifies whether interval marks are displayed for major/minor intervals. These intervals are defined on the *Scale* tab, described above.
- **Inner/Outer** – specifies whether interval marks are placed on the inner or outer side of the axis. The interval marks in Figure 87 are on both sides.
- **Place marks** – specifies where to place the marks: **At labels**, **At axis**, or **At axis and labels**. (The top two charts in Figure 87 show the labels along the axes. The marks are thus both at axis and labels. The marks in the bottom two charts are located at the labels.)

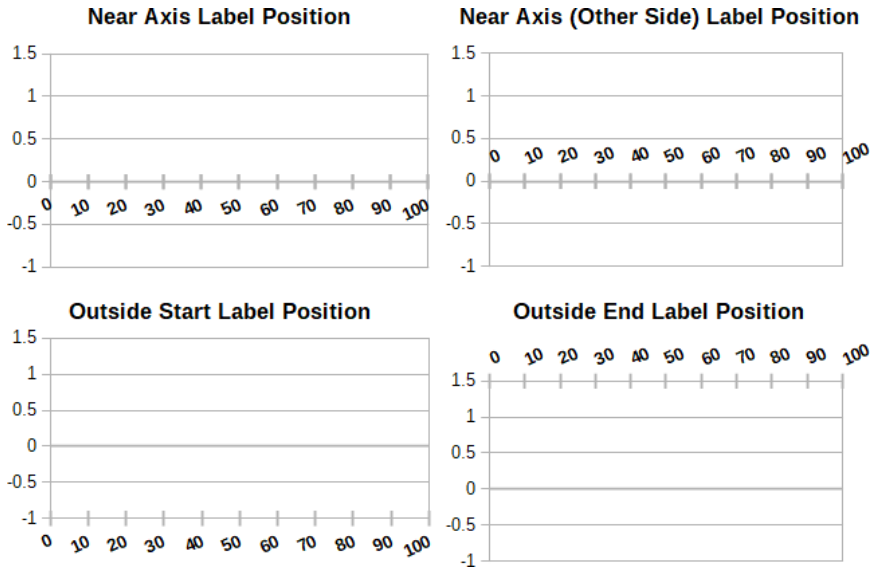


Figure 87: Axis label positions

Line tab

The *Line* tab has options for formatting the axis line style, color, width, and transparency. It has the same contents as the *Line* tab of the Data Series dialog shown in Figure 78 on page 128 but excluding the *Icon* section.

Label tab

On the *Label* tab (Figure 88), choose whether to show or hide the labels and specify how to handle them when they do not fit neatly in the chart. The options are described below.

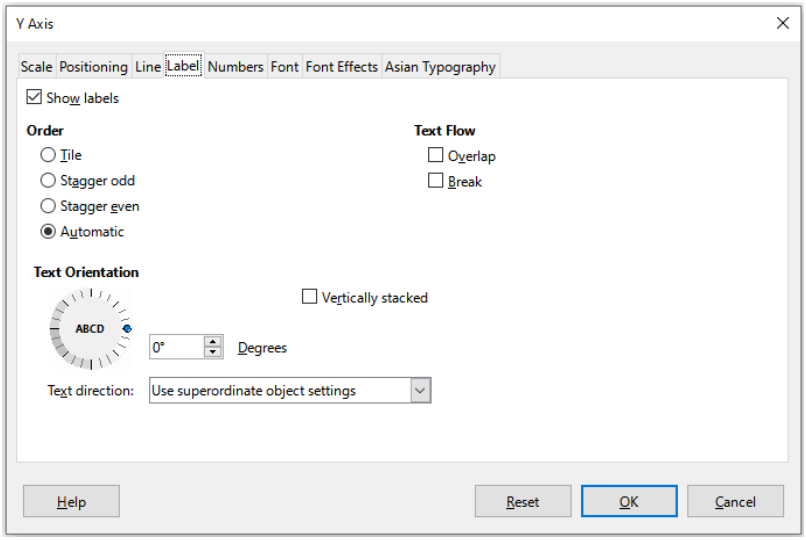


Figure 88: Axis formatting dialog – Label tab

Show labels

Sets whether to show or hide the axis labels.

Order

Defines the horizontal or vertical alignment of the labels on the X or Y axis. These options are available only for 2D charts.

- **Tile** - arranges labels on the axis side by side.
- **Stagger odd** - staggers labels on the axis, with even numbers lower than odd numbers (even numbers to the left on vertical axis).
- **Stagger even** - staggers labels, with odd numbers lower than even numbers (odd numbers to the left on vertical axis).
- **Automatic** - automatically arranges labels on the axis.

Note

Problems may arise in displaying labels if the chart is too small. Avoid this by either enlarging the chart or decreasing the font size.

Text flow

Determines how text flows in axis labels.

- **Overlap** - allows axis labels to overlap.
- **Break** - allows text breaks, enabling text to wrap into new lines in the available space.

Text Orientation

Defines the direction and orientation of label text.

- **Vertically stacked –** Stacks characters vertically so that text is read from top to bottom.
- **ABCD wheel –** Defines text orientation by clicking and dragging the indicator on the wheel. Orientation of the characters “ABCD” on the wheel corresponds to the new setting.
- **Degrees –** Shows the orientation angle of the text as determined by the ABCD wheel or by manually entering the degrees in the spin box.

– **Text direction –** Specifies the direction for any text that uses complex text layout (CTL). CTL is only available if **Tools > Options > Language Settings > Languages > Default Languages for Documents > Complex text layout** is enabled.

Numbers

Use the *Numbers* tab (Figure 89) to set the attributes for any numbers used on the axis. When **Source format** is selected (as it is by default), numbers are formatted exactly as they are formatted on the spreadsheet. Deselect this option to change number formatting. For information about formatting numbers, see Chapter 4, Formatting Data, as well as the online Help.

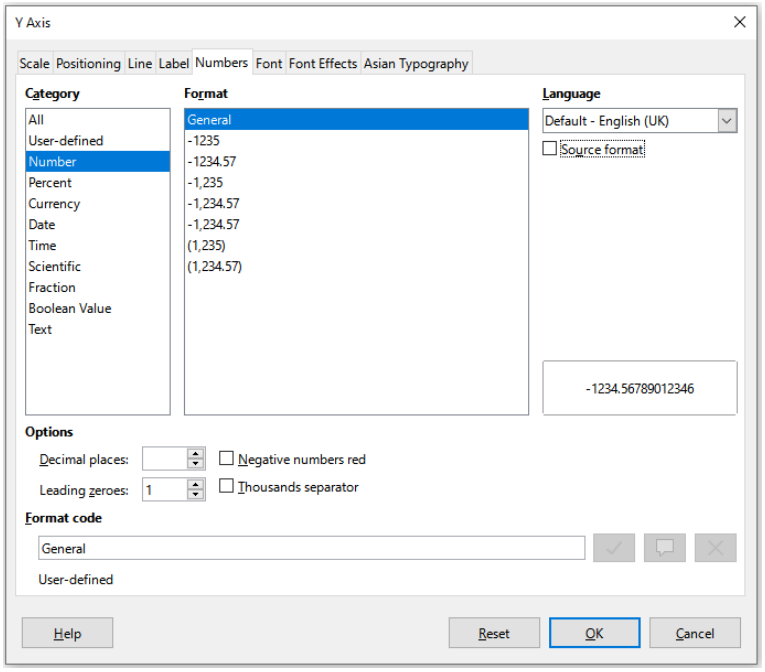


Figure 89: Axis formatting dialog – Numbers tab

Font and Font effects

Use the *Font* and *Font Effects* tabs to set the font and font effects for the axis labels. These tabs are the same as the tabs for specifying fonts and font effects in cells. See Chapter 4, Formatting Data, for more information.

Asian Typography

Sets the Asian typographic options for axis labels. This tab is the same as that for specifying Asian typographic options for cells. See Chapter 4, Formatting Data, for more information.

Hierarchical axis labels

Multiple levels of categories can be displayed in a hierarchical manner along the axis of a chart. Hierarchical axes labels are created automatically if the first column or row defined as data is text (as opposed to the first column or row defined as labels). An example of hierarchical labels is shown in Figure 90. In this case, Calc automatically defines the data range for categories as the first two columns in the spreadsheet. This is reflected in the chart, which shows the hierarchical relationship between quarters and months.

Equipment Rentals

		Canoes	Boats	Motors
1st Quarter	Jan	12	23	47
	Feb	9	31	54
	Mar	14	27	56
2nd Quarter	Apr	17	28	48
	May	13	19	39
	Jun	8	27	52

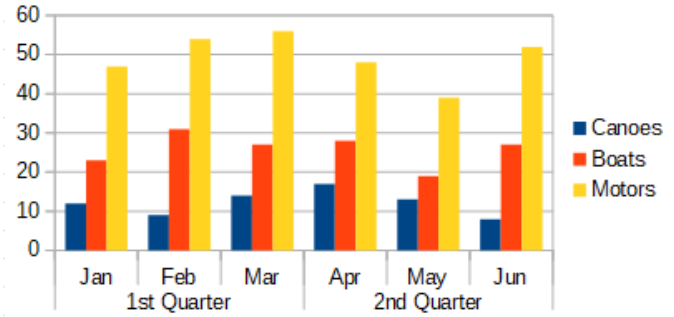


Figure 90: Example of hierarchical axes labels

Data labels

Data labels display information next to data points on the chart. They can be quite useful for highlighting specific data when presenting detailed information, but be careful not to create a chart that is too cluttered to read easily.

Adding and formatting data labels for a data series

To add or format data labels for a data series:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Do one of the following to select a specific data series:
   - Click once somewhere in the data series.
   - In the *Select Chart Element* drop-down list of the Formatting toolbar, select the data series name.

Note

If no data series is selected, then all data series on the chart will be labeled.

3) To open the Data Labels dialog (Figure 92), do one of the following:
   - Go to **Insert > Data Labels** on the Menu bar. If you selected a data series, Calc displays data labels for that data series using default settings, and displays the Data Labels dialog for the selected data series. In this case, the data labels will remain displayed even if you press **Cancel** on the dialog. If no data series was selected, Calc displays the Data Labels for all Data Series dialog (Figure 91). The controls on this dialog are similar to those on the *Data Labels* tab of the Data Labels dialog, which are described below.
   - Right-click on the selected data series in the chart and select **Insert Data Labels** in the context menu. Calc displays data labels with default settings. Then right-click again and select **Format Data Labels** in the context menu.

– Select the intended data labels on the chart or in the *Select Chart Element* drop-down, and then select **Format > Format Selection** on the Menu bar or press the **Format Selection** icon on the Formatting toolbar.

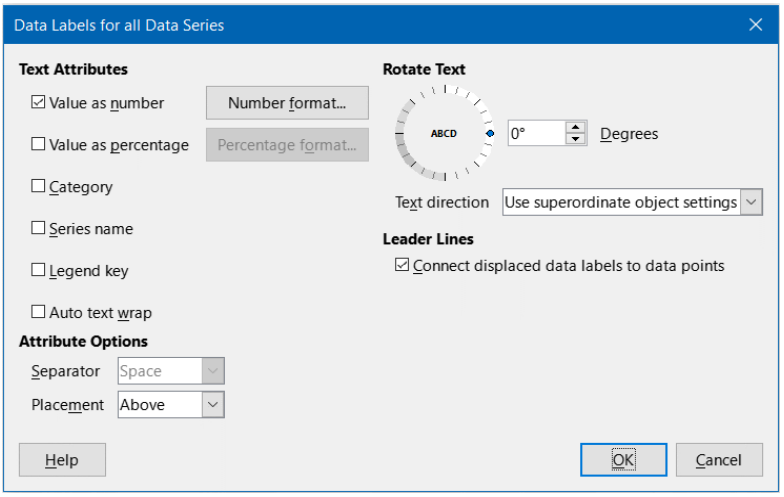


Figure 91: Data Labels for all Data Series dialog

4) Select the options as desired. The options are explained below.

5) Click **OK** to close the dialog. If desired, click outside the chart to leave edit mode.

Tip

Select a data series by clicking once on a column, bar, or other graphic representation of the data series. Select a single data point by pausing, then clicking again.

Most of the tabs in the Data Labels dialog are used in other dialogs and can be readily understood or easily researched. The exception is the *Data Labels* tab (Figure 92), which contains the following options:

Value as number
Displays the numeric value of a data point. When selected, this option activates the **Number format** button.

Number format
Opens the Format Number dialog, which is the same as the *Numbers* tab of the Format Cells dialog discussed in Chapter 4, Formatting Data. Deselect **Source format** to activate options on the Format Number dialog.

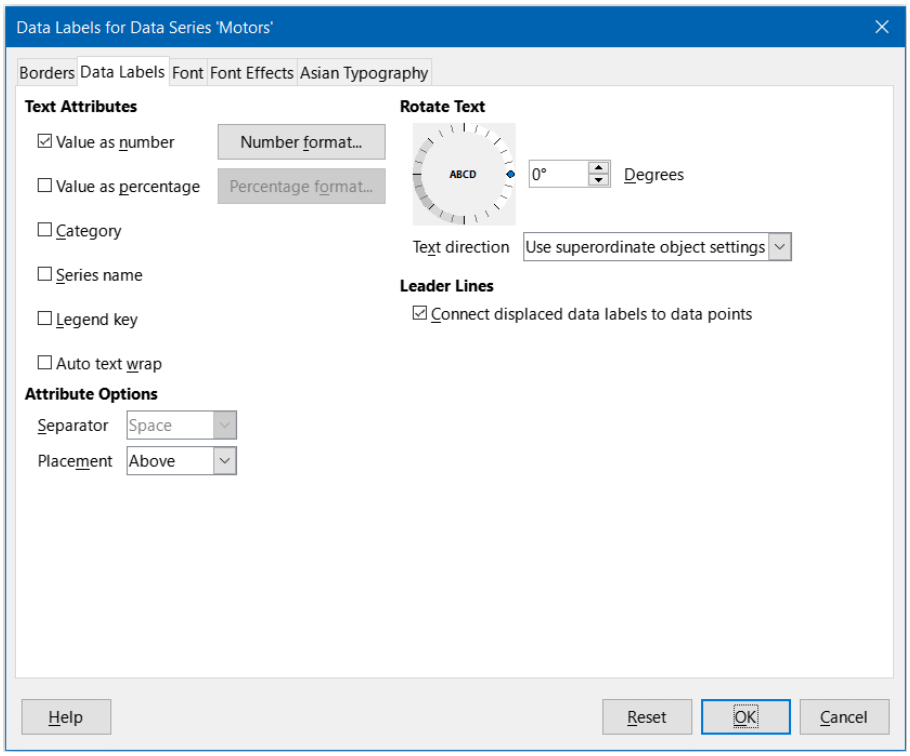


Figure 92: Data Labels tab of the Data Labels dialog

Value as percentage

Displays the percentage value of the data points in each data series. When selected, this option activates the **Percentage format** button. Note that the percentage referred to is a data point's Y value as a percent of total Y values for a specific X category or value. Thus, in Figure 93, the February canoe value 9 is 10% of the total February value of 94 (the sum of 9, 31, and 54).

Percentage format

Opens the Number Format for Percentage Value dialog. which is the same as the *Numbers* tab of the Format Cells dialog discussed in Chapter 4, Formatting Data. Deselect **Source format** to activate options on the Number Format for Percentage Value dialog.

Category

Displays the category next to each data point. This option is activated for all data labels in Figure 93. Thus, all data labels show the month. The text for data labels comes from the category data series and cannot be changed in the chart. It can only be changed in the spreadsheet data.

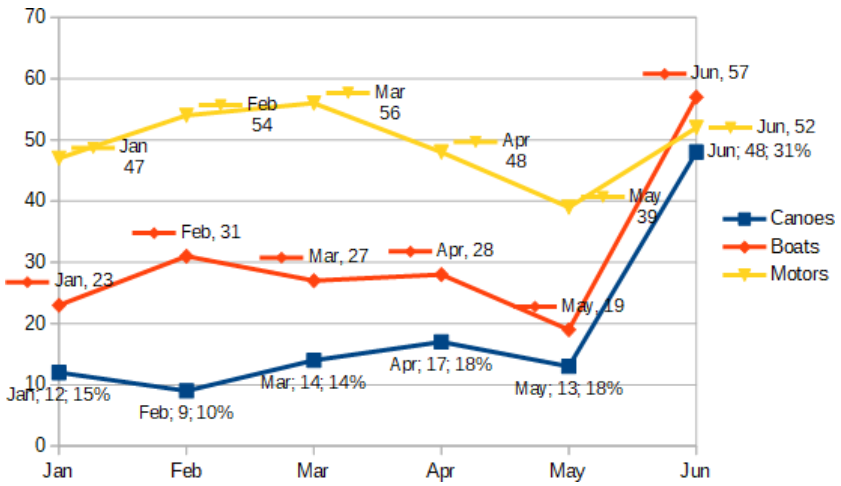


Figure 93: Examples of data label options

Series name
Displays the data series name next to each data point.

Legend key
Displays the legend icon for the data series next to each data point. Figure 93 shows the legend keys for motors and boats, but not for canoes.

Auto text wrap
Wraps data label text if needed.

Separator
Selects what will be used to separate multiple text strings when at least two options above are selected. In Figure 93, the separator is **Semicolon** for the canoes data labels, **New line** for the motors data labels, and **Comma** for the boats data labels (with the exception of the June label, which was modified for better fit). Further options are **Space** and **Period**.

Placement
Specifies the placement of data labels relative to the data point representation. In Figure 93, the placement of data labels is **Below** for canoes, **Above** for boats, and **Right** for motors. Other available options depend on chart type but may include **Left**, **Center**, **Outside**, **Inside**, and **Near Origin**.

Rotate Text
Sets the text orientation of data labels by using the dial or entering the rotation angle in degrees.

Text Direction
Specifies the text direction for a paragraph that uses complex text layout (CTL).

Leader Lines
When you choose to display data labels, Calc automatically determines where to place each label on the chart. However, you can move a data label (by dragging) to a more convenient position. By default, a “leader line” is drawn that connects such a displaced data label to its associated data point. Untick the **Connect displaced data labels to data points** checkbox to hide any leader lines for the selected data series.

Data labels for individual data points

Sometimes it is appropriate to apply data labels to one or a few data points rather than all data points. This reduces clutter and highlights the most important data.

Adding a single data label

Insert a data label for a single data point in the following way:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Click the data point once, pause, then click again to select it. (Clicking too quickly opens the Data Series dialog.)
3) Right-click on the selected data point and select **Insert Single Data Label** in the context menu. The data label will have the default settings.
4) If desired, click outside the chart to leave edit mode.

Formatting the label for a single data point

To format an existing label for a single data point, follow the directions above but instead of step 3)), do the following to open the Label for Data Series dialog (similar to Figure 92): right-click on the data point and select **Format Single Data Label** from the context menu.

The options in the Label for Data Series dialog are the same as for the Data Labels dialog described above.

You can also access the Label for Data Series dialog by clicking on the data label, pausing, and then clicking on it again. Then right-click and select **Format Single Data Label** in the context menu.

Removing data labels

Remove labels from a single data point, a single data series, or all data points using one of the methods below.

Before doing any of the following, first select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border. When finished, if desired, click outside the chart to leave edit mode.

Removing all data labels from a single data series

Method One

Right-click somewhere in the data series and select **Delete Data Labels** in the context menu.

Method Two

1) Do one of the following to open the Data Labels dialog (Figure 92):
   - Click somewhere in the data series to select it. Go to **Insert > Data Labels** on the Menu bar.
   - In the *Select Chart Element* drop-down list of the Formatting toolbar, select the data labels entry for the required series name or select one of the labels for the data series. Then click the adjacent **Format Selection** icon or select **Format > Format Selection** on the Menu bar.
   - Right-click in the data series or on the labels of the data series and select **Format Data Labels** in the context menu.
2) On the *Data Labels* tab, deselect all of the options and click **OK**.

Removing a data label from a single data point

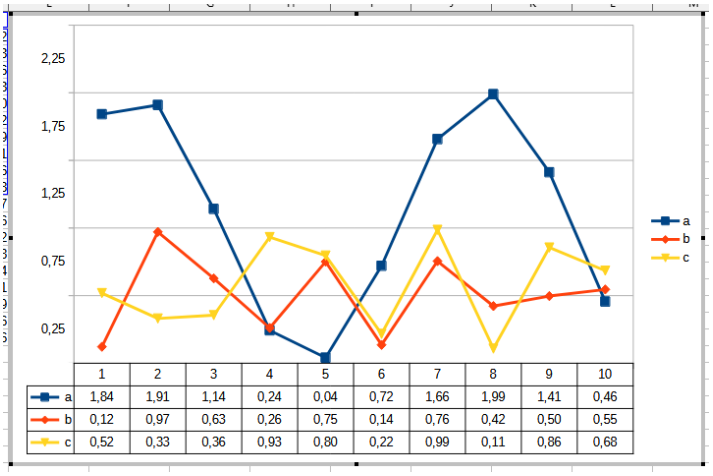
1) Click once on the data point, pause, then click again to select it.
2) Right-click to open the context menu and select **Delete Single Data Label**.

Removing all data labels

1) Make sure that no data label or data series is selected.
2) Go to **Insert > Data Labels** on the Menu bar.
3) On the Data Labels for all Data Series dialog, deselect all of the options for the data labels to be removed, then click **OK**.

Chart Data Table

Chart data tables (Figure 94) allows to visualize the underlying data represented by the chart. A table containing the data is placed at the bottom of the chart and in most cases, the data table contains an exact display of the chart source data.



	1	2	3	4	5	6	7	8	9	10
a	1,84	1,91	1,14	0,24	0,04	0,72	1,66	1,99	1,41	0,46
b	0,12	0,97	0,63	0,26	0,75	0,14	0,76	0,42	0,50	0,55
c	0,52	0,33	0,36	0,93	0,80	0,22	0,99	0,11	0,86	0,68

Figure 94: Chart data table displayed on the bottom of the chart

Inserting a chart data table

1) Double-click the chart object to enter edit mode and choose **Insert - Data Table.**
2) If the chart already has a Data Table, double-click the chart to enter edit mode and do one of the following:
   - Right-click the data table and choose **Format – Selection**.
   - Double-click the Data Table.

Tip

The data table contents retains the chart source data formatting.

To Remove the data table

Double-click the chart to enter edit mode, Choose **Insert - Data Table,** and uncheck the option **Show data table**.

Data table properties

Format properties of the data table (Figure 95):

- **Show horizontal border**: show or hide internal row borders.
- **Show vertical border**: show or hide internal column borders.

- **Show outline**: show or hide borders around the table.
- **Show keys**: show or hide the key associated with each data series, which is the same key used in the chart legend.

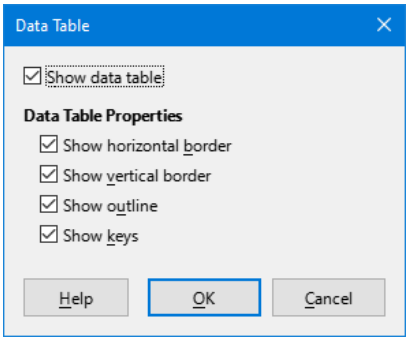


Figure 95: Chart data table options

Grids

Grid lines or grids divide the intervals along axes to help estimate data point values. Major and minor grid lines are shown in Figure 96. The darker lines with numbers are major grid lines while the lighter lines between them are minor grid lines. Note that the Y-axis major grid line is activated by default.

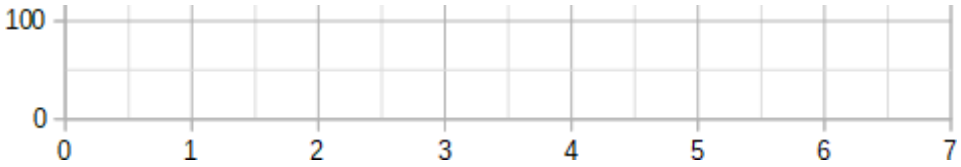


Figure 96: Major and minor grid lines for the X and Y axes

Grids are available for all chart types with the exception of pie charts.

Adding/removing grid lines

1) First select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Do one of the following:
   – Go to **Insert > Grids** on the Menu bar to open the Grids dialog (Figure 97). Select/deselect the check boxes as needed. The **Z axis** checkbox is only active for a 3D chart. Click **OK** to close the dialog.

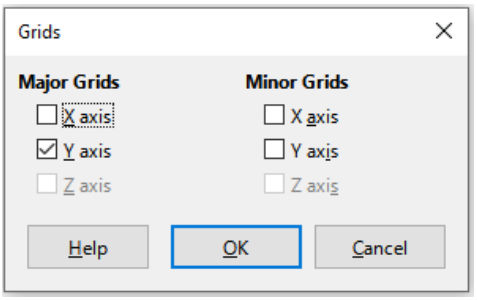


Figure 97: Basic Grids dialog

– Click the **Horizontal Grids** icon or the **Vertical Grids** icon, both located on the Formatting toolbar. Clicking once turns on the major grid lines. Clicking twice turns on the minor grid lines as well. Clicking again turns off the grids.

3) If desired, click outside the chart to leave edit mode.

Note

In the Formatting toolbar, the **Horizontal Grids** icon and the **Vertical Grids** icon set grid lines for the Y axis and X axis, respectively. This can be misleading because both the Y axis and the X axis can be horizontal or vertical, depending on the type of chart. Thus, for a bar chart, click the **Horizontal Grids** icon to control the vertical grids.

Formatting grids

In addition to the Grids dialog shown in Figure 97, there is another dialog for formatting grids. To open the grid formatting dialog:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Go to **Format > Grid** on the Menu bar and select the appropriate type of grid to open the Grid formatting dialog (Figure 98).

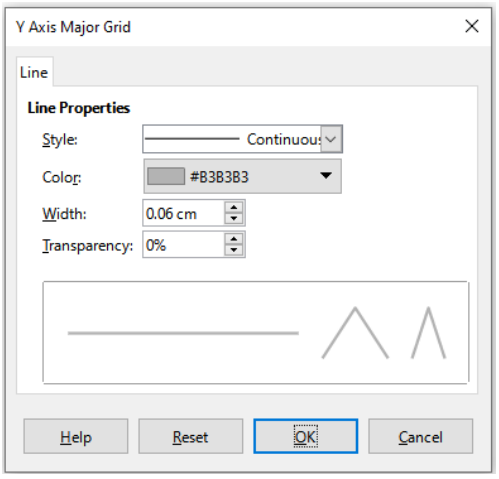


Figure 98: Grid formatting dialog

3) Set formatting options for line style, color, width, and transparency.
4) Click **OK** to close the dialog. If desired, click outside the chart to leave edit mode.

Note

Use the *Scale* tab of the Axis dialog to specify the intervals between grid lines. This is described in “Defining scales” on page 132.

3D charts

Setting 3D look

Column, bar, pie, and area charts can be displayed as 3D charts. The setting to make a chart 3D is on the first page of the Chart Wizard. If the chart has already been created, do the following to give it a 3D look:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Do one of the following:
   - Go to **Format > Chart Type**.
   - Click on the **Chart Type** icon on the Formatting toolbar.
   - Right-click in the chart and select the **Chart Type** option in the context menu.
3) Select **3D Look** in the Chart Type dialog.
4) Select the basic rendering scheme as **Simple** or **Realistic** from the adjacent drop-down.
5) For column and bar charts, select the shape as **Bar**, **Cylinder**, **Cone**, or **Pyramid**.
6) Click **OK** to close the dialog. If desired, click outside the chart to leave edit mode.

Formatting 3D view

To make changes to a 3D chart, use the 3D View dialog (Figure 99).

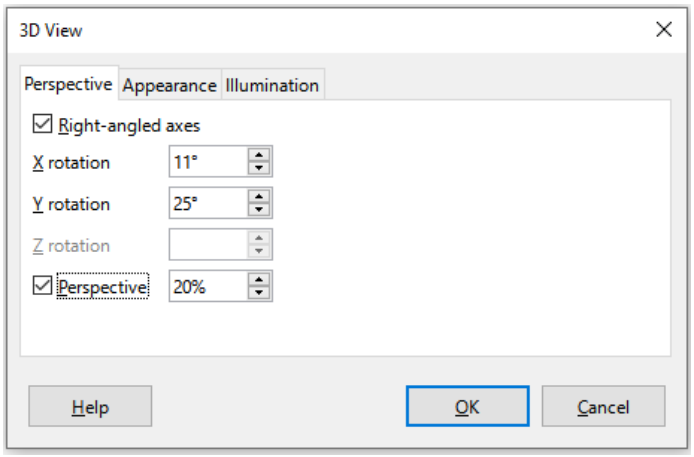


Figure 99: 3D View dialog – Perspective tab

Use the 3D View dialog to change the 3D settings, including perspective, appearance, and illumination. Note that the chart must already be set to show a 3D look, as described above. To open the 3D View dialog:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Do one of the following:
   - Right-click on the chart and select **3D View** in the context menu.
   - Go to **Format > 3D View**.
   - Click on the **3D View** icon on the Formatting toolbar.
3) Make any changes required.

4) Click **OK** to close the dialog. If desired, click outside the chart to leave edit mode.

This dialog has three tabs, which are explained below.

Rotation and perspective

Some hints for using the *Perspective* tab (Figure 99) to rotate a 3D chart or change its perspective view:

- Set all angles to 0 degrees for a front view of the chart. Pie charts and donut charts are shown as circles.
- With **Right-angled axes** enabled, the chart can be rotated only in the X and Y direction; that is, parallel to the chart borders.
- An X value of 90 degrees, with Y and Z set to 0 degrees, provides a view from the top of the chart. With X set to –90 degrees, the view is from the bottom of the chart.
- Rotation is applied in the following order: X axis first, then Y axis, and Z axis last.
- When shading is enabled (see below) and the chart is rotated, the lights are rotated as if they are fixed to the chart.
- The rotation axes always relate to the page, not to the axes of the chart. This is different from some other chart programs.
- Select the **Perspective** option to view the chart in central perspective as through a camera lens (as opposed to using a parallel projection). Set the focal length with the spin box or type a number in the box. With a 100% setting, a far edge in the chart looks approximately half as big as a near edge.

Rotating 3D charts interactively

In addition to using the *Perspective* tab of the 3D View dialog, rotate 3D charts interactively in the following way:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Click once on the chart wall to select it, causing round selection handles to appear. The pointer changes to a rotation icon.
3) Press and hold the left mouse button while dragging in the desired direction. A dashed outline of the chart is visible to help see how the result will look.
4) Release the mouse button when satisfied.
5) Click outside the chart to exit edit mode.

Appearance

Use the *Appearance* tab of the 3D View dialog (Figure 100) to modify some aspects of the appearance of the data in a 3D chart.

First select a rendering scheme from the *Scheme* drop-down list – **Realistic** (default) or **Simple**. The scheme selected sets the options and light sources. Depending on the scheme selected, not all options may be available. To create a custom scheme, select or deselect a combination of **Shading**, **Object borders**, and **Rounded edges**.

Some hints:

- 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 but soft gradients and spotlights are not possible. The Gouraud method applies gradients for a smoother, more realistic look. See the *Draw Guide* for more information on the use of shading.

- Select **Object borders** to draw lines along the edges.
- Select **Rounded edges** to smooth the edges of box shapes.

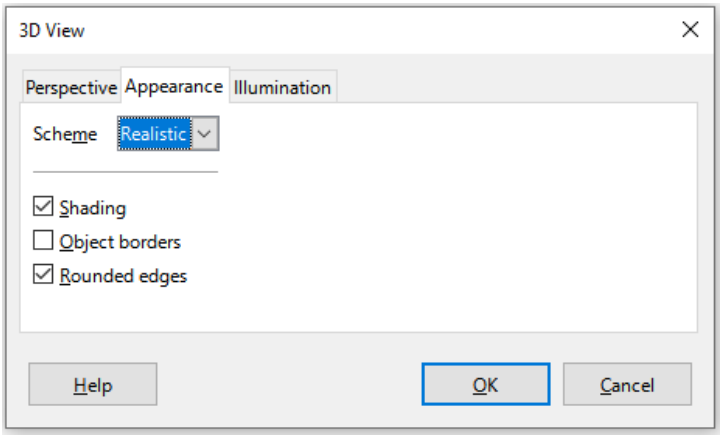


Figure 100: 3D View dialog – Appearance tab

Illumination

Use the *Illumination* tab (Figure 101) of the 3D View dialog to control light sources for the 3D view.

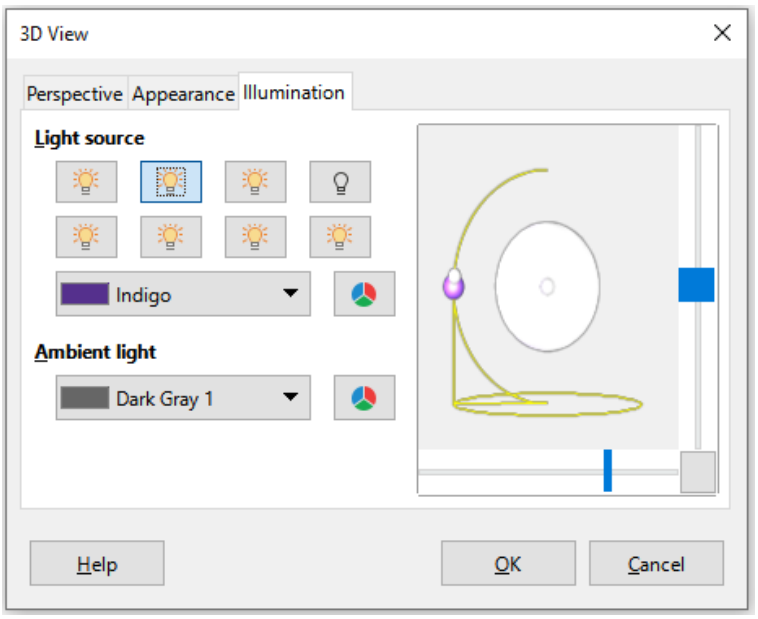


Figure 101: 3D View dialog – Illumination tab

Here are the options with some hints:

- Click any of the eight buttons to switch a directed light source on or off.
- The first light source projects a specular light with highlights.
- By default, the second light source is switched on. It is the first of seven normal, uniform light sources. To activate the others sources, click twice on their respective button.
- For the selected light source, select a color from the first drop-down list below the eight light source buttons. Alternatively press the adjacent button to select a color using the Pick a Color dialog. Note that the brightness values of all lights are added together, so use dark colors when enabling multiple lights.

- The small preview in the dialog shows the effect of repositioning the light source.
- Each selected light source appears as a small colored sphere in the specified color. The sphere is larger when the light source is actively selected.
- Each light source always points at the middle of the object initially. Move the vertical slider to adjust the lighting angle. The horizontal slider rotates the light around the object. In addition, click the light source and drag it to the desired location.
- Click the button in the bottom right corner of the preview to switch the internal illumination model between a sphere and a cuboid.
- Use the *Ambient light* drop-down list to define the ambient light, which shines with a uniform intensity from all directions. Alternatively press the adjacent button to select a color using the Pick a Color dialog.

See the *Draw Guide* for more information on setting the illumination.

Trend and mean value lines

Trend lines help show the relationships among scattered data points of a data series. Calc has a good selection of regression types for creating trend lines: linear, logarithmic, exponential, power, polynomial, and moving average. Choose the type that comes closest to passing through all of the points in a data series.

Trend lines can be added to all 2D chart types except for pie, net, bubble, and stock charts. When inserted in the chart, representations of the trend lines are automatically shown in the chart legend.

Note

For chart types that use categories for the X axis, such as column, bar, or line charts, the numbers 1, 2, 3... are used as values for calculating trend lines. By contrast, XY (scatter) chart types show data rather than categories along the X axis. Thus, only XY (scatter) chart types can show meaningful regression equations.

Adding and modifying trend lines

Trend lines can only be added to one data series at a time. To add a trend line to a data series:

1) Double-click on the chart to enter edit mode. The chart should now be surrounded by a gray border.
2) Select the data series by doing one of the following:
   - Click once on a data series representation such as a bar, column, line, or point.
   - Select the data series from the *Select Chart Element* drop-down list on the Formatting toolbar.
3) Do one of the following to open the Trend Lines dialog (Figure 102):
   - Go to **Insert > Trend Line** on the Menu bar.
   - Right-click on the data series and select **Insert Trend Line** in the context menu.
4) Select the type of regression and choose the desired options. These are explained below.
5) Click **OK** to close the dialog and place the trend line in the chart. If desired, click outside the chart to leave edit mode.

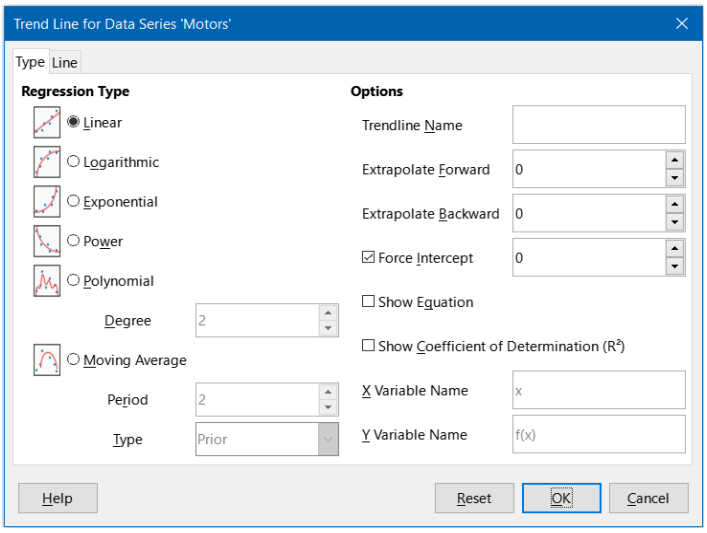


Figure 102: Trend Line dialog – Type tab

Regression types

By default, x is used for the abscissa variable and f(x) for the ordinate variable. Change the names under *X Variable Name* and *Y Variable Name* on the Trend Line dialog.

Linear
Regression through equation y = a · x+b. Intercept b can be forced.

Logarithmic
Regression through equation y = a · ln(x) + b. Only positive x values are used.

Exponential
Regression through equation y = b · exp(a · x).This equation is equivalent to y = b · mx, with m = exp(a). Intercept b can be forced. Only positive y values are considered, except if all y values are negative. In that case, the equation used is y = -b·exp(a · x).

Power
Regression through equation y = b · xa. Only positive x values are considered. Only positive y values are considered, except if all y values are negative. In that case, the equation used is y = -b · xa.

Polynomial
Regression through equation y = Σi (ai · xi). Intercept a0 can be forced. Degree of polynomial must be given (at least 2).

Moving Average
Simple moving average for n previous y-values, with n being the period. No equation is available for this trend line. The type of moving average regression curve is selected as **Prior**, **Central**, or **Averaged Abscissa**.

Tip

It is possible to add multiple trend lines to a single data series. This could be useful when you want to compare different regression types for your data.

Search for the term “Trend Lines” in the index of the Help system for more information about these regression types.

Trend line options

Trendline Name
Specifies the name to be used for labeling the equation in the legend; see Figure 103.

Extrapolate Forward/Backward
Specifies the number of units the trend line should be extended forward or back. This only works for charts that have numeric values along the X axis rather than categories.

Force Intercept
Forces the line to cross the Y axis at the specified value.

Show Equation
Displays the equation in the chart, as shown in Figure 103.

Show Coefficient of Determination (R2)
Displays the coefficient of determination in the chart. Shown with the polynomial equation in Figure 103.

X and Y Variable Names
Enables changing the names of X or Y variables for displaying the equation in the chart. The **Show Equation** option must be checked for these options to be active.

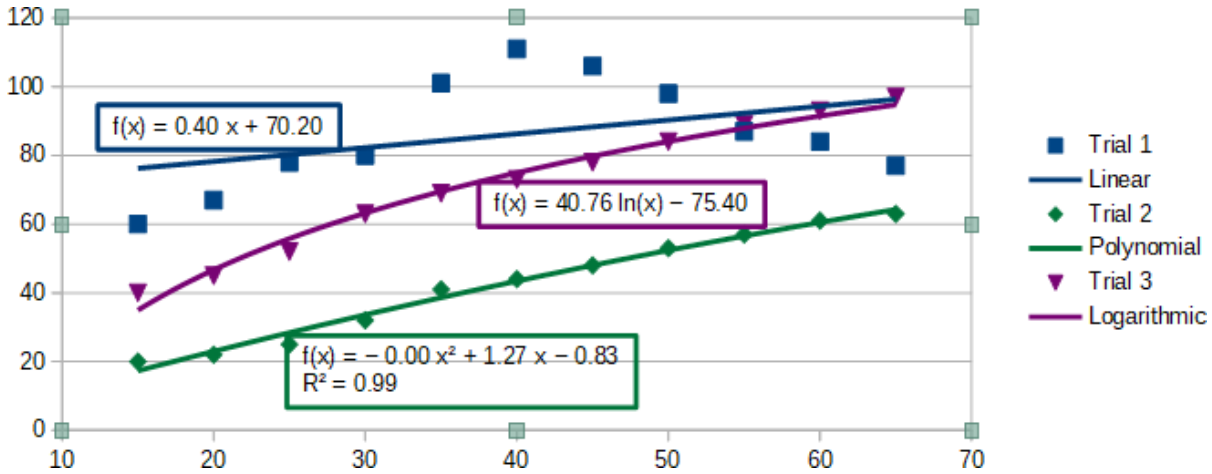


Figure 103: Trend lines showing various equations

Select a trend line to display information about it in the Status bar, as shown in Figure 104. The Status bar is normally located at the bottom of the spreadsheet.

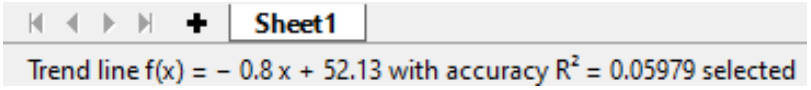


Figure 104: Equation information displayed in the Status bar

Formatting trend lines

When originally inserted, a trend line has the same color as the corresponding data series. To change the style, color, width, or transparency of a trend line, use the *Line* tab of the Trend Line dialog (Figure 105). The options are easily understood or researched.

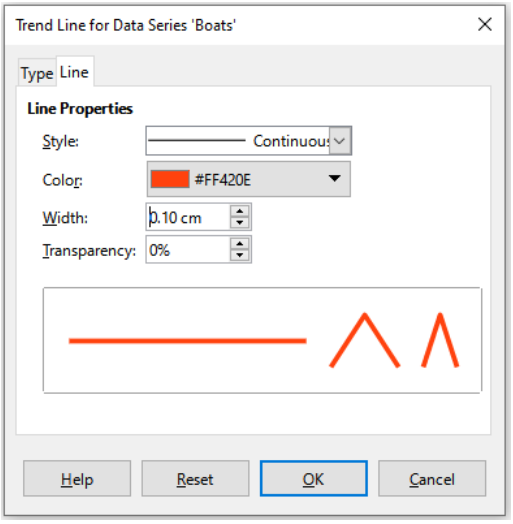


Figure 105: Trend Line dialog – Line tab

Formatting trend line equations

Display the equation in the chart by selecting **Show Equation** on the *Type* tab of the Trend Line dialog (Figure 102). Options for the trend line equation include formatting the border around the equation, area fill, transparency, font, and alignment. The number style can also be specified– this may be quite useful, especially for specifying the number of decimal places.

To format trend line equations:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Do one of the following to open the Equation dialog:
   - Select the equation on the **Select Chart Element** drop-down list and then click the **Format Selection** icon on the Formatting toolbar or select **Format > Format Selection** on the Menu bar.
   - Click once on the equation to select it then click the **Format Selection** icon on the Formatting toolbar or select **Format > Format Selection** on the Menu bar.
   - Right-click on the equation and select **Format Trend Line Equation** in the context menu.
3) Select the desired options on the dialog. The options are self-explanatory or easily researched. The *Numbers* tab has the same options as the *Numbers* tab of the Axis dialog, Figure 89 on page 136.
4) Click **OK** to close the dialog.
5) If desired, click outside the chart to leave edit mode.

Deleting trend lines

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Do one of the following:
   - Select the trend line and press the `Delete` key.
   - Right-click on the trend line and select **Delete Trend Line** in the context menu.
3) If desired, click outside the chart to leave edit mode.

Mean value lines

Mean value lines are a special type of trend line. To create one, Calc calculates the average of a data series and places a colored line at that value in the chart, as shown in Figure 106. They can only be created for 2D charts and cannot be created for pie, bubble, net, or stock charts.

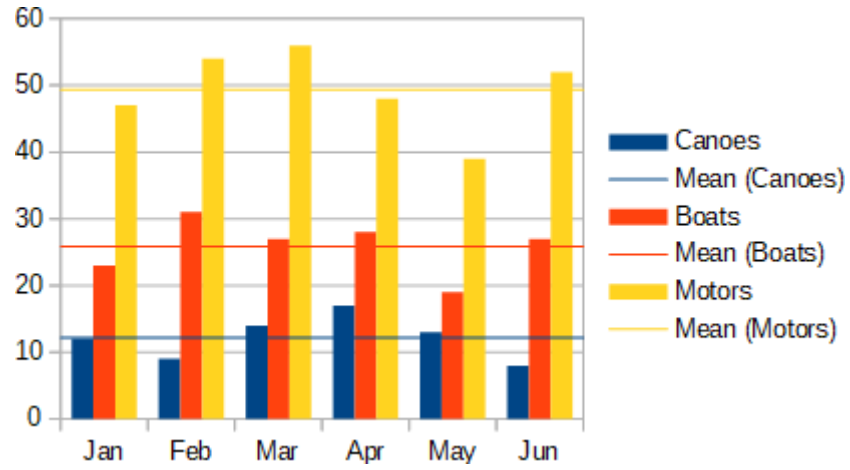


Figure 106: Mean value lines

Inserting mean value lines

For all data series (if no data series is selected, mean value lines are inserted for all data series):

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Go to **Insert > Mean Value Lines** on the Menu bar.
3) If desired, click outside the chart to leave edit mode.

For a single data series:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Select a data series by doing one of the following:
   - Click once somewhere in the data series.
   - Select the data series from the *Select Chart Element* drop-down list on the Formatting toolbar.
3) Add the mean value line by doing one of the following:
   - Go to **Insert > Mean Value Lines** on the Menu bar.
   - Right-click on the data series and select **Insert Mean Value Line** in the context menu.
4) If desired, click outside the chart to leave edit mode.

Modifying mean value lines

When inserted, a mean value line has the same color as the corresponding data series. To modify the style, color, width, and transparency of a mean value line:

1) Double-click on the chart to enter edit mode. The chart should now be surrounded by a gray border.
2) Do one of the following to open the Mean Value Line dialog (the dialog has the same options as the *Line* tab of the Trend Line dialog in Figure 105):

– Right-click on the mean value line and select **Format Mean Value Line** in the context menu.

– Left-click on the mean value line or select the appropriate mean value line from the *Select Chart Element* drop-down list on the Formatting toolbar, then click the **Format Selection** icon in the Formatting toolbar, or select **Format > Format Selection**.

3) Make the desired changes.

4) Click **OK** to close the dialog. If desired, click outside the chart to leave edit mode.

Deleting mean value lines

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.

2) Do one of the following:

– Left-click on the mean value line or select the appropriate mean value line from the *Select Chart Element* drop-down list on the Formatting toolbar and then press the `Delete` key.

– Right-click on the data series and select **Delete Mean Value Line** in the context menu.

3) If desired, click outside the chart to leave edit mode.

Error bars

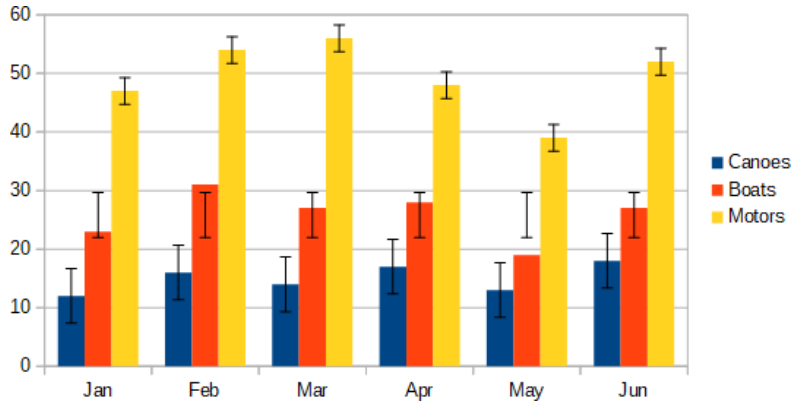


Figure 107: Error bars showing variance (Canoes), standard deviation (Boats), and standard error (Motors)

Error bars, shown in Figure 107, can be useful for presenting data that has a known possibility of error, such as social surveys using a particular sampling method, or for showing the measuring accuracy of the tool used. They can be created for 2D charts only and cannot be created for pie, bubble, net, or stock charts.

Inserting error bars

If no data series is selected, X or Y error bars are inserted for all data series. To add error bars for all data series:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.

2) Go to **Insert > X Error Bars** or **Insert > Y Error Bars** on the Menu bar to open the Error Bars dialog (Figure 108). The *Line* tab is not present if you are inserting error bars for all data series; in this circumstance, an extra **None** option appears in the *Error Category* area.
3) Select the desired options. See below for more information about the options.
4) Click **OK** to close the dialog and add the error bars to the chart. If desired, click outside the chart to leave edit mode.

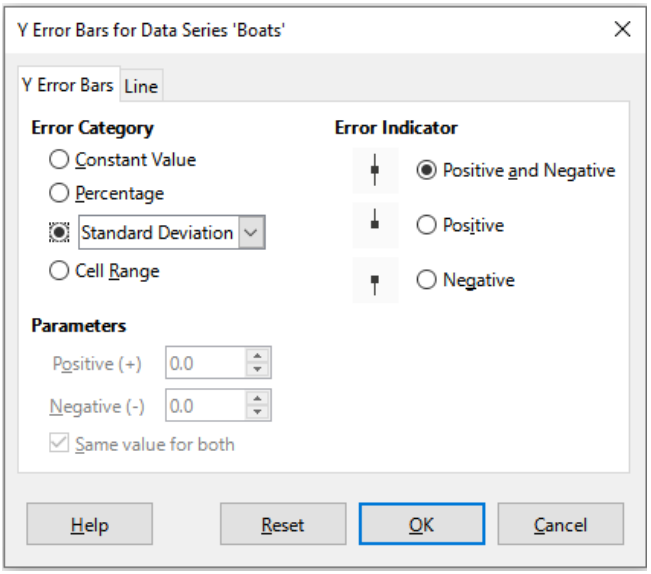


Figure 108: Error Bars dialog – Error Bars tab

To insert error bars for a single data series:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Do one of the following to select the data series:
   - Click once on a bar, column, line, or other graphical representation in the data series.
   - Select the data series from the *Select Chart Element* drop-down list on the Formatting Toolbar.
3) Do one of the following to open the Error Bars dialog (Figure 108):
   - Go to **Insert > X Error Bars** or **Insert > Y Error Bars** on the Menu bar.
   - Right-click on the data series and select **Insert X Error Bars** or **Insert Y Error Bars** in the context menu.
4) Select the desired options. See below for more information about these options.
5) Click **OK** to close the dialog and add the error bars to the chart. If desired, click outside the chart to leave edit mode.

Error Bars dialog options

Under *Error Category*, only one of the following options can be selected at a time.

None - does not show any error bars. This option is only available when no data series is selected.

Constant Value - shows the error as constant positive and/or negative value(s). Specify these values in the *Parameters* section.

Percentage – shows the error as a percentage of the data points. Specify this percentage in the *Parameters* section.

The drop-down list has four measures of the error value:

- **Standard Error**
- **Standard Deviation**
- **Variance**
- **Error Margin** – uses the value for the error margin that is specified in the *Parameters* section.

Cell Range – uses error values defined in a range of cells. Specify the range in the *Parameters* section.

Under *Parameters*, specify positive and negative values or ranges for the error bars. **Constant Value**, **Percentage**, **Error Margin**, or **Cell Range** must be checked for these options to be active.

Under *Error Indicator*, select whether the error graphic shows both positive and negative errors, only positive errors, or only negative errors.

On the *Line* tab you can adjust the line style, color, width, and transparency for the error bars.

Modifying error bars

Error bars can only be changed one data series at a time, using the Error Bars dialog (Figure 108). Do one of the following to open the Error Bars dialog:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Do one of the following to open the Error Bars dialog:
   - Click once on the data series to select it, then go to **Insert > X Error Bars** or **Insert > Y Error Bars** on the Menu bar.
   - Select the error bars for the specific data series from the *Select Chart Element* drop-down list on the Formatting toolbar. Then go to **Format > Format Selection** or click the **Format Selection** icon on the Formatting toolbar.
   - Right-click on the data series and select **Format X Error Bars** or **Format Y Error Bars** in the context menu.
3) Select the desired options on the *Error Bars* and *Line* tabs of the Error Bars dialog.
4) Click **OK** to close the dialog and update the error bars for the selected series. If desired, click outside the chart to leave edit mode.

Deleting error bars

To delete X or Y error bars for all data series:

1) Select the chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) With no data series selected, go to **Insert > X Error Bars** or **Insert > Y Error Bars** on the Menu bar to open the Error Bars dialog (Figure 108).
3) Select **None**.
4) Click **OK** to close the dialog and delete the error bars.
5) If desired, click outside the chart to leave edit mode.

To delete error bars for a single data series, follow the same steps as above but instead of steps 2)) to 4)), right-click on the data series and select **Delete X Error Bars** or **Delete Y Error Bars** in the context menu.

Adding drawing objects to charts

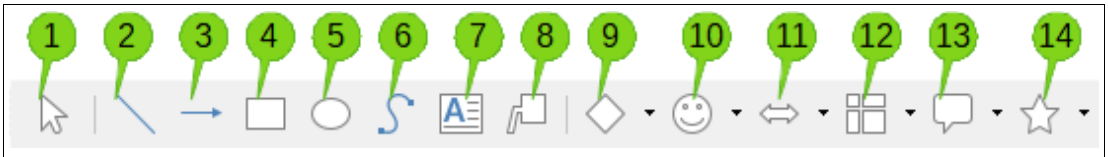
Use the Drawing toolbar to add shapes such as lines, rectangles, circles, text objects, or more complex shapes such as symbols or block arrows. Use additional shapes to add explanatory notes, highlight points of interest on a chart, or even hide certain data or text.

Open the Drawing toolbar by going to **View > Toolbars > Drawing**. Note that it can be moved around the workspace as needed. For more information on using the Drawing toolbar and drawing shapes, see Chapter 6, Using Images and Graphics, as well as the *Draw Guide*.

The Drawing toolbar (Figure 109) appears when the chart is in edit mode (by clicking on it twice).

Tip

To place arrows, text, or other drawing objects in a chart, be sure that the chart is in edit mode. Otherwise, an object will not be connected to the chart and will not be moved with it.



1. Select	6. Freeform Line	11. Block Arrows
2. Insert Line	7. Insert Text Box	12. Flowchart
3. Line Ends with Arrow	8. Callouts	13. Callouts
4. Insert Rectangle	9. Basic Shapes	14. Stars and Banners
5. Insert Ellipse	10. Symbol Shapes	

Figure 109: Drawing toolbar when chart is placed in edit mode

Most of these options are self-evident or can be readily researched, especially by referring to the *Draw Guide*. Clicking on the icon for an option changes the pointer's appearance, depending on the option. Click and drag the pointer to create the desired drawing object in the chart. Information that may be helpful for charts follows.

Insert Line

Draws a straight line where dragged.

Note

If you draw a line in the spreadsheet (outside any chart), you can hold down `Shift` while dragging to constrain angles of the line to multiples of 45 degrees. This facility is not applicable when inserting a line on a chart.

Write on the line by double-clicking the line and typing or pasting text. If the text is too low, press `Enter` to raise it above the line.

Insert Text Box

Draws a text box with horizontal text direction. To place the text at an angle, click once on the text box to select it, right-click, and select **Position and Size** from the context menu. Specify the angle on the *Rotation* tab.

Callouts

Draws a line that ends in a graphic in which text can be placed. Use a callout to describe or draw attention to a specific point or area. Double-click the callout to write text in it. In Figure 109, **Callouts** option 8 creates a default callout while option 13 opens a tool palette of callout styles.

Clicking the down arrows next to the last six options on the right of the Drawing toolbar (Figure 109) opens tool palettes similar to those shown in Figure 110.

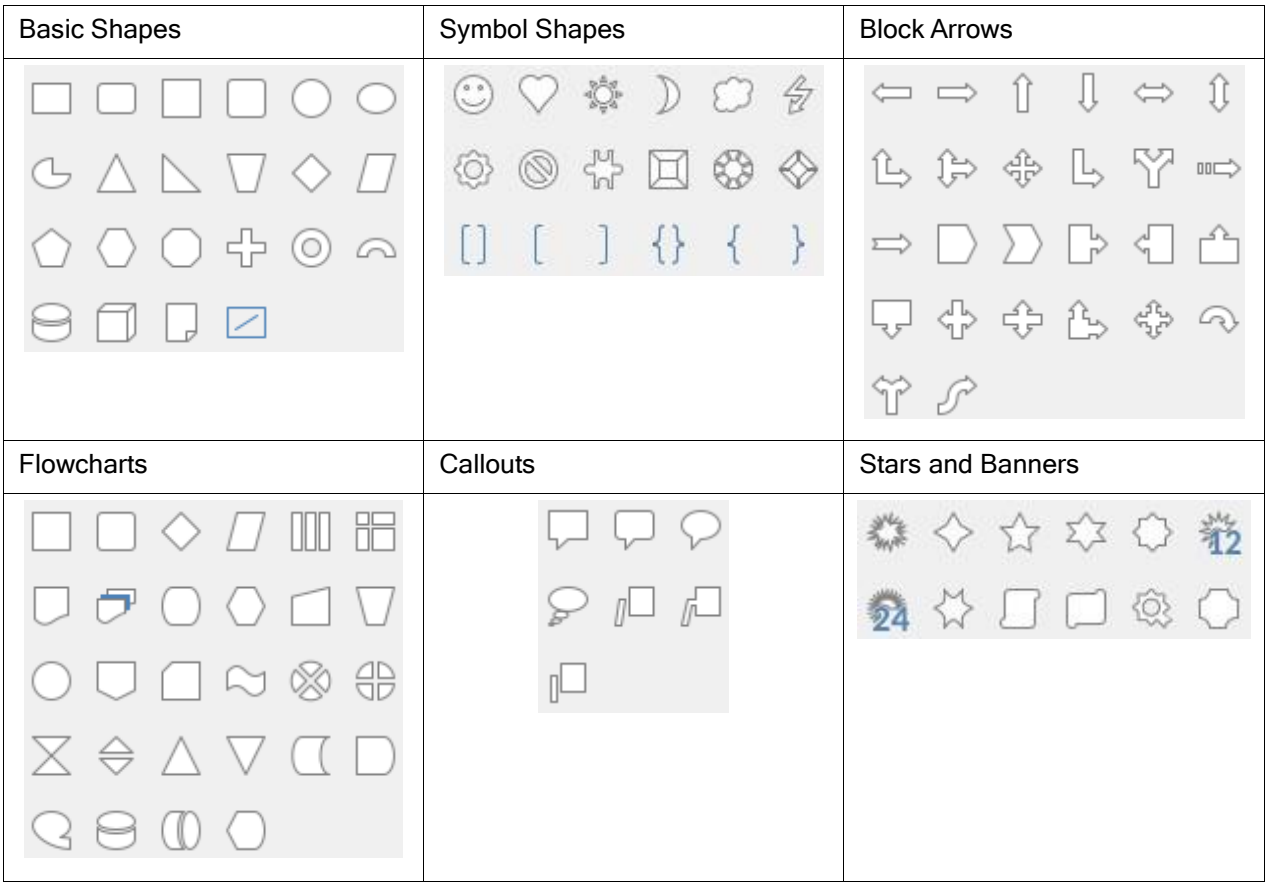


Figure 110: Tool palettes that can be opened from the Drawing toolbar

Resizing, moving, and positioning charts

To resize or move a chart, click it once to put it in selection mode. Resize or move a chart in two ways: interactively, or by using the Position and Size dialog. Combining both methods may be useful. Position a chart interactively for quick and easy changes, then use the Position and Size dialog for precise sizing and positioning.

Changing interactively

Resizing

To resize a chart interactively:

1) Click once on the chart to select it. Square selection handles appear around the border of the chart.

2) Click and drag one of the selection handles. The pointer indicates the direction to increase or decrease the chart size. Clicking and dragging a corner handle preserves the horizontal to vertical size ratio.

3) When finished, click outside the chart to leave selection mode.

Moving

Move a chart interactively using one of two methods:

For small moves

1) Click once on the chart to select it. Square selection handles appear around the border of the chart.

2) Press an arrow key to move the chart a few pixels at a time, or press `Alt` + an arrow key to move the chart one pixel at a time.

3) When finished, click outside the chart to leave selection mode.

For larger moves

1) Click once on the chart to select it. Square selection handles appear around the border of the chart.

2) Hover the pointer anywhere over the chart until it changes to a move pointer (shape depends on computer setup).

3) Click and drag the chart to its new location.

4) Release the mouse button when the chart is in the required position.

5) When finished, click outside the chart to leave selection mode.

Position and Size dialog

The Position and Size dialog contains options for defining the position of the chart on the page, specifying its size, rotating it, and slanting it.

Note

In addition to charts, the Position and Size dialog can also be used to modify and position other graphic elements, such as those available on the Drawing toolbar.

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

1) Right-click on the chart and select **Position and Size** in the context menu to open the Position and Size dialog (Figure 111).

2) Select the desired options on the *Position and Size*, *Rotation*, and *Slant & Corner Radius* tabs on this dialog. See below for further information about the options on these tabs.

3) Click **OK** to close the dialog and save changes.

4) When finished, click outside the chart to leave selection mode.

When positioning or resizing, click one of the points in the *Base point* graphic corresponding to the location to use for anchoring either the position of the chart or its size.

Note that either the position or the size can be protected from unwanted changes by clicking the appropriate box in the *Protect* section. Either or both option(s) selected will remain active after the dialog is closed. By contrast, Calc resets the base point to the default position after the dialog is closed.

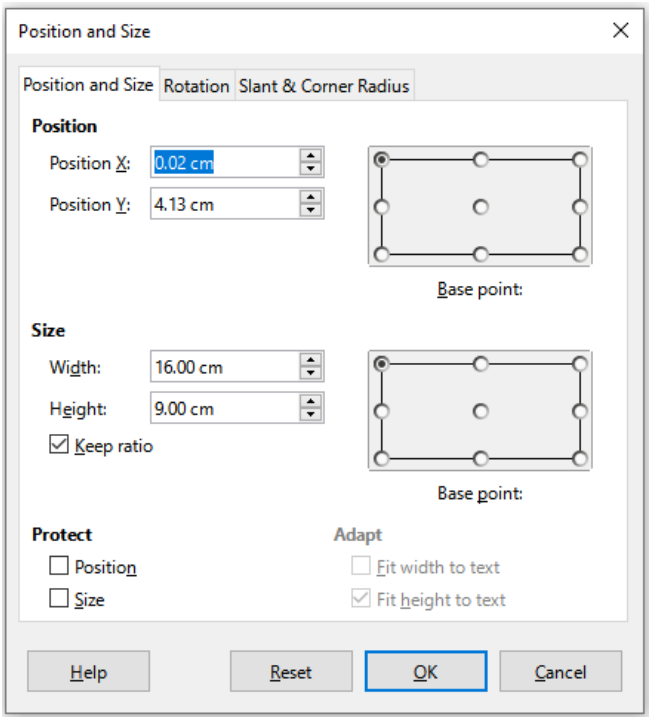


Figure 111: Position and Size dialog — Position and Size tab

Position and Size

The options available on the *Position and Size* tab (Figure 111) are as follows:

Position

Determines the location of the chart on the page. The position of a chart is coordinated relative to a fixed point (the base point). By default, this base point is located at the upper left of a chart. To make positioning of a chart simpler, the base point can be temporarily changed.

- *Position X* - specifies the horizontal location of the chart relative to the base point.
- *Position Y* - specifies the vertical location of the chart relative to the base point.
- *Base point* - specifies a temporary base point for the chart.

Size

Specifies the amount by which to resize the selected chart with respect to the selected base point.

- *Width* - sets a width for the selected object.
- *Height* - sets a height for the selected object.
- *Keep ratio* - maintains proportions between width and height when resizing the chart.
- *Base point* - determines the directions in which the chart size will be increased or decreased.

Protect

Prevents unintended changes to the position or the size of the chart.

- *Position* - prevents unintentionally moving the chart.
- *Size* - prevents unintentionally resizing the chart.

Adapt

These options are always unavailable for charts.

Rotation

The options for the *Rotation* tab (Figure 112) are as follows:

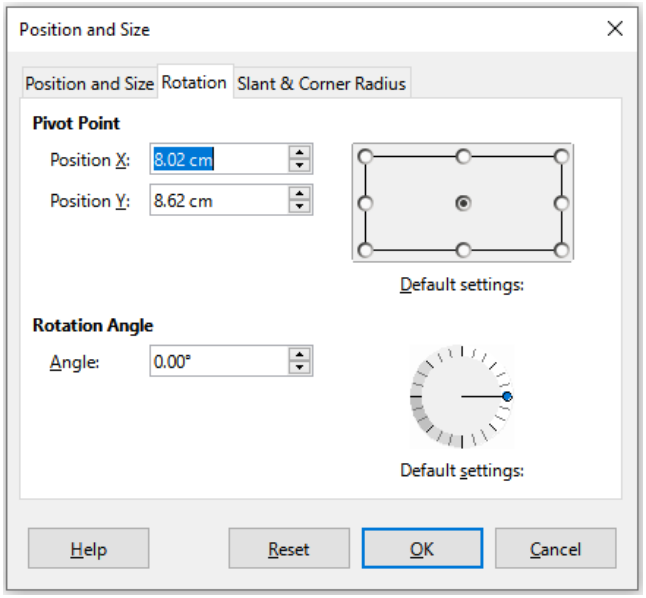


Figure 112: Position and size dialog – Rotation tab

Pivot Point

The chart can be rotated around a pivot point. The default pivot point is at the top left of the chart. Note that if there is not enough room to rotate the chart, it could be rotated off of the page.

- *Position X* - specifies the horizontal distance from the left edge of the page to the pivot point.
- *Position Y* - specifies the vertical distance from the top edge of the page to the pivot point.
- *Default settings* – sets the location of the pivot point in a visual approach. The pivot point can be temporarily changed. However, when the dialog is opened again, the pivot point will return to its default location and the X and Y positions will reflect the default location.

Rotation Angle

Specifies the number of degrees that the chart is rotated.

- *Angle* – shows the number of degrees of rotation (in the range 0 to 359 degrees). The number can be entered directly or it can be set using the indicator labeled *Default settings*.
- *Default settings* - graphically shows the rotation angle. The angle can be set by clicking and dragging the indicator. The number of degrees rotated is shown in the *Angle* box.

Slant & Corner Radius

The options for the *Slant & Corner Radius* tab (Figure 113) are as follows:

Corner Radius

This option is not available for charts.

Slant

Slants the chart along an axis. Specify the angle of the axis (in the range -89° to +89°).

Control Points

These options are not available for charts.

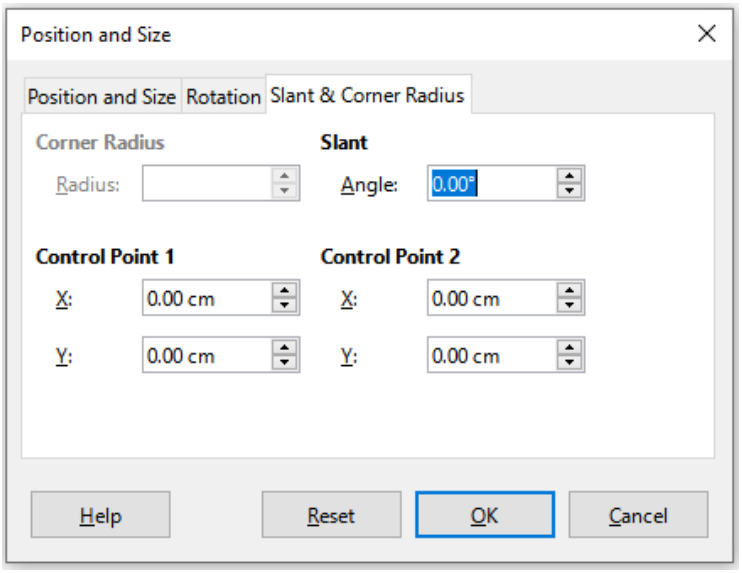


Figure 113: Position and Size dialog – Slant and Corner Radius tab

Selecting multiple charts

Select multiple charts by clicking once on the first chart then pressing `Shift` while clicking on additional charts. An invisible selection rectangle covers all of the selected charts and selection handles appear at the corners and midway between corners. The multiple charts are now treated as a single object and actions such as the following can be conducted.

- Cut and paste or drag them to new locations.
- Use the Position and Size dialog described in the previous section.
- Use the Drawing Object Properties toolbar to align all of the charts, format the outer borders, or anchor the charts to the same cell or page.

Changing overall appearance of charts

When a chart is selected (by clicking on it once) it can be formatted as an object. The Drawing Object Properties toolbar (Figure 114) usually appears below the Standard toolbar (but the location depends on setup) and shows tools available for all objects, including charts.

Most of the options are self-evident or can be easily researched. Please refer to Chapter 6, Using Images and Graphics, and the *Draw Guide* for further information. Following are a few tips for using these tools with charts.

Anchor

Connects a chart to either remain in the same position on a page or to move with a cell (when rows and columns are inserted or deleted). When **To cell (resize with cell)** is chosen, the chart or object increases or decreases in size when the cell is made larger or smaller.

Align Objects

Click the icon to open options for aligning multiple charts horizontally (left, centered, right) or vertically (top, center, bottom). This option is only active when two or more charts (or other objects) are selected.

Bring to Front/Forward One/Back One/Send to Back

Stacks charts or other objects in front of or behind other objects.



1. Anchor	7. To Foreground	13. Fill Color
2. Align Objects	8. To Background	14. Arrow Style
3. Bring to Front	9. Line Style	15. Rotate
4. Forward One	10. Line Width	16. Points
5. Back One	11. Line Color	17. Group
6. Send to Back	12. Area Style/Filling	

Figure 114: Drawing Object Properties toolbar that appears when chart is selected

To Foreground/To Background

Places charts or stacks of objects in either the foreground or the background. In Calc, objects in the background are behind the cell grid and may be difficult to select. Use the **Select** tool (arrow icon) on the Drawing toolbar (Figure 109) to select them.

Line Style/Line Width/Line Color

Formats the outer borders of charts.

Area Style/Filling and Fill Color

Colors objects such as arrows, shapes, and callouts. For charts, use the fill options available in edit mode.

Arrow Style

Specifies the appearance of line arrows and lines. Does not apply to the block arrows shown in Figures 109 and 110.

Rotate

Rotates the chart around a base point. When selected, places round rotation handles at each corner. Move these to rotate the chart. Move the small circle in the center of the chart to change the base point. Move the handles midway between the corners to slant the chart or other object.

Points

Changes the shape of curved objects. Move the points to shape curves created with the **Curve** tool on the Drawing toolbar.

Group

Groups or ungroups two or more objects. When grouped, the objects can be moved together and global changes can be applied to them. From left to right, the four icons are **Group**, **Enter Group**, **Exit Group**, and **Ungroup**.

Copying, exporting, and deleting charts

Copying charts in the same spreadsheet document

When a chart is copied, it retains a connection to the source data it is built on as long as it is in the same document. This means that changes made to the source data will be reflected in the chart.

Copying and pasting the chart is easy. Just click the chart once to select it, then either press *Ctrl*+*C*, or right-click on the chart and select **Copy** in the context menu, or click the **Copy** icon on the Standard toolbar, or select **Edit > Copy** on the Menu bar. To paste the chart in the desired location, press *Ctrl*+*V*, or right-click and select **Paste** in the context menu, or click the **Paste** icon in the Standard toolbar, or select **Edit > Paste** on the Menu bar.

Copying to another LibreOffice document

When a chart is copied and pasted into another LibreOffice document, any connection to the data it is based on is lost. The data is kept with the chart and is now called a data table rather than a data range. Figure 115 shows an example of this internal data table.

Note

A copied chart links to or retains its data only when pasted into a LibreOffice document. To retain data or links outside LibreOffice, use embedding or linking, as explained in Chapter 11, Linking Data.

Keeping original data

If the goal is to use the original data for the chart, follow the same procedure as above to copy and paste the chart to another document. Nothing more needs to be done.

Modifying original data

If the original data for the chart needs to be modified, do the following:

1) Select the copied chart by double-clicking on it to enter edit mode. The chart should now be surrounded by a gray border.
2) Right-click on the chart and select **Data Table** to open the Data Table dialog shown in Figure 115.
3) Modify the data as desired. In addition to changing numbers in the data, use options to insert, move, or delete columns and rows.
4) Click **Close** to close the dialog.
5) If desired, click outside the chart to leave edit mode.

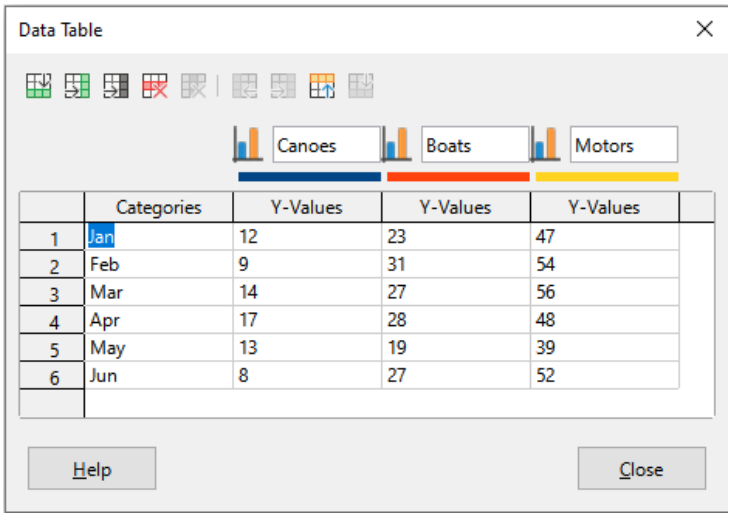


Figure 115: Data Table dialog when a chart is copied into another document

Dragging replacement data

If the chart is still in Calc and replacement data is in the same spreadsheet, select and drag the new data onto the chart. This is described in “Replacing data by dragging” on page 122.

Note

Calc does not provide a direct way to save chart settings for creating another chart in LibreOffice. Here are three options for using the same chart settings: 1) copy and paste the chart into another file; 2) save the file containing the chart as a new file; and 3) save the chart in a template. Depending on the method used, create a new chart by modifying either the data range or the data table.

Exporting chart images

Charts can be exported in a variety of image formats for use in other documents. File types include BMP, EMF, EPS, GIF, JPEG, PDF, PNG, SVG, SVM, TIFF, and WMF.

To export a chart in an image format:

1) Right-click on the selected chart and select **Export as Image** in the context menu to open the Save as Image dialog.
2) In the dialog, type a name for the graphic file, select the location for saving the file, and select the desired graphic format.
3) Click **Save** and an image of the chart will be exported to the location specified.

Deleting charts

To delete a chart, click it once to select it. Square selection handles appear on the borders of the chart. Then press `Delete`.

Gallery of chart types

While data can be presented using a variety of charts, focus on the message of the chart to determine which type of chart to use. The following sections present examples of the chart types that Calc provides, with some notes on the uses of each one.

Column charts

A column chart shows vertical bars, with the height of each bar proportional to its value. The X axis shows categories and the Y axis shows the value for each category.

Column charts are commonly used for data that show trends over time. They are best for a relatively small number of data points. It is the default chart type provided by Calc, as it is one of the most useful and easy to understand. For a larger time series, a line chart would be more appropriate.

The column chart type has three variants, with a preview pane for each variant as shown in Figure 116.

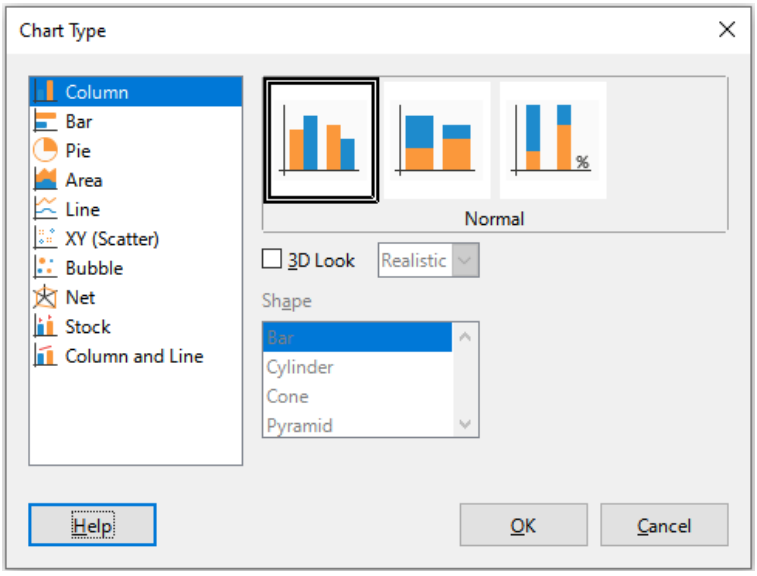


Figure 116: Chart Type dialog – Column

When a preview is clicked, its borders are highlighted and the name appears below. The 2D variants are:

Normal
Shows all data values belonging to a category next to each other. The main focus is on the individual absolute values, compared to every other value.

Stacked
Shows the data values of each category on top of each other. The main focus is the overall category value and the individual contribution of each value within the category.

Percent stacked
Shows the relative percentage of each data value with regard to the total of its category. The main focus is the relative contribution of each value to the category total.

Additional options for creating column charts are:

3D Look
When this box is checked, two options become available in the drop-down list:

- **Realistic** – tries to give the best 3D look.
- **Simple** – tries to mimic the chart view of other products.

When you check the **3D Look** box, a fourth chart variant becomes available called **Deep**. This shows the data values of each category lined up, one behind the other.

Shape

Gives options for the shape of the columns in 3D charts. The choices are: **Bar**, **Cylinder**, **Cone**, and **Pyramid**.

Bar charts

A bar chart is like a column chart that has been shifted 90 degrees. It shows horizontal bars rather than vertical columns. In contrast to some other chart types, the Y axis is horizontal and the X axis is vertical. The Chart Type dialog for a bar chart is essentially the same as for a column chart, which was described above, with the previews modified to show horizontal bars.

Bar charts can have an immediate visual impact when time is not an important factor — for example, when comparing the popularity of a few products in a marketplace. They may be preferred to column charts when the category names are long or there are a significant number of categories.

In the examples in Figure 117 below:

- To make the first chart, after using the Chart Wizard enter the edit mode and go to **Insert > Grids**, deselect **Y axis**, and choose **Insert > Mean Value Lines.** Right-click each mean value line and select **Format Mean Value Line** to increase the width of the lines. Create rectangles from the Drawing toolbar to cover the mean value line entries in the legend. Make them white by right-clicking and selecting **Line** and then **Area**.
- The second chart is a 3D chart created with a simple border and cylinder shape. The chart area is rotated (described under “Rotation and perspective” on page 146).
- The third chart eliminates the legend by using labels with the names of the companies on the Y axis. Whereas the first two charts treat the data as separate data series, this chart treats the data as one data series in order to have category labels for the X axis. Rather than colors, a colored hatch pattern is used for the bars.

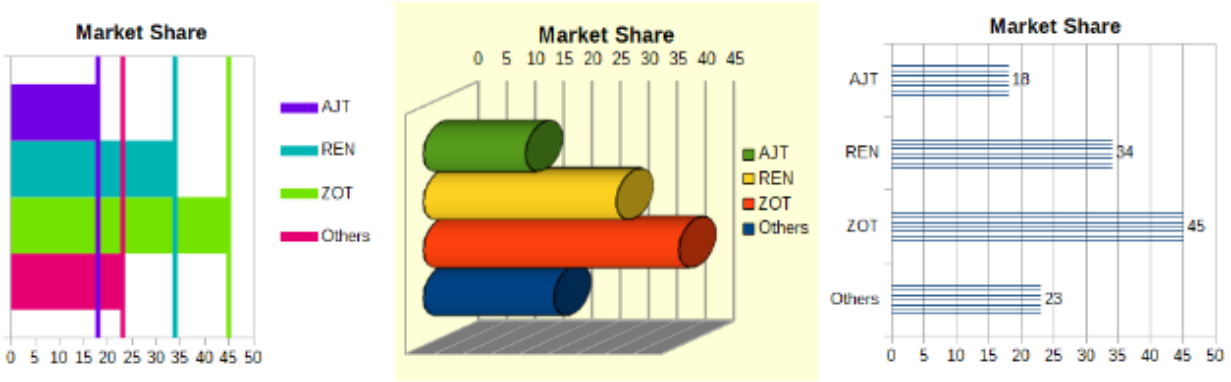


Figure 117: Bar chart examples

Pie charts

A pie chart shows values as circular sections of a circle. The area of each section is proportional to its value.

Pie charts are excellent for comparing proportions — comparisons of departmental spending, for example. They work best with smaller numbers of values, up to about half a dozen; more than this and the visual impact begins to fade.

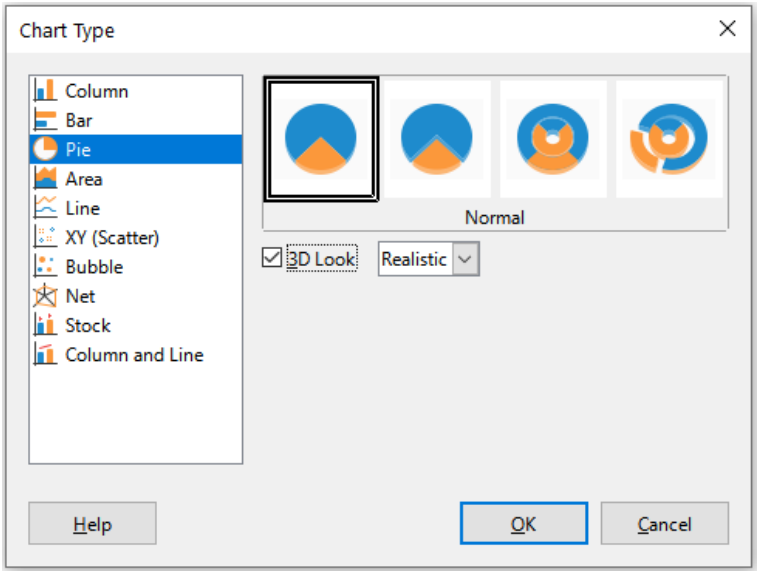


Figure 118: Chart Type dialog - Pie

Pie variant options, shown in Figure 118, are:

Normal
: Shows values as sections of a complete pie, with the option of separating out individual pieces. Click the outer edge of a section to separate it from the remaining pie or to join it back.

Exploded Pie
: Shows all of the sections separated from each other. Click and drag any section to move it along radial lines from the pie center.

Donut
: Shows multiple data series. Each data series is shown as one donut shape with a hole inside, where the next data series can be shown. Click and drag an outer section to move it along radial lines from the donut center.

Exploded Donut
: Shows the outer sections already separated from the remaining donut. Click and drag an outer section to move it along radial lines from the center.

The Chart Wizard initially guesses how the data should be presented in the chart. Adjust this on the Data Range and Data Series pages of the Chart Wizard or by using the Data Ranges dialog.

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

You can choose in the Chart Wizard to use the exploded pie variant, but this option explodes all of the pieces (contrary to the preview graphic in Figure 118). If the aim is to accentuate just one piece of the pie, separate out a piece by carefully highlighting it and dragging it out of the group. After this, the chart area may need to be enlarged to regain the original size of the pieces.

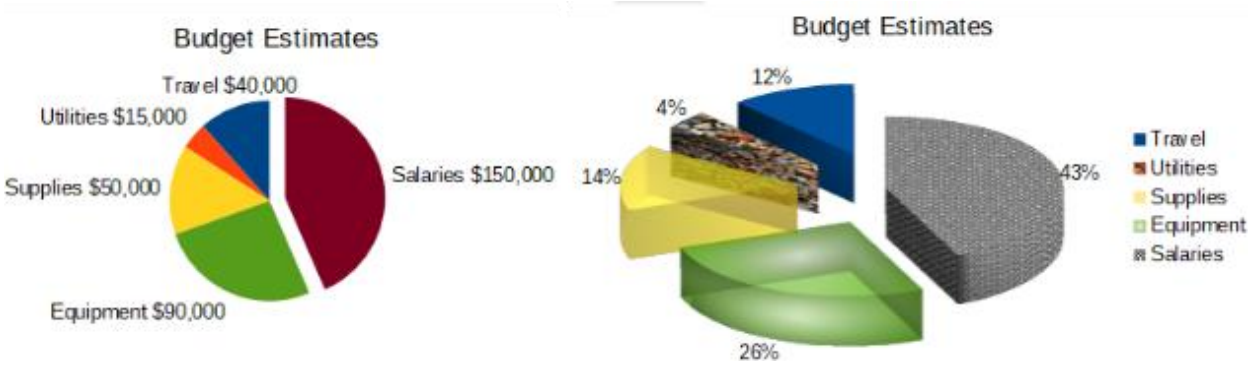


Figure 119: Pie chart examples

The effects achieved in Figure 119 are explained below.

2D pie chart with one section of the pie exploded

In the edit mode, go to **Insert > Legend** and deselect the **Display legend** box. Go to **Insert > Data Labels**. Select **Show value as number** and also **Show category**. Click the edge of the section (the section will have highlight squares to mark it), and drag it out from the rest of the sections. The sections will decrease in size. If needed, highlight the chart wall and drag it at a corner to increase the size.

3D pie chart, exploded variant, with realistic schema and various fill effects

In the edit mode, go to **Format > Chart Type** and select **3D Look**. Go to **Insert > Data Labels** and select **Show value as percentage**. Then carefully select each section so that it has a wire frame highlight. Right-click and select **Format Data Point** to get the Data Point dialog. Choose the *Area* tab. The illustration in Figure 119 shows one section formatted with bitmap, one with a radial gradient, one with 50% transparency, and one with a pattern.

Donut and exploded donut variants, shown in Figure 120, are used to display two sets of related information, such as two years of financial data. This variant can be misleading for comparing numeric data, since inner circles are necessarily smaller. For more variety, use a 3D look.

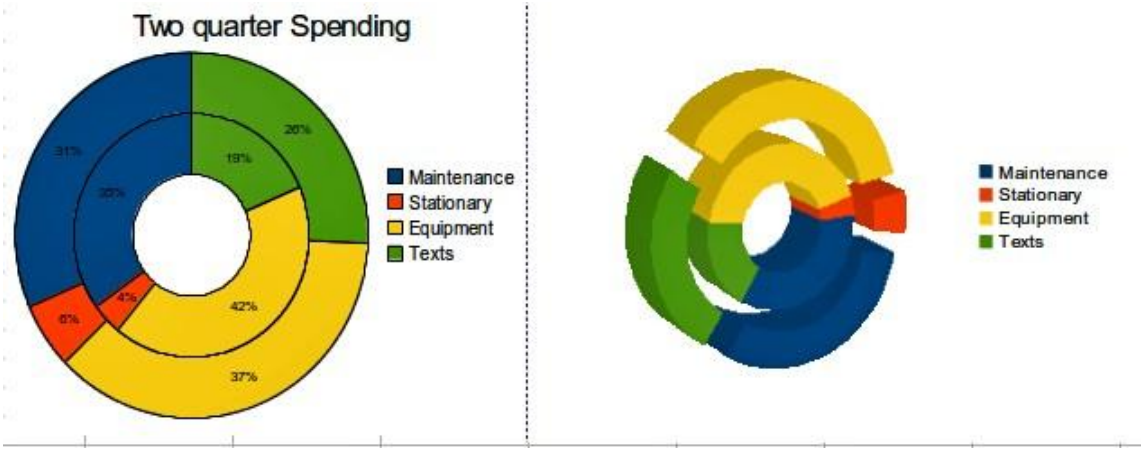


Figure 120: Donut chart examples

Area charts

Like a line or column chart, an area chart shows values as points on the Y axis and categories on the X axis. The Y values of each data series are connected by lines and the areas below the lines are colored.

Area charts emphasize volumes of change from one category to the next. They have greater visual impact than line charts, but the data used will make a difference.

Figure 121: Chart Type dialog - 2D and 3D Area

Area chart variants, shown in Figure 121 are:

Normal
When **3D Look** is deselected, plots all data as absolute Y values. It first plots the area of the last data series in the data range, then the next to last, and so on. Finally the first data series is drawn over the other data. Thus, higher values in the first data series will hide lower values of later data series.

Deep
When **3D Look** is selected, this variant shows the first data series in front, with subsequent data series behind.

Stacked
Stacks cumulative values on top of each other. This ensures that all values are visible, and no data set is hidden by others. However, the Y values no longer represent absolute values, except for the first data series, which is shown at the bottom of the stacked areas.

Percent Stacked
Stacks cumulative values on each other and also scales the values as percentages of the category total.

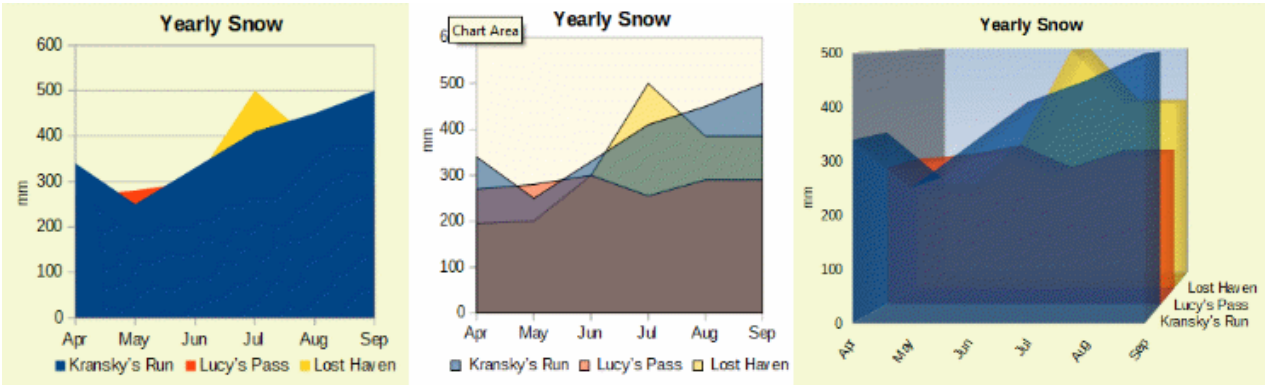


Figure 122: Area chart examples

Normal area charts

Area charts are sometimes tricky to create. Using transparency values may be helpful. To create the charts in Figure 122, first set up the basic chart using the Chart Wizard. The chart on the left shows the result. Because of the data overlap, some of it is missing behind the first data series. This is probably not desirable. The other examples are better solutions.

To create the chart in the center:

After deselecting the Y axis grid, right-click on each data series in turn and select **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.

To create the chart on the right:

After doing the steps above, right-click and select **Chart Type**. Select the **3D Look** option and select **Realistic** in the drop-down list. Rotate the chart area using the 3D View dialog. Instead of a legend, use labels on the Z axis.

Stacked area charts

Other ways of visualizing the same data series are the stacked area chart and the percentage stacked area chart (Figure 123). In the first example, each point in a data series is added to the other data series to show the total area. The second example shows a percentage stacked chart, showing each value in the series as a percentage of the whole.

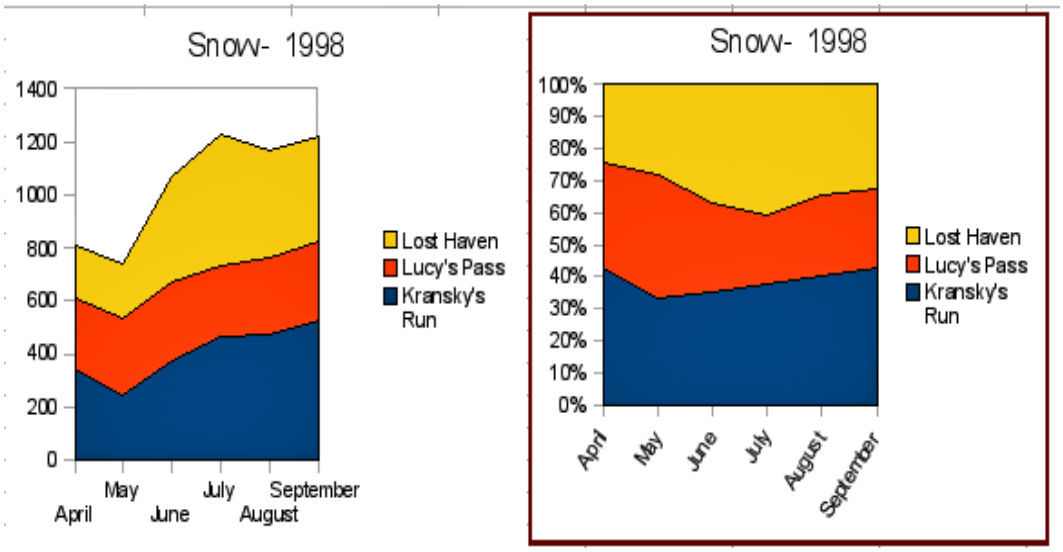


Figure 123: Stacked and percentage stacked area charts

Line charts

A line chart is useful for showing trends or changes over time when you want to emphasize continuity. Values are shown as points on the Y axis and the X axis shows categories–often time series data. The Y values of each data series may be connected by a line.

Note

The difference between line charts, described in this section, and XY (scatter) charts, described in the next section, is this: line charts show categories along the X axis while XY (scatter) charts show values along the X axis.

As shown in Figure 124, four variants are available:

Points Only
Plots only points.

Points and Lines
Plots points and connects points of the same data series by a line.

Lines Only
Plots only lines.

3D Lines
Connects points of the same data series by a 3D line.

When **Stack series** is selected, it shows cumulative Y values above each other. The options are:

> **On top** – places the value of each data series above the others. The Y values no longer represent absolute values, except for the first data series, which appears at the bottom of the chart. This is the default setting.

> **Percent** – scales the Y values as percentages of the category total.

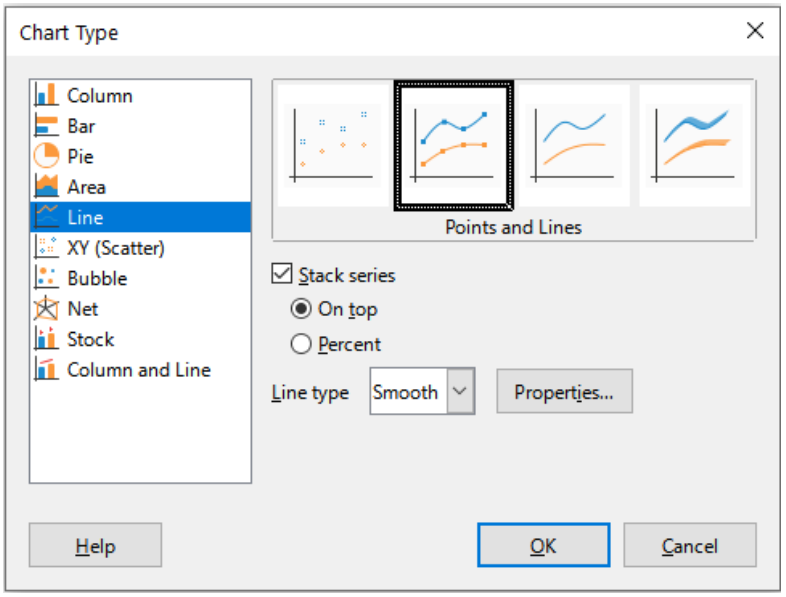


Figure 124: Chart Type dialog – Line

The *Line type* drop-down list has three options that determine how the data points are connected:

Straight
Draws straight lines between the points.

Smooth
Connects the points with curves instead of lines. When this option is selected, click **Properties** to open the Smooth Lines dialog (Figure 125) and further specify the curves.

For smooth lines, there are two line type options: **Cubic spline** or **B-spline**. These are mathematical models that join together segments of polynomials to display the curves. For B-spline lines, there is an option to set the degree of the polynomials. Select a higher resolution for smoother curves.

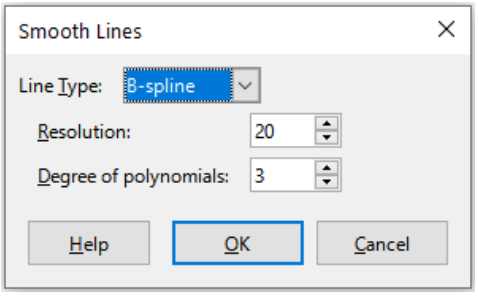


Figure 125: Smooth Lines dialog

Stepped
Connects points with horizontal and vertical lines only. Click **Properties** to further specify the formatting of the lines (Figure 126). The options are self-explanatory.

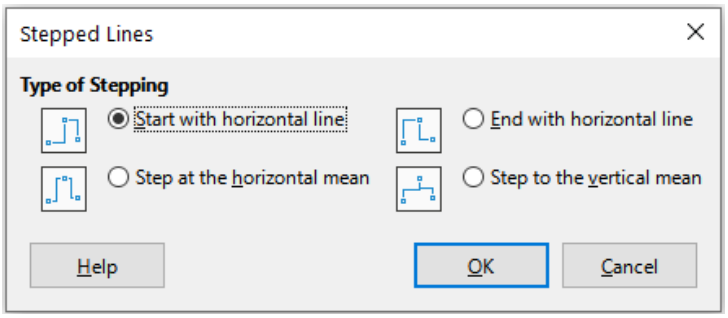


Figure 126: Stepped Lines dialog

Things to do with lines: thicken them, smooth the contours, just use points, or make them 3D. However, 3D lines can confuse the viewer, so just using a thicker line often works better. Figure 127 shows some examples of line charts.

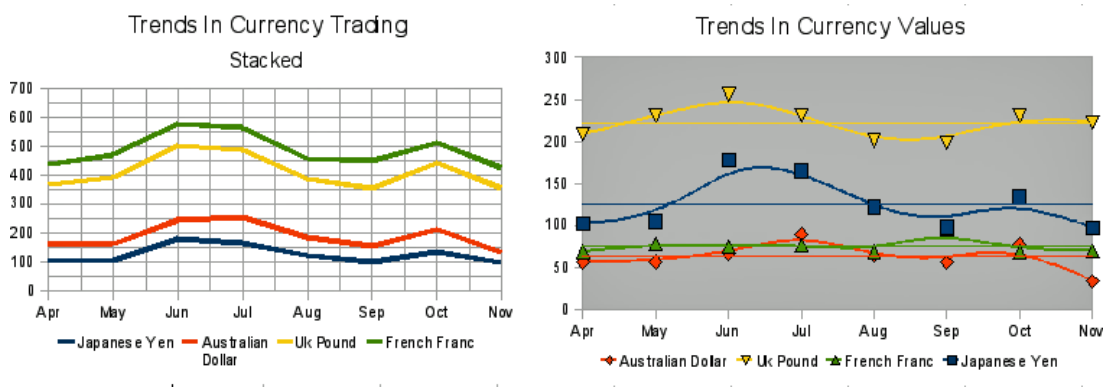


Figure 127: Line chart examples

Scatter or XY charts

In contrast to line, column, and bar charts, which contain numeric values on the Y axis and categories on the X axis, scatter or XY charts contain values along both axes. They are quite useful, especially for understanding relationships among data that are precise and complex. An XY chart may contain more than one data series and can perform many tasks, such as generating a parameter curve or drawing the graph of a function.

Tip

When plotting time on the X axis, make sure that it is not text and is written in the correct format for your locale. For example, instead of January, use a format such as 1/1/2022. Check locale formats at **Tools > Options> Language Settings > Languages > Date acceptance patterns**.

XY charts are most frequently used to explore the statistical associations among quantitative variables. There is often a constant value against which to compare the data — for example, weather data, reactions under different acidity levels, or conditions at various altitudes.

Tip

By custom, if one of the variables is either controlled by an experimenter or it changes consistently (such as time) it is considered an independent variable and plotted on the X axis.

XY chart variants

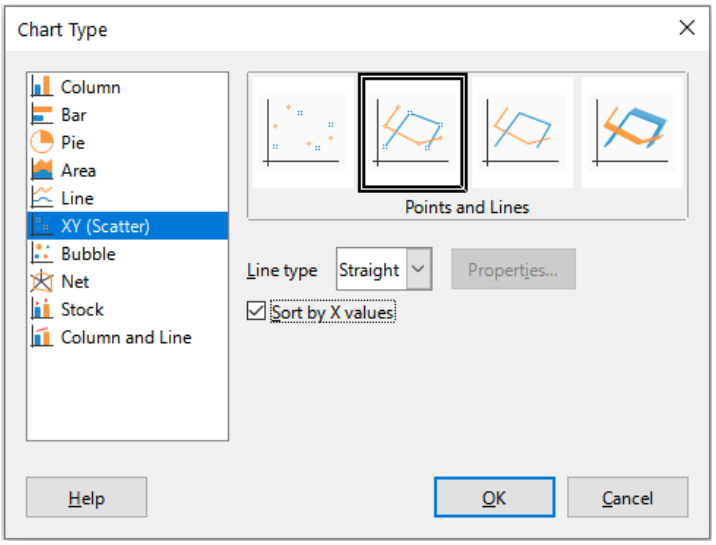


Figure 128: Chart Type dialog – XY (Scatter)

As shown in Figure 128, when the **XY (Scatter)** chart type is selected, the following variants are available:

Points Only
Shows an icon for each data point. Calc uses default icons with different forms and colors for each data series. The default colors are set in **Tools > Options > Charts > Default Colors**. Changing the colors and icons is discussed in “Lines, areas, and data point icons” on page 127.

Points and Lines
Shows both points and lines.

Lines Only
Draws straight lines from one data point to the next. The data points are not indicated by icons. By default, the drawing order is the same as the order in the data series, but note the option to sort by X values.

3D Lines
Makes the lines look like tapes. The data points are not shown by icons. In the finished chart, use the **3D View** dialog to set properties like illumination and angle of view.

The following options are available:

Sort by X values
Draws the lines in order of the X values. This can be helpful if the data series on the spreadsheet is not in numeric order.

Line type – Straight
Draws straight line segments.

Line type – Smooth
Draws curves instead of straight line segments. Click **Properties** to set details for the curves.

- **Cubic spline** interpolates the data points with polynomials of degree 3. The transitions between the polynomial pieces are smooth, having the same slope and curvature.
- **B-spline** uses parametric, interpolating B-spline curves. The curves are built from polynomials.

- **Resolution** determines how many line segments are calculated to draw a piece of polynomial between two data points. A value in the range 1 to 100. Click any data point to see the intermediate points.
- **Degree of polynomials** (only for B-spline line type) sets the degree of these polynomials. A value in the range 1 to 15.

Line type – Stepped

Uses only horizontal and vertical lines. Click **Properties** to set details for the stepped lines.

After a scatter chart is created, its default settings can be changed in ways such as the following. Be sure to first double-click the chart to enter edit mode. Depending on the option, a data point or data series may also need to be double-clicked.

- Line styles and icons – double-click or right-click on a data series in the chart to open the Data Series dialog. See “Lines, areas, and data point icons” on page 127 for further information.
- Error bars – For 2D charts, select **Insert > Y Error Bars** or **X Error Bars** to enable the display of error bars. See “Error bars” on page 153 for further information.
- **Mean Value Lines** and **Trend Lines** – Enable the display of mean value lines and trend lines with commands on the **Insert** menu. See “Trend and mean value lines” on page 148 for further information.

Examples of XY or scatter charts

By default, the first column or row of data (depending on whether the data is arranged in columns or rows) is represented on the X axis. The rest of the rows of data are then compared against the first row of data.

Scatter charts may surprise those unfamiliar with how they work. This can be seen in examples using the following data (Figure 129), which is organized with data series in rows.

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Yen	102	105	178	165	122	98	134	97
Dollar	56	57	67	90	64	56	78	34
Rupee	209	230	256	231	201	199	230	223
Yuan	69	78	75	76	69	95	69	70

The data range for the chart on the left in Figure 129 includes the cells containing the months. However, the months do not appear on the chart because only values can be used in XY (scatter) charts and Calc substitutes them for cardinal numbers.

The data range for the chart on the right does not include the cells containing the months. Calc assumes that the first row (or column) of data contains values for the X axis. The Y values of the other data series are paired with each of those X values. This means that there are no data points for the Japanese yen but each of the other currencies are shown in comparison to the yen, since it supplies the X values.

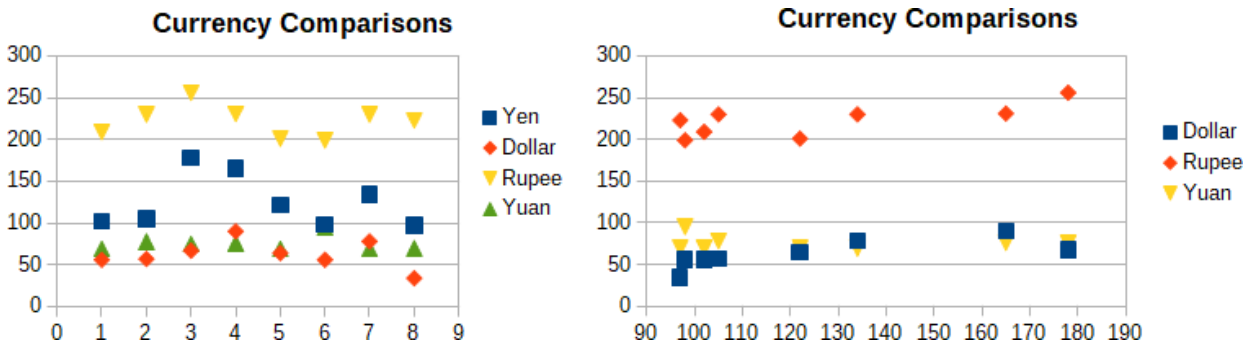


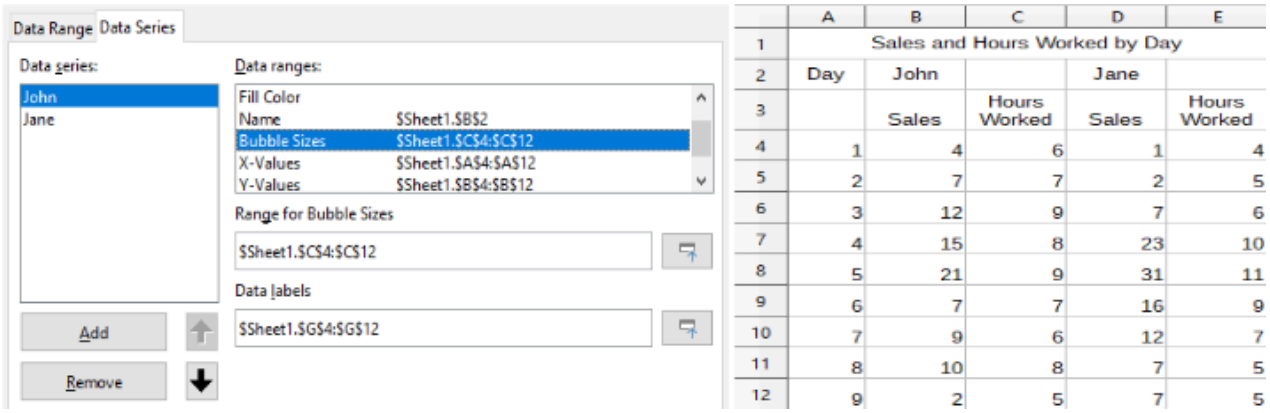
Figure 129: XY (Scatter) chart examples

Bubble charts

A bubble chart is a variation of a scatter chart that can show three variables in two dimensions. The data points are shown with bubbles. Two variables are plotted along the X and Y axes, while the third variable is represented by the relative size of the bubbles. These charts are often used to present financial data or social/demographic data.

One or more data series can be included in a single chart. The data series dialog for a bubble chart has an entry to define the data range that determines the size of the bubbles.

It may be necessary to build a bubble chart manually in the data series page of the Chart Wizard. Figure 130 shows how the data ranges can be set for a bubble chart.



	A	B	C	D	E
1	Sales and Hours Worked by Day				
2	Day	John		Jane	
3		Sales	Hours Worked	Sales	Hours Worked
4	1	4	6	1	4
5	2	7	7	2	5
6	3	12	9	7	6
7	4	15	8	23	10
8	5	21	9	31	11
9	6	7	7	16	9
10	7	9	6	12	7
11	8	10	8	7	5
12	9	2	5	7	5

Figure 130: Data series entries for a bubble chart

The chart in Figure 131 is based on the data in Figure 130. To format the chart, the data series are 50% transparent with a radial gradient. The data labels are formatted to be numbers in the center of the data points (bubbles).

Note

Remember that bubble charts require numeric data. If the data series for the X axis contains text (or dates not formatted as numbers) cardinal numbers will be used for axis labels.

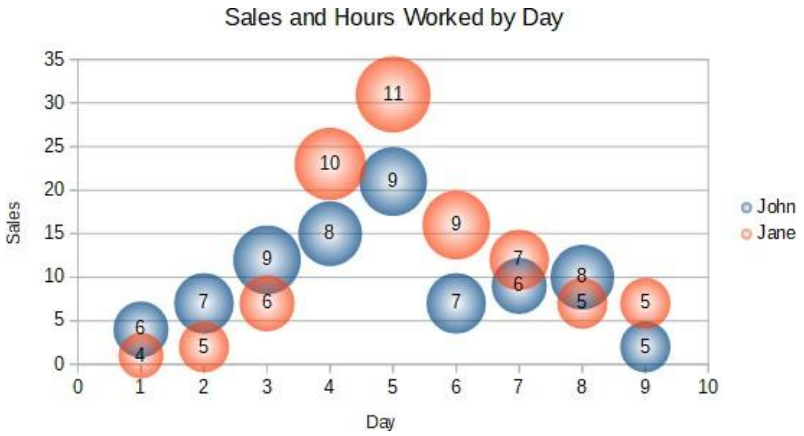


Figure 131: Bubble chart example

Net charts

Net charts are also known as spider, polar, or radar charts. They display data values as points on radial spokes, with each spoke representing a variable. They compare data that are not time series, but show different circumstances, such as variables in a scientific experiment. They are especially useful for displaying clusters and outliers.

Figure 132 shows an example of a simple net chart. The radial spokes of the net chart are equivalent to the Y-axes of other charts. All data values are shown with the same scale, so all data values should have about the same magnitude.

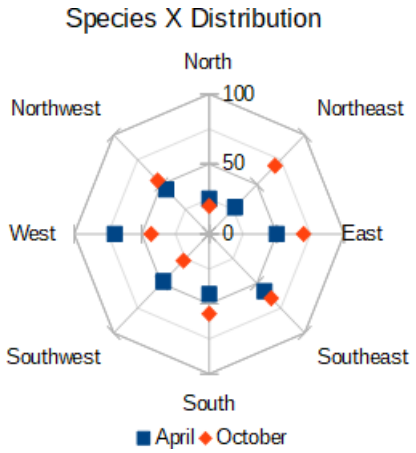


Figure 132: Simple net chart example

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 133 shows the options for creating a net chart. These are similar to those for area and line charts, described above. However, keep in mind that area increases as the square of the distance along the linear spokes. Therefore, net charts can distort the areas representing the data. Be especially careful about choosing to stack data series. In this case, successive data series show increasingly large areas that are not proportional to their values.

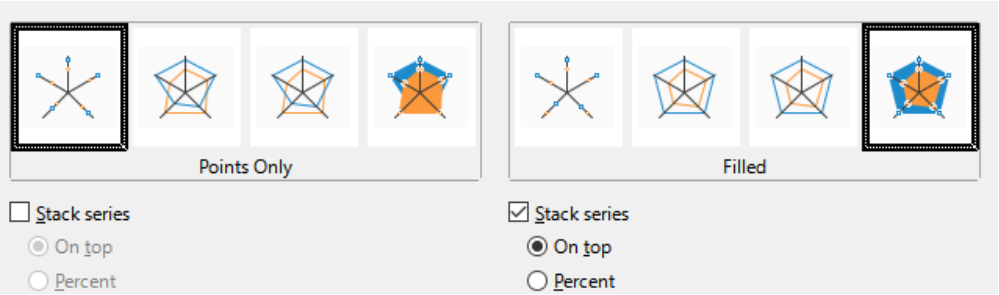


Figure 133: Chart Type dialog - Net

Figure 134 shows examples of two types of net charts.

> The example on the left is a filled net chart. The color of one of the data series is 50% transparent. Partial transparency is often best for showing all of the series.

> The example on the right is a net chart with lines and points. The data point icons are taken from the Gallery and have a 3D look.

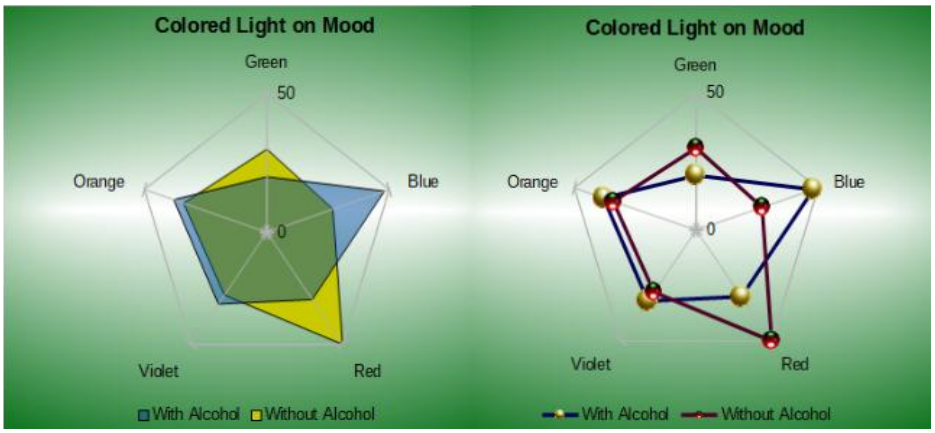


Figure 134: Filled net chart and net chart with 3D data point icons

Stock charts

A stock chart illustrates the market trends for stock and shares by giving opening price, bottom price, top price, and closing price. The transaction volume can also be shown and the X axis usually represents a time series.

When setting up a stock chart in the Chart Wizard, the data should be arranged as shown in Figure 135. It specifies which columns should be the opening, low, high, and closing prices of the stock as well as the transaction volume. However, manual adjustments may still be needed when defining the data series.

	Acme					Ajax				
	Volume	Open	Low	High	Close	Volume	Open	Low	High	Close
Monday	2500	20	15	25	17	1700	15	10	20	17
Tuesday	3500	32	22	37	30	2700	25	5	25	16
Wednesday	1000	25	15	17	17	4100	14	7	17	10
Thursday	2200	40	30	47	35	3300	20	12	26	19
Friday	4600	27	20	32	31	3500	28	16	32	21

Figure 135: Example data arrangement for stock charts

A stock chart organizes data series in two basic ways. The first way is not used in other chart types. In this case, the open, low, high, and closing values of a row create one data unit in the chart and one data series consists of several rows containing such data units. The columns containing transaction volumes are the second way used to organize data series. This is the familiar way used in other chart types.

Figure 135 shows the data for four data series: 1) the price data for Acme, which contains columns for open, low, high, and closing prices, 2) the price data for Ajax, which contains columns for open, low, high, and closing prices, 3) the Acme transaction volume, which is one column, and 4) the Ajax transaction volume, which is one column.

Stock chart variants

The Chart Wizard offers four stock chart variants, as shown in Figure 136. Note that some of them do not use all of the data columns.

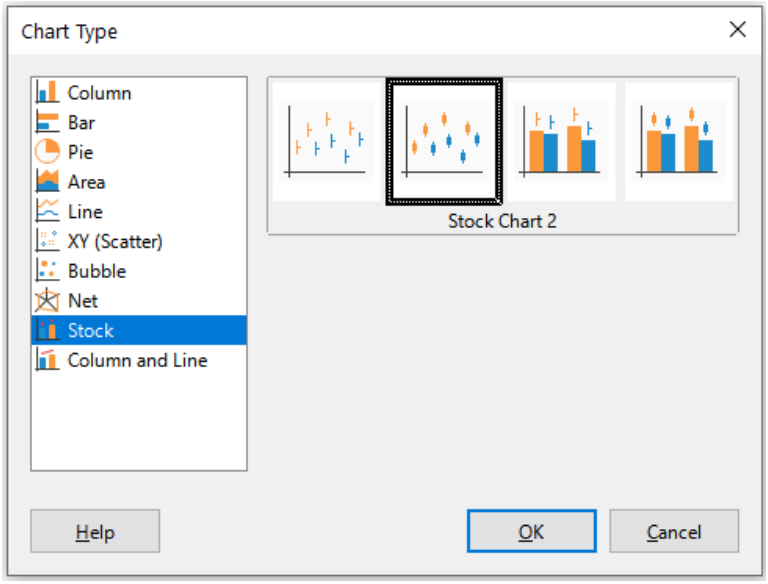


Figure 136: Chart Type dialog - Stock

The data table in Figure 135 is used to illustrate the variants, which are as follows.

Stock Chart 1

When based only on data in the low and high columns, this variant shows the distance between bottom price (low) and top price (high) with a vertical line. When the closing column is also included (Figure 137), it shows an additional horizontal mark for the closing price.

Stock Chart 2

Based on the open, low, high, and close columns, this variant generates the traditional candlestick chart (Figure 138). It shows a vertical line between the bottom and top prices and adds a rectangle in front that shows the range between the opening and closing prices. For rising values (the opening price is lower than the closing price), the fill color is white. For falling values, the fill color is black.

Stock Chart 3

Using the low, high, and close columns, draws a chart similar to Stock Chart 1 but with additional columns for transaction volume. As shown in Figure 139, a secondary Y axis enables both transaction volume and price to be shown on vertical axes.

Note

Variants 3 and 4 automatically align data to the secondary Y axis. For more information about a secondary Y axis, see “Aligning data to secondary Y axis” on page 124.

Stock Chart 4

Based on all five data columns (volume, open, low, high, and close), this variant combines Stock Chart 2 with a column chart for the transaction volume (Figure 140).

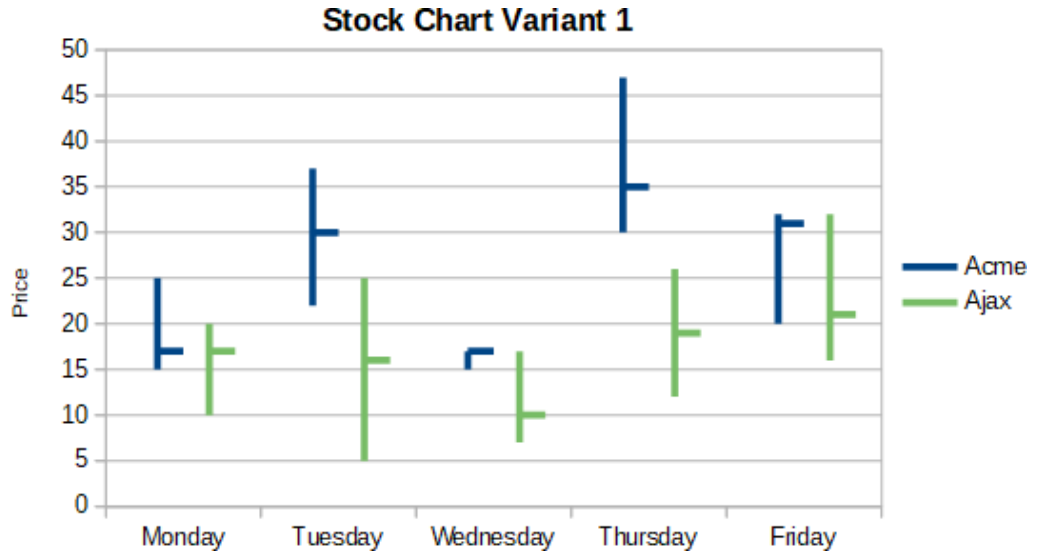


Figure 137: Stock chart variant 1 showing low, high, and closing prices

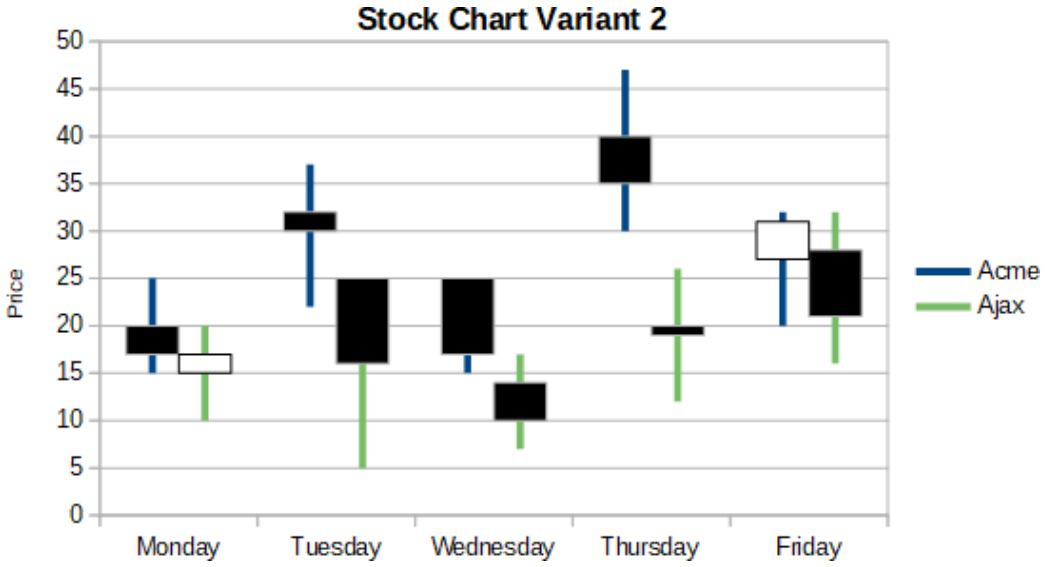


Figure 138: Stock chart variant 2 showing low and high prices as well as the range between opening and closing prices

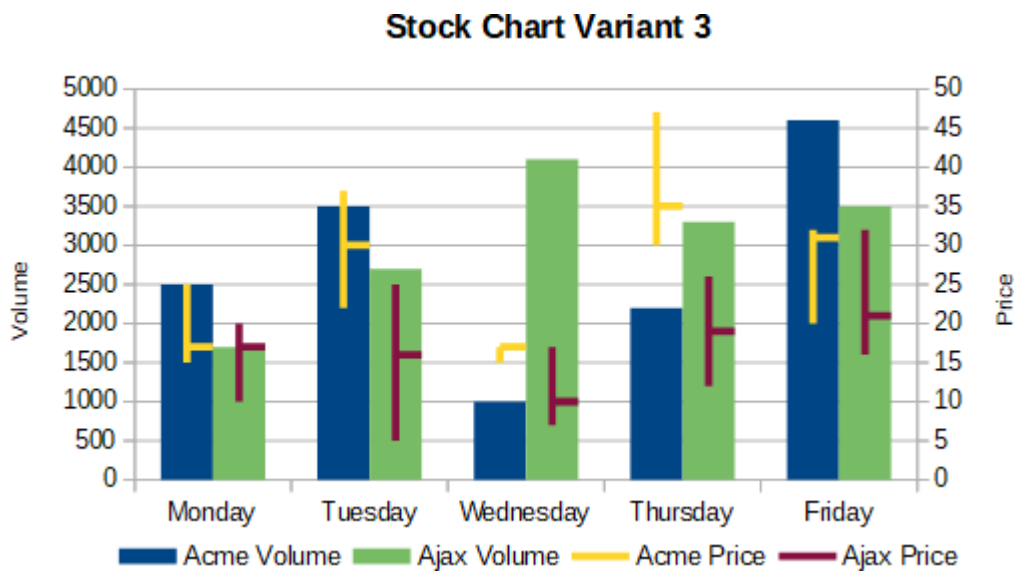


Figure 139: Stock chart variant 3 showing low, high, and closing prices as well as transaction volumes

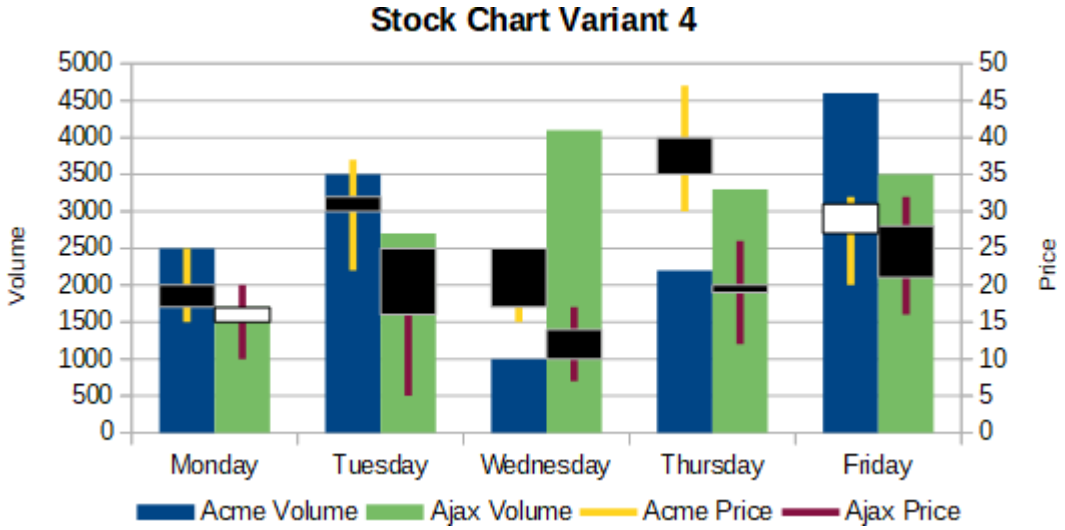


Figure 140: Stock chart variant 4 showing opening, low, high, and closing prices as well as transaction volumes.

Column and line charts

A column and line chart is useful for displaying two or more distinct but related data series, such as sales over time (columns) and profit margin trends (lines). It could also show constant minimum and maximum lines, such as used in medical testing or quality control.

Specify in the Chart Type dialog the number of lines. By default, the first column or row of data is categories and the last columns or rows of data are lines.

Choose between two variants:

Columns and Lines

As seen in Figure 141, the columns are drawn side by side to easily compare their values.

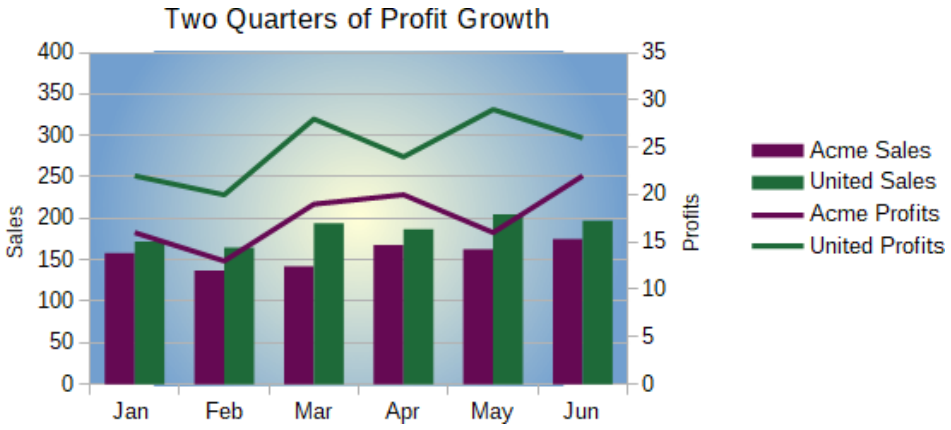


Figure 141: Column and line chart with secondary Y axis

Stacked Columns and Lines

The columns are stacked above each other, so that the height of a column shows the sum of the data values.

The charts in Figures 141 and 142 show sales and profit data for two firms over a period of time. Note that when first created, the lines were different colors than the columns for the same company. To reflect the company relationships, change the line colors individually by clicking on a line, right-clicking, selecting **Format Data Series**, and formatting the line color and size on the *Line* page.

For the background, right-click the chart wall, select **Format Wall**, and select desired options on the *Gradient* page of the *Area* tab. To align the two data series to the secondary Y axis, see “Aligning data to secondary Y axis” on page 124.

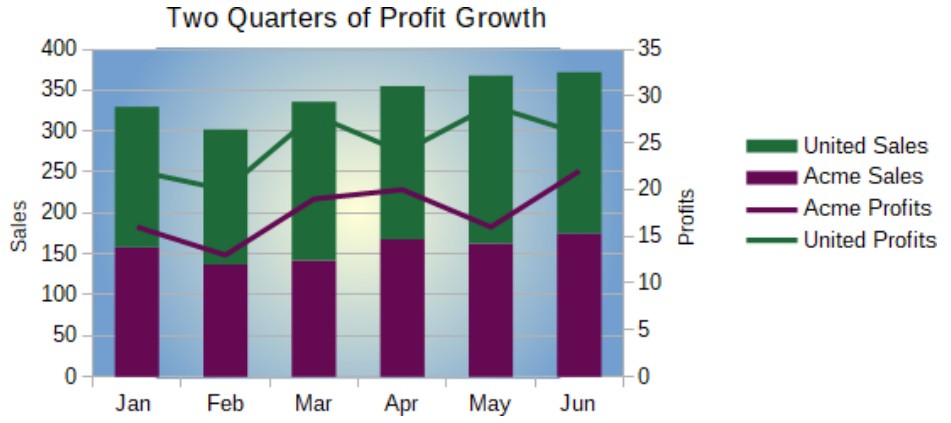


Figure 142: Column and line chart with stacked columns

Pivot charts

Pivot tables are special types of data tables that simplify the manipulation and analysis of data. They are widely used, especially for processing large amounts of data. Pivot charts are based on pivot tables and are created by selecting **Insert > Chart**, or clicking the **Insert Chart** icon in the Standard toolbar, after left-clicking a cell inside a pivot table. Pivot charts inherit many properties of the other chart types described in this chapter but also have other characteristics that are described in Chapter 9, Using Pivot Tables.

Create box plots with whiskers in Calc

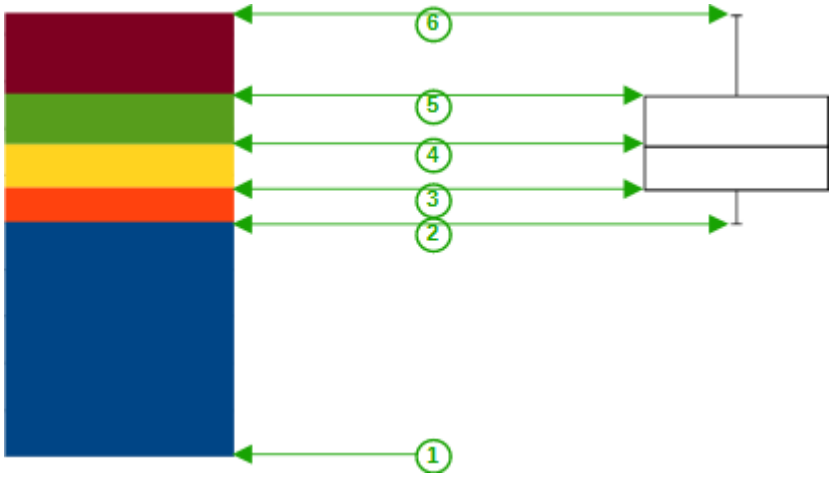
Calc does not currently have the option of creating a data series as a box plot. However, it is possible to convert the minimum, 1st quartile, median, 3rd quartile, and maximum of a stacked column chart with the data series in rows and without a legend into a box plot with whiskers.

The conversion of this stacked column chart to a box plot with whiskers is done by replacing the stacks in the chart with:

- Minimum of the data series
- The difference between the first quartile and the minimum of the data series.
- The difference between the median and the first quartile of the data series.
- The difference between the third quartile and the median of the data series.
- The difference between the maximum and the third quartile of the data series.

When calculating the differences of the first and third quartiles, it is important whether the data series contains an even or an odd amount of data. For an even amount of data, the function QUARTILE.EXC (range, parameter) should be used and for an odd amount of data use the function QUARTILE.INC (range, parameter) (Figure 143).

The MIN (range), MEDIAN (range), and MAX (range) functions can be used to calculate the minimum, median, and maximum, respectively.



1 Minimum of the data series
2 The first quartile of the data series
3 Bottom of the box to be formed
4 The median of the data series
5 The third quartile of the data series is also the top of the shapes box
6 The maximum of the data series

Figure 143: Stacked column chart in rows of minimum, 1st quartile, median, 3rd quartile, maximum with no legend and box plot with whiskers constructed from that column chart

Converting the column chart to box plot with whiskers

You can convert a column char to box plot with whiskers by following the next steps:

1) Remove or apply the color white to the bottom stack with **Format Data Series** in the context menu.

2) While in edit mode, right-click on the chart and select **Insert Y Error Bars** from the context menu.

3) Set the style in the Line Properties section of the *Line* tab in the Data Series Y Error Bars dialog box to **Continuous** and the width to 0.03 cm.

4) On the Y Error Bars tab, select **Cell Range** and in the Error Indicator section choose **Negative**. In the now opened **Negative (-)** box insert the difference between the 1st quartile and the minimum.

5) Remove or apply the color white to the top stack with **Format Data Series** in the context menu.

6) Set the configuration of the top whisker by performing steps similar to the described above.

The box consists of the middle stack and the stack above it with the median separating the two stacks. Both stacks should be framed with borders by selecting **Format Data Series** from the context menu. On the *Borders* tab of the dialog, the Style should be set to Continuous and the thickness to 0.03 cm. If desired, you can remove or whiten the background on the *Plane* tab.

For more detailed instructions about making a boxplot, see https://wiki.documentfoundation.org/Documentation/HowTo/Calc/BoxplotWithWhiskers.

Sparklines

Sparklines are small, simple, cell-sized charts meant to convey the general shape of data variation within a data set. Typically, sparklines are used to show variation over time and are drawn without axes or coordinates.

Monthly Inventory Change						
Jan	Feb	Mar	Apr	May	Jun	
4,098	3,514	-2,168	6,182	-5,234	1,837	

Figure 144: A simple sparkline example

Tip

Calc's sparklines are compatible with Excel's version of sparklines and can both be imported from and exported to Excel.

Creating a sparkline

To create a sparkline, select the row or column of source data and then do one of the following:

- Right-click on the selected data and from the context menu choose **Sparklines > Insert Sparkline**
- Go to **Insert > Insert Sparkline** on the Menu bar

Then complete the Sparkline Properties dialog and click OK to complete the creation of your sparkline:

Data

- Input Range – Data range for the sparkline. This will be auto-populated if you selected a data range before creating the sparkline.
- Output Range – The cell where the sparkline will be placed.

Properties

- Type - Select the sparkline type: **Line**, **Column** or **Stacked** (see Types of sparklines below).
- Line width - Set the line width for **Line** sparklines.
- Display empty cells as - **Gap** - skips the missing data and shows a gap in the sequence. **Zero** - displays the missing data as zero, **Span** - skips the missing data and draws a line to the next value.
- Display hidden - Check to show data in the selected **Input Range** in the sparkline. If unchecked, hidden data will be ignored.
- Right-to-left - By default, the data in the sparkline will display the data from left to right for rows and top to bottom for columns. Checking this box will reverse the display.

Colors –

- Set the main color for the **Series** of values and check and select colors for various values types to display in the sparkline. **Marker** will set the default color for the data points in **Line** sparklines only

Axes

- Display X axis - Check to show an X axis in the sparkline
- Vertical minimum, Vertical maximum – set the minimum and maximum values for the Y axis based on the **Individual** sparkline, the **Group** of sparklines (see Creating multiple sparklines below) or set **Custom** minimum and maximum values.

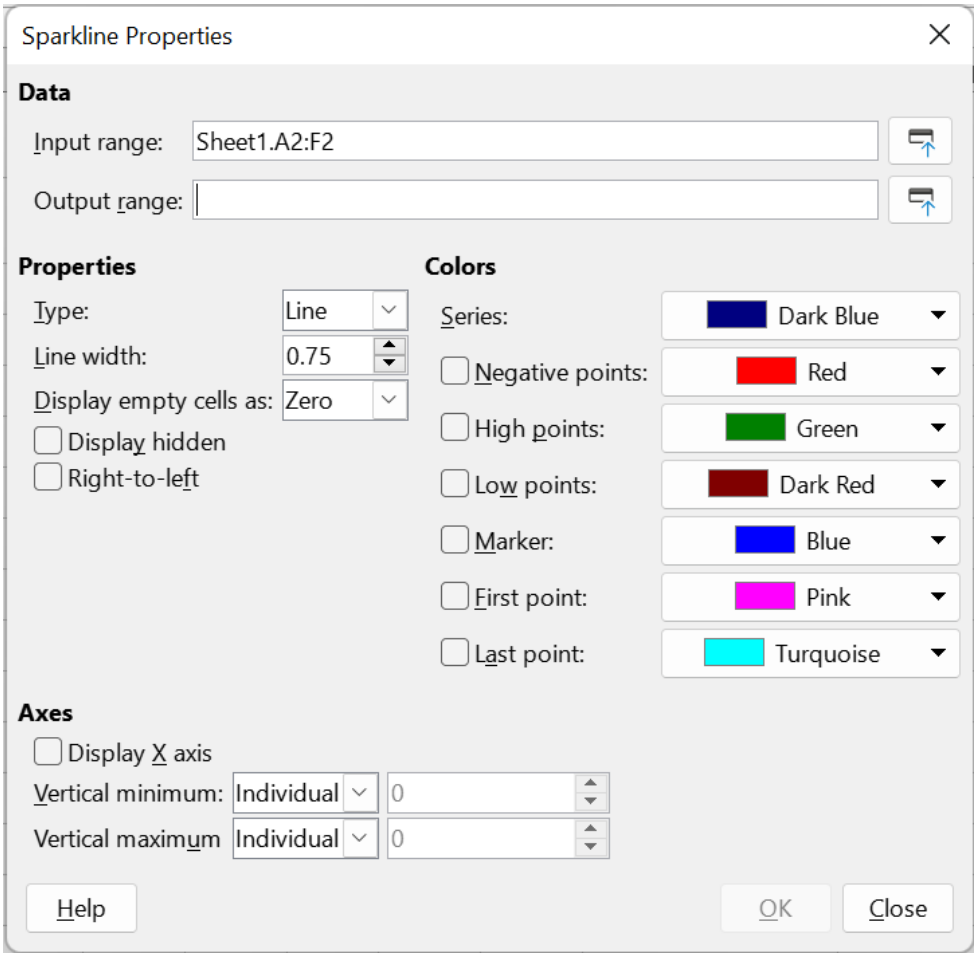


Figure 145: Sparkline creation dialog

Note

A sparkline is limited to one cell. To increase the size of display, increase the size of the cell. If the sparkline is merged into other cells it will remain the same size as the original cell and will lose the option to modify the sparkline formatting until it is unmerged.

Types of sparklines

There are three types of sparklines: Line, Column and Stacked.

Line

A line is drawn connecting data values.

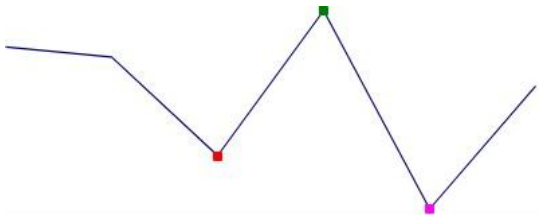


Figure 146: Line sparkline example

Column

Shows a bar for each data value

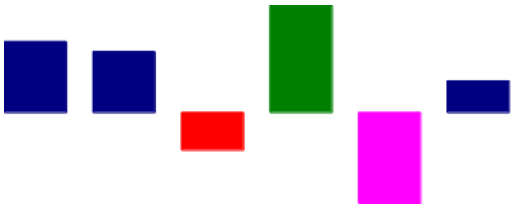


Figure 147: Column sparkline example

Stacked

Shows equally sized bars up or down for positive or negative values. This is also known as a win/loss sparkline.



Figure 148: Stacked sparkline example

Creating multiple sparklines

Create multiple sparklines at once by selecting multiple rows or columns for the **Input Range**. Then select an equal number of cells as the **Output Range** as there are rows or columns in the **Input Range**.

Then set the properties of the sparklines and click **OK** to create them. They will appear in the **Output Range** cells in the same order as the rows or columns selected in the **Input Range**.

These sparklines will all share the same formatting and the same sparkline group (see Sparkline groups below).

When setting the **Vertical minimum** or **Vertical maximum** to **Group**, each associated sparkline Y axis will enlarge to include the lowest (for minimum) or highest (for maximum) value from all of the data in the associated sparklines.

Tip

If the **OK** button in the Sparkline Properties dialog is unavailable to click (appears dimmed) it is because the number of cells in the **Output Range** does not match the number of rows or columns selected in the **Input Range**. Update these to match and the **OK** button will become available.

Modifying a sparkline

Updating a sparkline's data range

To update a sparkline's data range, right-click on the sparkline and choose **Sparklines > Edit Sparkline**, update the **Data range**, and click **OK**.

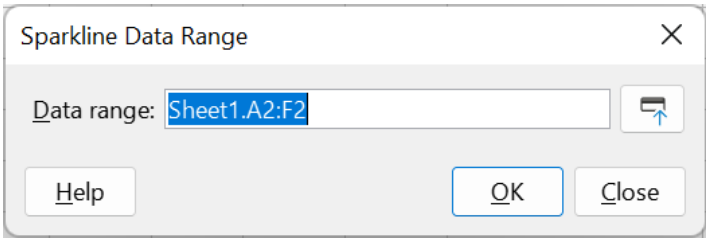


Figure 149: Sparkline Data Range dialog

Sparkline groups

Once created, each sparkline is associated to one sparkline group. A sparkline group contains sparkline formatting information and can be associated with more than one sparkline. If multiple sparklines are created at once, they will all have the same sparkline group. Any change to a sparkline group will affect all related sparklines.

Modifying a sparkline group

To update a sparkline group, open the Sparkline Properties dialog with one of these methods:

- Right-click on a sparkline in the group to be modified and choose: **Sparklines > Edit Sparkline Group**
- Select a cell containing a sparkline in the group to be modified and from the Menu Bar select: **Format > Sparklines > Edit Sparkline Group**

The properties can then be updated and applied by clicking **OK**.

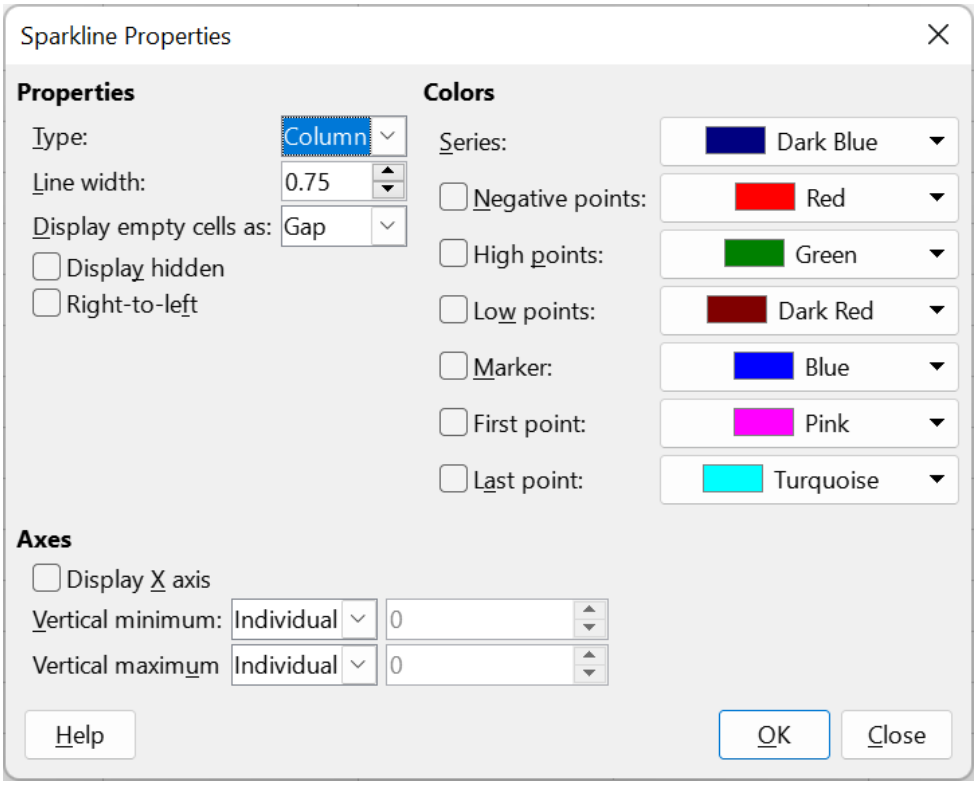


Figure 150: Edit Sparkline Group Properties dialog

Grouping and ungrouping sparklines

To group sparklines so that they share the same formatting:

1) Select the sparkline with the group formatting to be applied to other sparklines.
2) Select other sparklines to add to the group
3) Then select one of these methods to finish the grouping:
   - Right-click one of the selected cells and choose: **Sparklines > Group Sparklines**
   - From the Menu Bar, select **Format > Sparklines > Group Sparklines**

To ungroup sparklines so that they can be formatted separately, select the sparklines to be removed from the sparkline group and do one of the following:

- Right-click one of the selected cells and choose: **Sparklines > Ungroup Sparklines**
- From the Menu Bar, select **Format > Sparklines > Ungroup Sparklines**

The sparklines that were ungrouped will now each have their own sparkline group.

Deleting a sparkline

To delete a sparkline, simply select the sparkline and press *Delete*.



Calc Guide 7.5

Chapter 4
Formatting Data

Make your data shine

Introduction

Cell formatting is an important feature of any modern spreadsheet software including Calc. Calc formatting resources use an extensive set of attributes to enhance the visual display of relevant information of your spreadsheet. Manual and style formatting as well as conditional formatting are addressed in this chapter.

Formatting data

Note

All the settings discussed in this section can also be set as a part of the cell style. See Chapter 5, Using Styles and Templates, for more information.

You can format the data in Calc in several ways, either defined as part of a cell style so that it is automatically applied, or applied manually to the cell. For more control and extra options, select a cell or cell range and use the Format Cells dialog. All of the format options are discussed below.

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.

Automatic wrapping

To automatically wrap multiple lines of text in a cell, use one of the following methods:

Method 1

1) Select a cell or cell range.
2) Go to **Format > Cells** on the Menu bar, or right-click and select **Format Cells** in the context menu, or press `Ctrl+1`, to open the Format Cells dialog.
3) Click on the *Alignment* tab (Figure 151).
4) Under *Properties*, select **Wrap text automatically** and click **OK**.

Method 2

1) Select the cell.
2) On the Properties deck of the Sidebar, open the Alignment panel (Figure 152).
3) Select the **Wrap text** option to apply the formatting immediately.

Method 3

1) Select the cell.
2) Click on the toolbar *Wrap Text* tool.

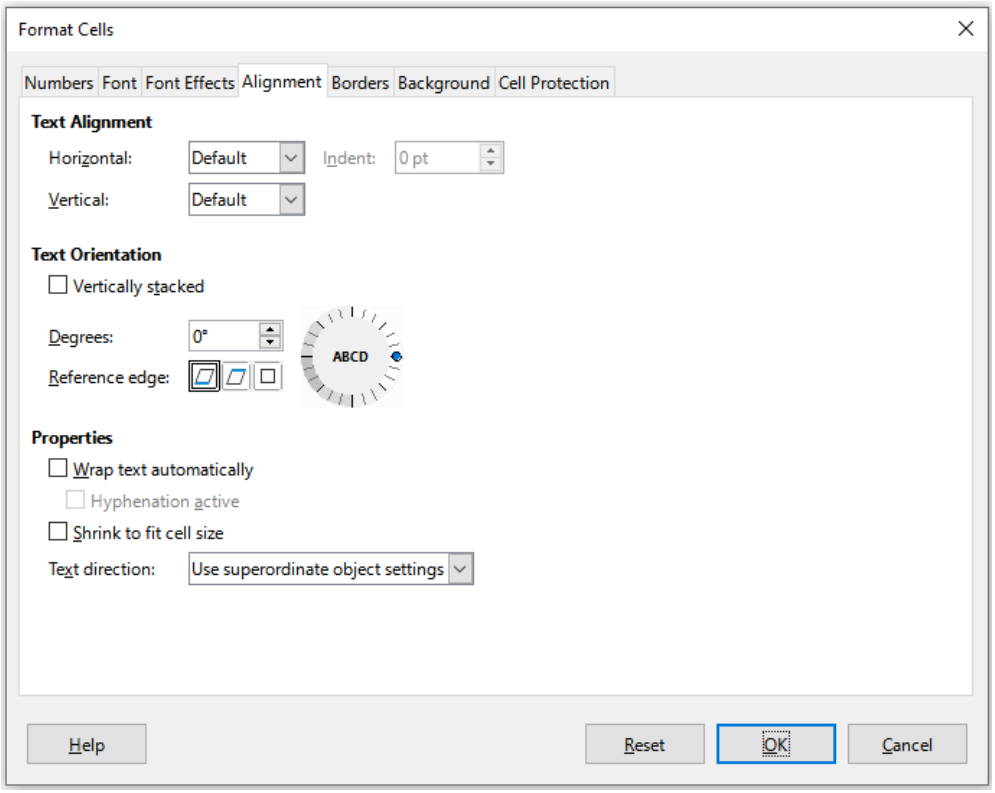


Figure 151: Format Cells dialog – Alignment tab

Manual line breaks

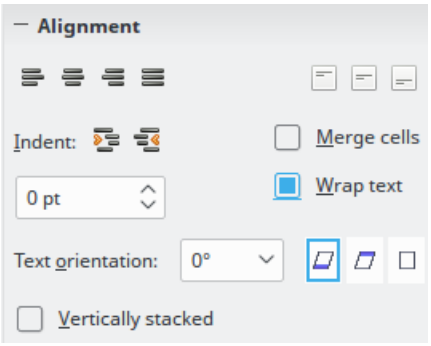


Figure 152: Wrap text formatting

To insert a manual line break while typing in a cell, press `Ctrl+Enter`. When editing text, double-click the cell, then reposition the cursor to where you want the line break. In the Input line of the Formula bar, you can also press `Shift+Enter`.

When a manual line break is entered, the cell row height changes but the cell width may not change and the text may still overlap the end of the cell. You have to change the cell width manually or reposition the line break.

Shrinking text to fit a cell

The font size of the data in a cell can automatically adjust to fit inside cell borders:

1) Select a cell or cell range.
2) Go to **Format > Cells** on the Menu bar, or right-click and select **Format Cells** in the context menu, or press `Ctrl+1`, to open the Format Cells dialog.

3) Click on the *Alignment* tab (Figure 151).

4) Under *Properties*, select **Shrink to fit cell size** and click **OK**.

Formatting numbers

Several number formats can be applied to cells by using icons on the Formatting toolbar (highlighted in Figure 153). Select the cell, then click the relevant icon to change the number format.

For more control or to select other number formats, use the *Numbers* tab of the Format Cells dialog (Figure 151 on page 194):

- Apply any of the data types in the *Category* list to the data.
- Select one of the predefined formats in the *Format* list.
- Control the number of decimal places and leading zeroes in *Options*.
- Enter a custom format code. This is a very powerful facility that is detailed in the *Number Format Codes* page of the Help.
- The *Language* setting controls the local settings for the different formats such as the date format and currency symbol.



Figure 153: Number icons on Formatting toolbar

Formatting fonts

To select a font and format it for use in a cell:

1) Select a cell or cell range.

2) Click the down arrow on the right of the *Font Name* box on the Formatting toolbar (highlighted in Figure 154) and select a font in the drop-down list. The font can also be changed using the *Font* tab on the Format Cells dialog.

3) Click on the down arrow on the right of the *Font Size* box on the Formatting toolbar and select a font size from the drop-down list. The font size can also be changed using the *Font* tab on the Format Cells dialog.

4) To change the character format, click on the **Bold**, **Italic**, or **Underline** icons on the Formatting toolbar.

5) To change the paragraph alignment, click on one of the alignment icons (**Align Left**, **Align Center** and **Align Right**). The **Format > Align** menu also provides these options in addition to the **Justified** alignment.



Figure 154: Font Name and Size on Formatting toolbar

Note

To specify the language used in the cell, open the *Font* tab on the Format Cells dialog. Changing language in a cell allows different languages to exist within the same document. For more changes to font characteristics, see “Font effects” below.

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 15, Setting up and Customizing.

Font effects

1) Select a cell or cell range.
2) Right-click and select **Format Cells** in the context menu, or go to **Format > Cells** on the Menu bar, or press `Ctrl+1`, to open the Format Cells dialog.
3) Click on the *Font Effects* tab (Figure 155).

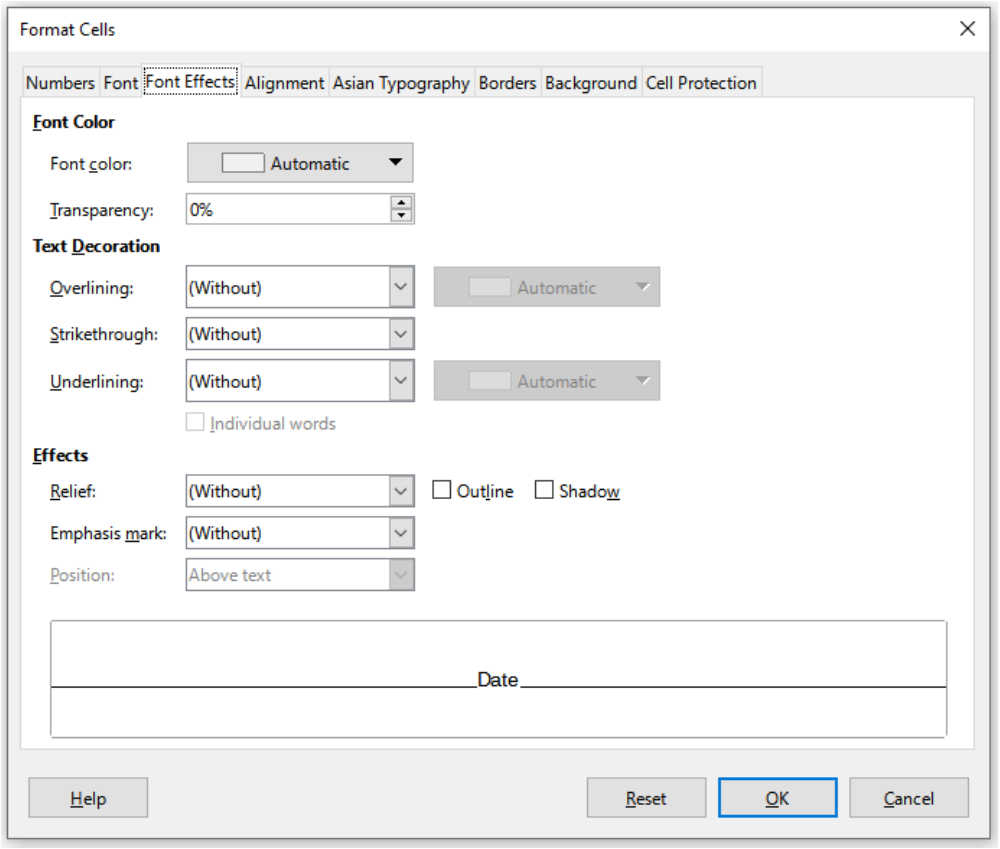


Figure 155: Format Cells dialog – Font Effects tab

4) Select the font effect you want to use from the options available. The options available are described in Chapter 5, Using Styles and Templates.
5) Click **OK** to apply the font effects and close the dialog.

Any font effect changes are applied to the current selection, or to the entire word that contains the cursor, or to any new text that you type.

Text orientation

To change the text direction within a cell, use the *Alignment* tab on the Format Cells dialog (Figure 151 on page 194):

1) On the *Alignment* tab of the Format Cells dialog, select the *Reference edge* from which to rotate the text as follows:
   - *Text Extension From Lower Cell Border* – writes the rotated text from the bottom cell edge outwards.
   - *Text Extension From Upper Cell Border* – writes the rotated text from the top cell edge outwards.
   - *Text Extension Inside Cell* – writes the rotated text only within the cell.
2) Click on the small indicator at the edge of the text orientation dial and rotate it until you reach the required degrees.
3) Alternatively, enter the number of degrees to rotate the text in the **Degrees** box.
4) Select **Vertically stacked** to make the text appear vertically in the cell.

An Asian layout mode checkbox is available on the *Alignment* tab of the Format Cells dialog when Asian language support is enabled and the text direction is set to vertical. This option aligns Asian characters one below the other in the selected cell(s). If the cell contains more than one line of text, the lines are converted to text columns that are arranged from right to left. Western characters in the converted text are rotated 90 degrees to the right. Asian characters are not rotated.

Using the Formatting toolbar tools

The tools on the Formatting toolbar can be used as follows after the cell has been selected:

- To change the text direction from horizontal (default direction) to vertical, click on the **Text direction from top to bottom** icon.
- To change text direction from vertical to horizontal (default), click on the **Text direction from left to right** icon.
- To change text direction from left to right, which is the default direction for Western fonts, to a right to left direction used in some fonts, for example Arabic, then click on the **Right-To-Left** icon. This only works if a font has been used that requires a right to left direction.
- To change text direction back to the default left to right direction used for Western fonts, click on the **Left-To-Right** icon.

Note

The text direction icons can only be made available if the **Asian** and **Complex text layout** options are checked under **Tools > Options > Language Settings > Languages > Default Language for Documents**. If it is necessary to make the buttons visible, right-click on the toolbar and select **Visible Buttons** in the context menu, then click on the icon you require and it will be placed on the Formatting toolbar.

Asian typography

If Asian language support is enabled through **Tools > Options > Language Settings > Languages > Default Languages for Documents > Asian**, an *Asian Typography* tab is included on the Format Cells dialog (Figure 156). This tab enables setting of typographic options for cells in Asian language documents.

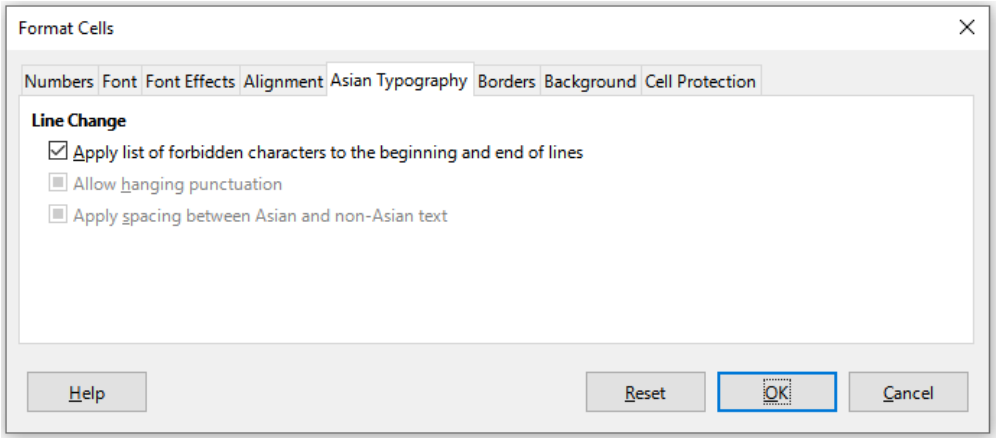


Figure 156: Format Cells dialog - Asian Typography tab

The following options are provided:

- **Apply list of forbidden characters to the beginning and end of lines** – prevents the characters in the list of restricted characters from starting or ending a line. The characters are relocated to either the previous or the next line. To edit the list of restricted characters, go to **Tools > Options > Language Settings > Asian Layout > First and Last Characters**.
- **Allow hanging punctuation** - prevents commas and periods from breaking the line. Instead, these characters are added to the end of the line, even in the page margin.
- **Apply spacing between Asian and non-Asian text** - inserts a space between ideographic and alphabetic text.

Formatting cell borders

To format the borders of a cell or a group of selected cells, you can use the border icons on the Formatting toolbar to apply the default styles to borders, or the Format Cells dialog for greater control. See Chapter 5, Using Styles and Templates, for more information on the options:

Note

Cell border properties apply only to the selected cells and can only be changed if you are editing those cells. For example, if cell C3 has a top border, that border can only be removed by selecting C3. It cannot be removed in C2, even though it appears to be the bottom border for cell C2.

1) Select a cell or a range of cells.
2) Go to **Format > Cells** on the Menu bar, or right-click and select **Format Cells** in the context menu, or press `Ctrl+1`, to open the Format Cells dialog.
3) On the *Borders* tab (Figure 157), select the options required.
4) Click **OK** to close the dialog and save the changes.

Alternatively, use the icons on the Formatting toolbar to apply default styles to borders:

1) Click the **Borders** icon and select one of the options displayed in the *Borders* palette.
2) Click the **Border Style** icon and select one of the line styles from the *Border Style* palette.
3) Click the **Border Color** icon to apply the most recently selected color. Click the down arrow to the right of the **Border Color** icon to select another color from the *Border Color* palette.

Note

When entering borders with the border icons on the Formatting toolbar, you have two choices: click the required icon to add a border to the present borders or *Shift-click* to add a border and remove the present borders.

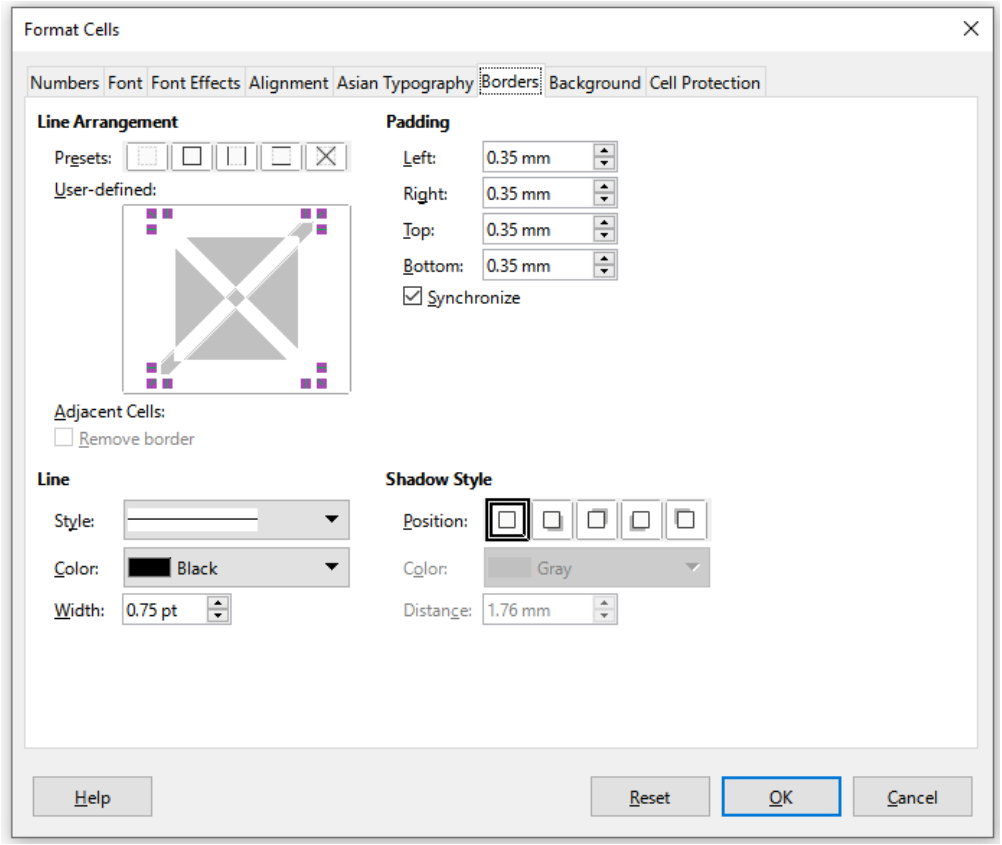


Figure 157: Format Cells dialog – Borders tab

Formatting cell backgrounds

To format the background color for a cell or a group of cells (see Chapter 5, Using Styles and Templates, for more information):

1) Select a cell or a range of cells.
2) Go to **Format > Cells** on the Menu bar, or right-click and select **Format Cells** in the context menu, or press *Ctrl+1*, to open the Format Cells dialog.
3) On the *Background* tab, click the **Color** button and select a color from the color palette.
4) Click **OK** to save the changes and close the dialog.

Alternatively, click on the **Background Color** icon on the Formatting toolbar to apply the most recently selected color. Click the down arrow to the right of the **Background Color** icon to select a different color from the *Background Color* palette.

AutoFormat of cells and sheets

Using AutoFormat

You can use AutoFormat to format a group of cells:

1) Select the cells in at least three columns and rows, including column and row headers, that you want to format.
2) Go to **Format > AutoFormat Styles** on the Menu bar to open the AutoFormat dialog (Figure 158).
3) Select the type of format and format color in the list.
4) Select the formatting properties to be included in the AutoFormat function.
5) Click **OK** to apply the changes and close the dialog.

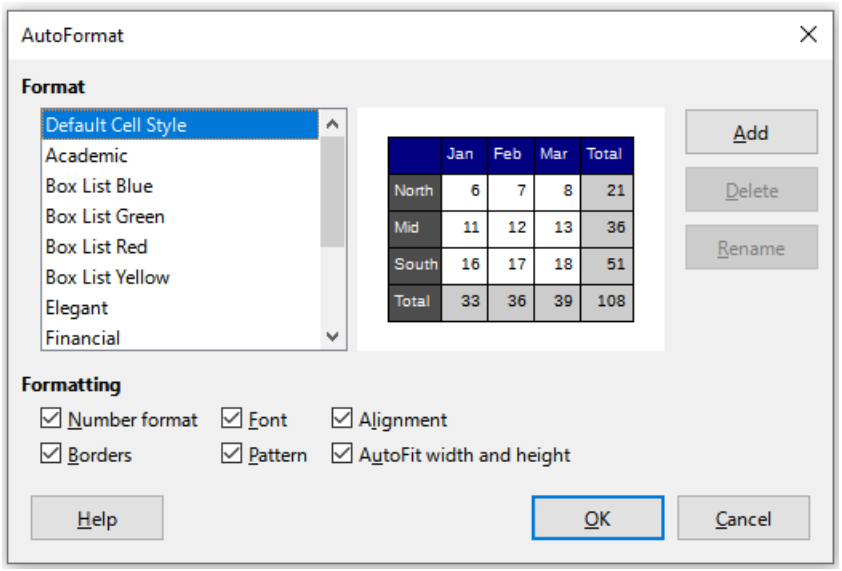


Figure 158: AutoFormat dialog

Defining a new AutoFormat

You can define a new AutoFormat so that it becomes available for use in all spreadsheets:

1) Format the data type, font, font size, cell borders, cell background, and so on for a group of cells.
2) Select a cell range of at least 4x4 cells.
3) Go to **Format > AutoFormat Styles** to open the AutoFormat dialog. The **Add** button is now active (if a range smaller than 4x4 cells is selected, the Add button will be unavailable).
4) Click **Add**.
5) In the *Name* box of the Add AutoFormat dialog that opens, type a meaningful name for the new format and click **OK**.
6) The new AutoFormat is now available in the Format list on the AutoFormat dialog. Click **OK** to close the AutoFormat dialog.

Note

Autoformatting does not use cell styles. It applies direct formatting to the selected range. The new Autoformat is stored in the user profile and is not part of the spreadsheet document. This means that you can reuse the new AutoFormat in another spreadsheet document using your profile but under a different profile or different user, the new AutoFormat will not be listed. See Chapter 5, Using Styles and Templates.

Value highlighting

Sometimes your spreadsheet can contain data of different types in the same column, row or range. For example, a column with dates can have a string (text) written in the same format as the default date format for the column. Because strings and numbers are treated differently in some important functions like AVERAGE, the spreadsheet can display wrong results if your data has mixed types.

Value highlighting displays cell contents in different colors depending on the type of content. An example of value highlighting is shown in Figure 159:

- Text is shown in black.
- Formulas are shown in green.
- Numbers (including date and time) are shown in blue.

15	01/03/2008	Kurt	7:30	17:45	9.50
16	01/03/2008	Ute	8:30	18:30	9.25
17	01/06/2008	Brigitte	9:30	17:30	7.25
18	01/06/2008	Fritz	11:00	14:30	3.50

Figure 159: Example of value highlighting

The value highlighting colors override any colors used in formatting. This color change applies only to the colors seen on a display. When a spreadsheet is printed, the original colors used for formatting are printed.

Go to **View > Value Highlighting** on the Menu bar, or use the keyboard shortcut *Ctrl+F8*, to turn the function on or off. When value highlighting is switched off, the original formatting colors are used for display.

You can make value highlighting the default when opening a spreadsheet in Calc, by selecting **Tools > Options > LibreOffice Calc > View > Display > Value highlighting**. This default mode for value highlighting may not be what you want if you are going to format the cells for printing.

Using conditional formatting

You can set up cell formats to change depending on conditions that you specify. Conditional formatting is used to highlight data that is outside the specifications that you have set. It is recommended not to overuse conditional formatting as this could reduce the impact of data that falls outside those specifications.

Note

Conditional formatting depends upon the use of styles and the AutoCalculate feature must be enabled. If you are not familiar with styles, see Chapter 5, Using Styles and Templates, for more information.

Setting up conditional formatting

1) Ensure that AutoCalculate is enabled: **Data > Calculate > AutoCalculate**.
2) Select the cells where you want to apply conditional formatting.
3) Go to **Format > Conditional > Condition** (Figure 164), **Color Scale** (Figure 169), **Data Bar** (Figure 170), **Icon Set** (Figure 172), or **Date** (Figure 168), on the Menu bar to open the Conditional Formatting dialog. Any conditions already defined are displayed.
4) Click **Add** to create and define a new condition. Repeat this step as necessary.
5) Select a style from the styles already defined in the *Apply Style* drop-down list. Repeat this step as necessary.
6) Alternatively, select **New Style** to open the Cell Style dialog (Figure 173) and create a new cell style. Repeat this step as necessary.
7) Click **OK** to save the conditions and close the dialog. The selected cells are now set to apply a result using conditional formatting.

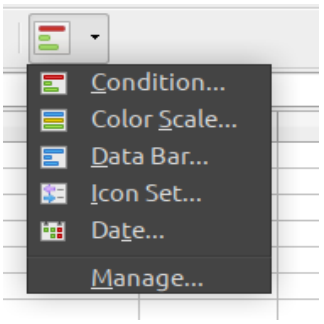


Figure 160: Conditional formatting toolbar icon

Tip

Although each condition type can be accessed using a different option in the **Format > Conditional** menu of the Menu bar, the five variants of the Conditional Formatting dialog shown in Figures 164 to 168 are not distinct. Once the dialog is open you can create conditions of all types without interacting with the Menu bar. For example, you might create *Condition 1* to select a cell style to be used if the cell takes a certain value (*Condition 1* is of type “Condition”). You might then press the **Add** button to create *Condition 2* by selecting **All Cells** in the condition’s upper left drop-down and then selecting **Data Bar** in the adjacent drop-down (*Condition 2* is of type “Data Bar”). You might then press the **Add** button to create Condition 3 by selecting **Date is** in the condition’s upper left drop-down (*Condition 3* is of type “Date”). In this way you can create many conditions of different types to control the conditional formatting of the selected cells.

Types of conditional formatting

The Condition dialog is the starting point when using conditional formatting. Here you can define what formats to use to highlight any data in the spreadsheet that meets the conditions you have defined.

Cell value

Applies the selected style to the cell or cell range controlled by the condition set in the drop down list. The formatting is applied to each cell individually and the condition may depend on other cells values of the selected range. Valid conditions are described in tables 5, 6 and 7.

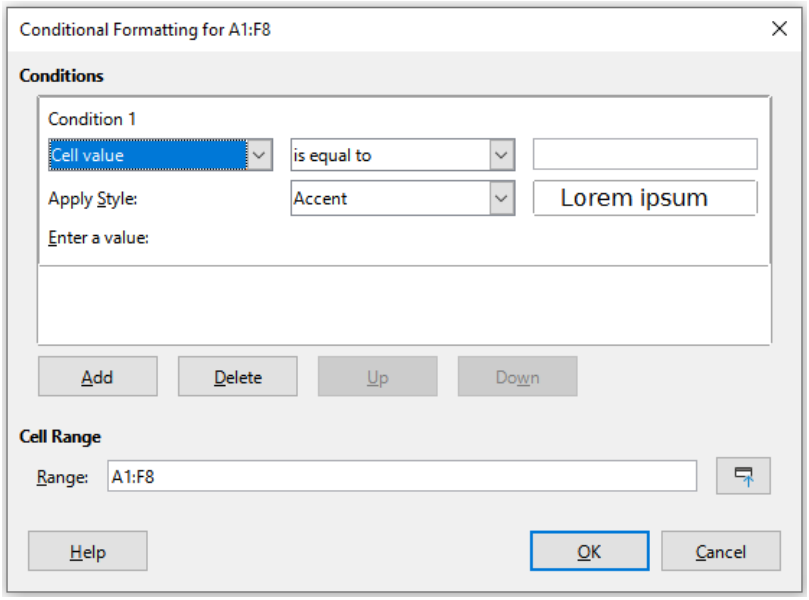


Figure 161: Conditional Formatting dialog – Cell value

Table 5: Conditions for number and text in cells

Condition	***Applies the selected style to the cell...***
is equal to	...when the cell value equals the user defined value in text box in the right. Use text inside quotes if you compare text values.
is not equal to	the cell value is not equal (different) to the user defined value in the text box in the right. Use text inside quotes if you compare text values.
is duplicate	Applies the selected style to the cell when at least one other cell in the range has equal contents.
is not duplicate	Applies the selected style to the cell when the cell contents is unique in the range.
begins with	Applies the selected style to the cell when the cell contents begins with the text or number defined in the right text box. See note on text conversion below.
ends with	Applies the selected style to the cell when the cell contents ends with the text or number defined in the right text box. See note on text conversion below.
contains	Applies the selected style to the cell when the cell contents contains the text or number defined in the right text box. See note on text conversion below.
does not contain	Applies the selected style to the cell when the cell contents does not contains the text or number defined in the right text box. See note on text conversion below.

Note on text conversion conditions

The condition applies to the internal text conversion of the cell contents. Numeric values are compared with their equivalent text representation. Numeric cell formats (currency, scientific, user-defined ...) are not considered for comparisons.

Table 6: Conditions for number-only cell values

Condition	Applies the selected style to the cell when the cell value is...
is less than	strictly less than the user defined value in the text box in the right.
is greater than	strictly greater than the user defined value in the text box in the right.
is less than or equal to	less than or equal to the user defined value in the text box in the right.
is greater than or equal to	greater than or equal to the user defined value in the text box in the right.
is between	between the two values defined in the text boxes on the right - lower and upper values - including the boundary values themselves.
is not between	not between the two values defined in the text boxes on the right - lower and upper values - including the boundary values themselves.
is in top N elements	Between the maximum value in the range and the N^{th} greater element of the same. Enter the value of N in the text box on the right.
is in bottom N elements	Between the minimum value in the range and the N^{th} lower element of the same. Enter the value of N in the text box on the right.
is in top N percent	In the top N percent of the number of cells in the range. For example, in a 20 cells range and N equals 20, the style is applied to the 4 last cells of the range. Enter the value of N in the text box on the right.
is in bottom N percent	In the bottom N percent of the number of cells in the range. For example, in a 20 cells range and N equals 20, the style is applied to the 4 first cells of the range. Enter the value of N in the text box on the right.
is above average	strictly greater than the average of the cell range values. See note below on average function.
is below average	the cell value is strictly less than the average of the cell range values. See note below on average function.
is above or equal average	greater or equal than the average of the cell range values. See note below on average function.
is below or equal average	is less or equal than the average of the cell range values. See note below on average function.

Note on AVERAGE function in conditions

The average function ignores any text or empty cell within a data range. If you suspect wrong results from this function, look for text in the data ranges. To highlight text contents in a data range, use the Value highlighting feature above.

Table 7: Conditions for errors in cells

Condition	Applies the selected style to the cell...
is error	When the cell is in an error condition defined in the right text box. See Appendix B "Error Codes". Tip A cell that references another cell with an error condition is not in error itself.
is not error	When the cell is not in an error condition defined in the right text box. See Appendix B "Error Codes".

Color Scale

Use Color Scale to set the background color of cells depending on the values of the data in those cells. Color Scale can only be used when **All Cells** has been selected for the condition. You can use either two or three colors for the color scale or gradient.

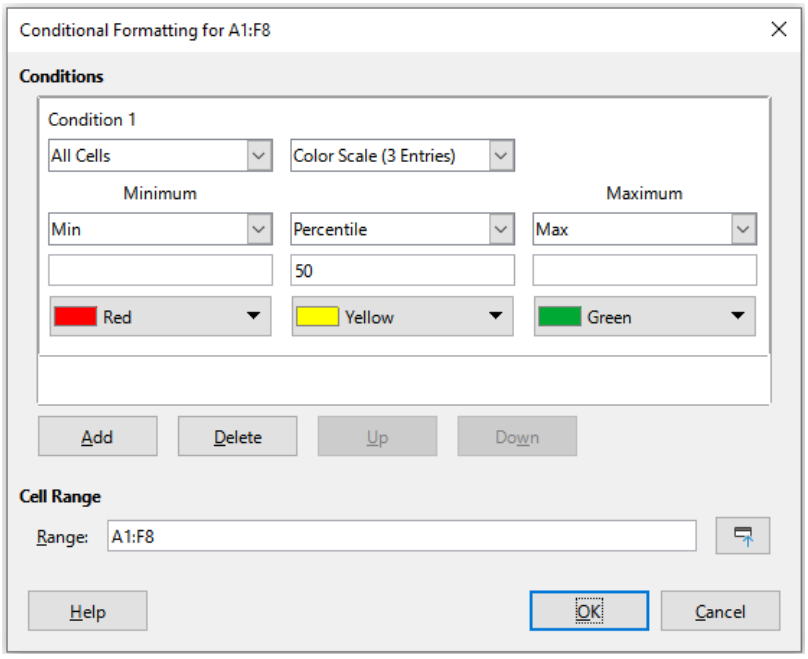


Figure 162: Conditional Formatting dialog – Color Scale

The **Color Scale (2 entries)** requires the definition of the colors for the minimum and the maximum values in the range. These two values can be calculated in several ways:

- **Min (Max)**: the minimum (maximum) value of the range.
- **Percentile**: A percentile is each of the 99 values which divide the sorted data in 100 equal parts, so that each part represents 1/100 of the sample population. A percentile return the value for a data series going from the smallest to the largest value in a set of data. For P = 25, the percentile means the first quartile. P = 50 is also the MEDIAN of the data set. Enter the percentile value in the text box just below. Valid values are from 0 to 100.
- **Value**: a fixed value set for the minimum (maximum) color. Enter the value in the text box just below.

- **Percent**: a fixed value representing the percentage of the minimum (maximum) of the length defined by minimum and maximum values in the range. A minimum of 10% selects the values below 10% of the segment [Min,Max]. A maximum of 80% select values above 80% of the segment [Min,Max]. Valid values are from 0 (zero) to 100. Do not enter a percent (%) sign.
- **Formula**: A formula expression starting with the equal sign (=) that calculates the numeric value for the minimum (maximum) colors. Values can be numbers, dates or time. Enter the formula expression in the text box just below.

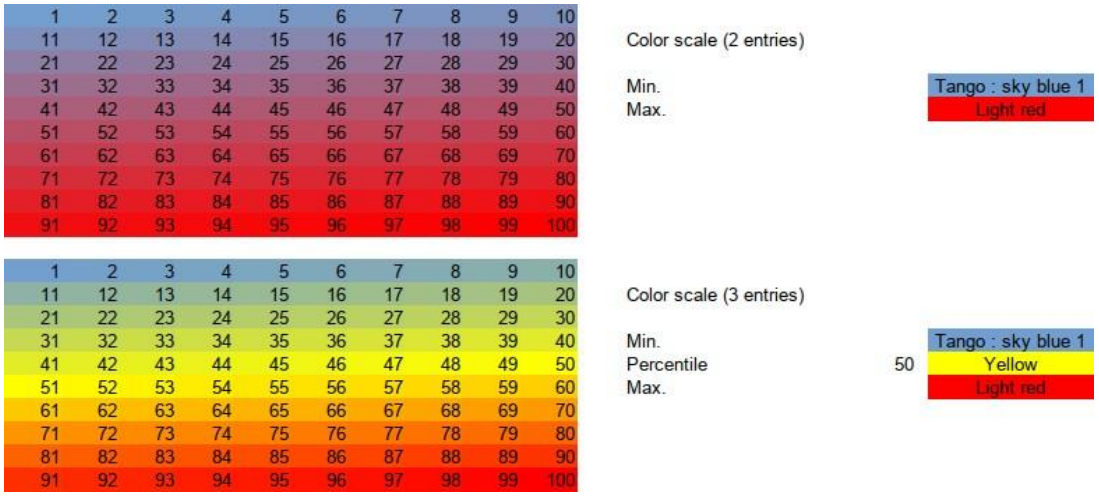


Figure 163: Color scale with 2 and 3 colors

The **Color scale (3 entries)** allows a third color for an intermediate data value. The third color can be defined as for the **Color scale (2 entries)** above and with two more options:

- **Min**, **Max**: The minimum (maximum) value of the range.

Data Bar

Data bars provide a graphical representation of data in the spreadsheet. The graphical representation is based on the values of data in a selected range. Click on **More Options** in the Conditional Formatting dialog to define how the data bars will look. Data bars can only be used when **All Cells** has been selected for the condition.

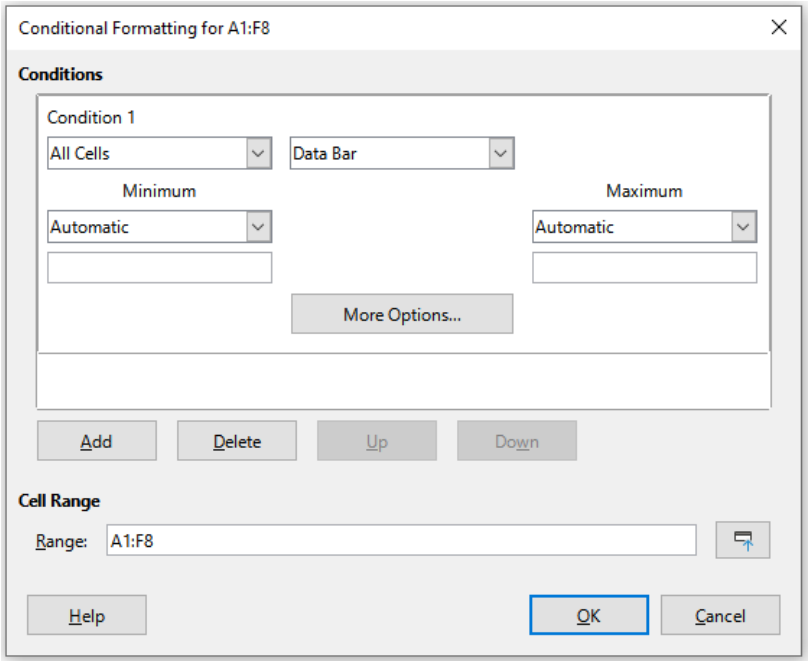


Figure 164: Conditional Formatting dialog – Data Bar

To format all cells with data bars, you must set the minimum and maximum values of the data range. The condition options are the same as the Color Scale above with the addition of:

- **Automatic:** Automatically sets the and maximum value based on the values in the data set.

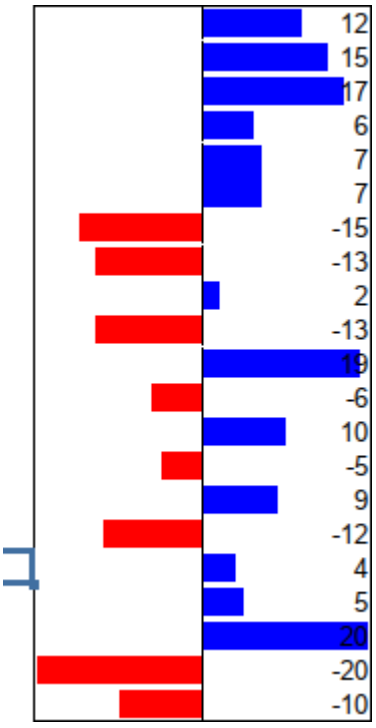


Figure 165: Data bars

Data bar options

Click on the **More Options** button to select attributes of the data bars. The Data Bar dialog opens (Figure 166):

Entry values

Defines the minimum and maximum values for the data bar formatting. See the dropdown items described in the minimum and maximum of the Color Scale above.

Bar Colors

Set the color for positive and negative values.

Set the bar fill mode:

- **Gradient**: set a color scale between the color of positive (negative) values and white.
- **Color**: use the positive (negative) color for the entire data bar, no fade out gradient (Figure 165).

Axis

Set the position of the vertical axis for the data bar. Values are:

- **Automatic**: position the vertical axis in the middle of the maximum and minimum values.
- **Middle**: set the vertical axis in the middle of the column (Figure 165).
- **None**: do not display a vertical axis.

Bar Lengths

Sets the minimum (maximum) length of the data bars, as a percentage of the column width.

Display bars only

Do not display values in the cell, only the data bars.

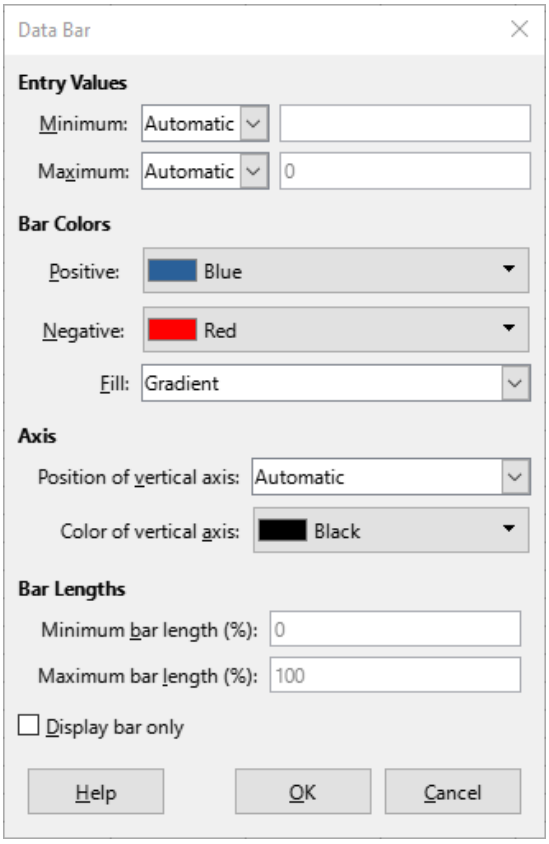


Figure 166: Data bars options

Icon Set

Icon sets display an icon next to the data in each selected cell to give a visual representation of where the cell data falls within the defined range that you set. The icon sets available include colored arrows, gray arrows, colored flags, colored signs, symbols, bar ratings, and quarters (Figure 169 and Figure 170). Icon sets can only be accessed when the Conditional Formatting dialog has been opened and **All Cells** has been selected for the condition (Figure 167).

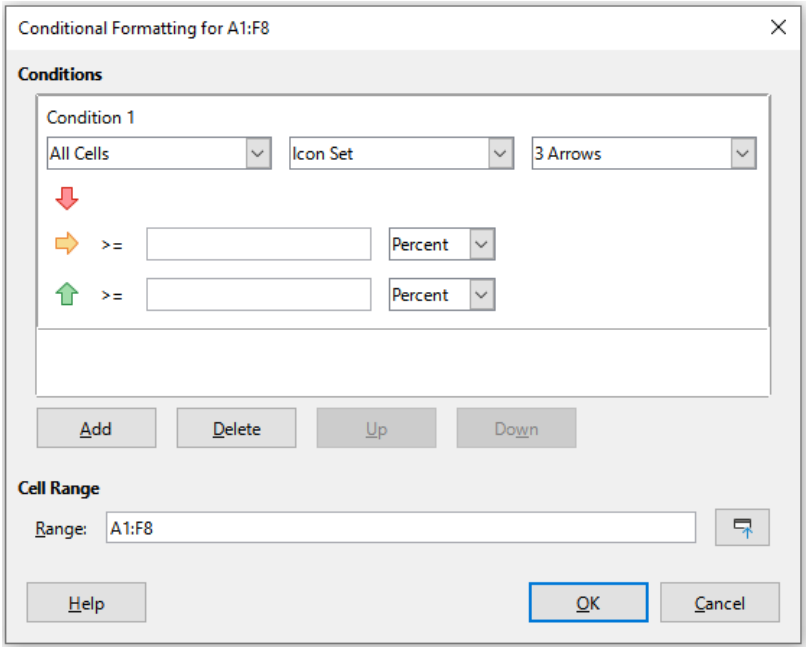


Figure 167: Conditional Formatting dialog – Icon Set

Figure 168 show the icon set used in conditional formatting to show the evolution of data in two datasets.

Notes1	Notes2	Evolution
17	2	-15
11	15	4
17	7	-10
9	8	-1
12	4	-8
1	20	19
14	6	-8
3	8	5
6	6	0
col B Average	8	
	R : < average	R : < 0 (B1 < A1)
	J : >= average	J : >= 0 (A1 = B1)
	V : >= average +1	V : >= 1 (B1 > A1)

Figure 168: Arrows icon set used to indicate evolution in data



Figure 169: Icon sets with 3 icons

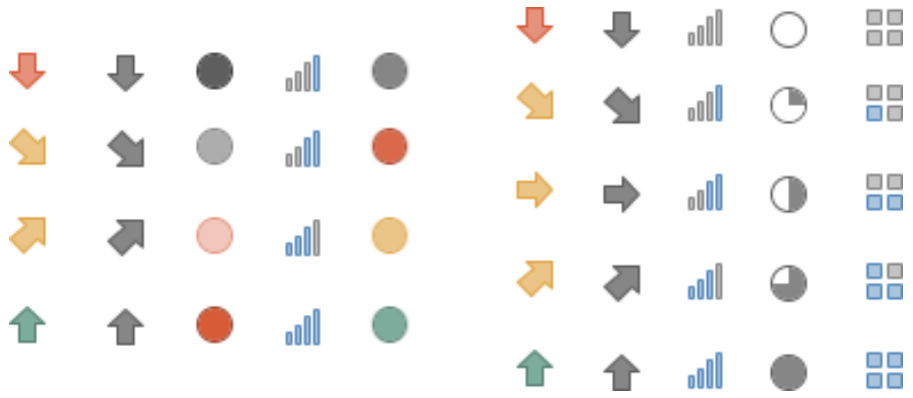


Figure 170: Icon sets with 4 and 5 icons

Date

Date applies a defined style depending on a date range chosen in the drop-down menu. Date range options are formed by applying This, Last, and Next adjectives to the available periods for Day, Week, Month, or Year with. Last 7 days is another option available. Examples include *Tomorrow (the word for next day)*, *Last 7 days*, *This week*, *Next month*, *Last year*.

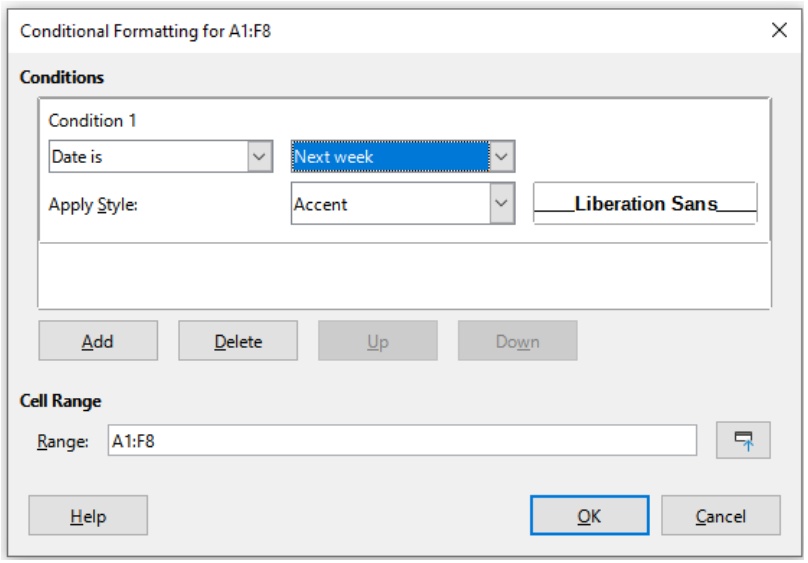


Figure 171: Conditional Formatting dialog - Date

Note

The start and end of the week is locale dependent (set in **Tools > Options > Language Settings > Languages**).

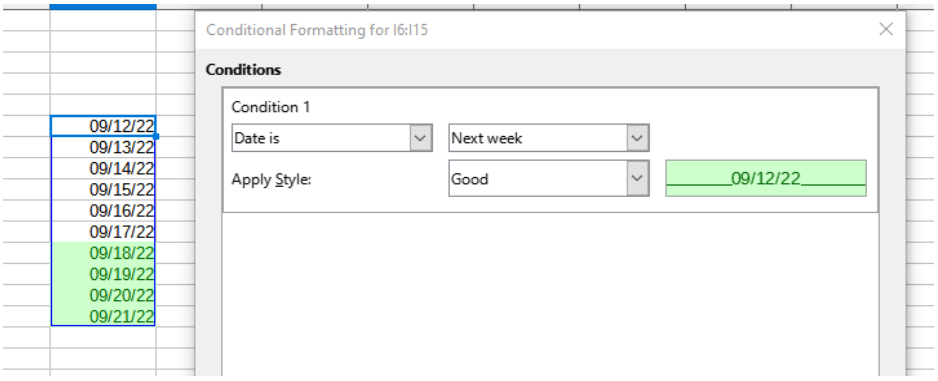


Figure 172 Condition for dates in next week.

Formula is

Applies the selected style to the cell when the formula expression in the text box in the right is not zero.

The formula is expressed similar to a test condition evaluating to TRUE or FALSE.

Figure 173 shows different cell styles applied based on conditions for dates before and after the current date. The formulae are expressed in Table 8.

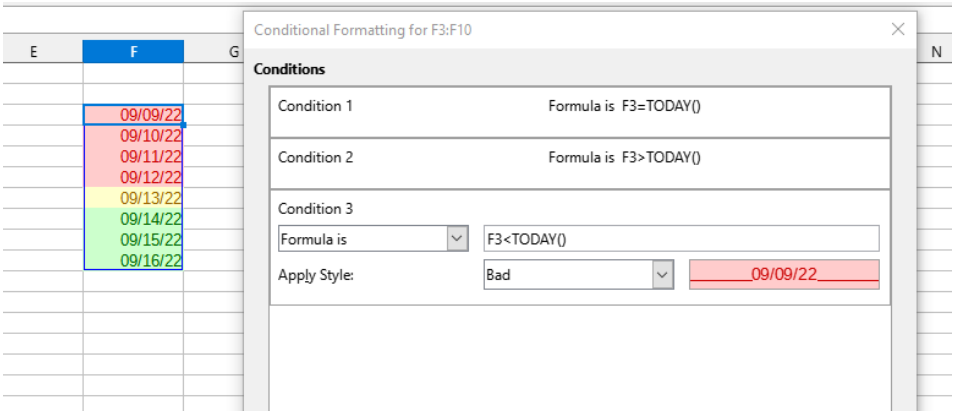


Figure 173 Conditions to set current, past and future dates using formulas

Table 8: Current, past and future deadlines with formulas

Deadlines	***Formula is***	***Style applied***
Current date	F3 = TODAY()	"Neutral"
Past date	F3 < TODAY()	"Bad"
Future date	F3 > TODAY()	"Good"

Conditional formatting management

To see all the conditional formatting defined in the spreadsheet and any styles used:

1) Go to **Format > Conditional > Manage** on the Menu bar to open the Manage Conditional Formatting dialog (Figure 174).

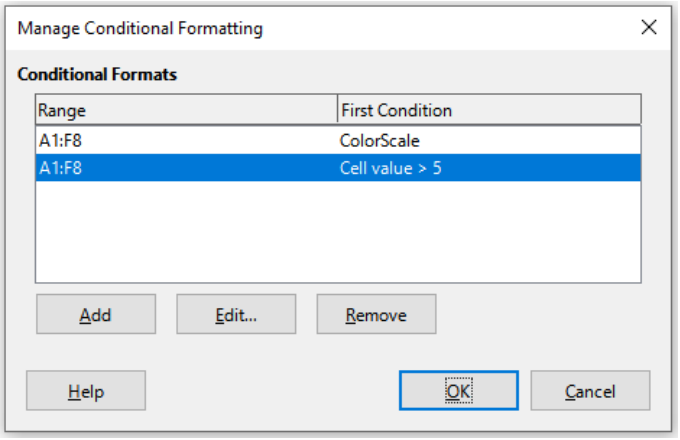


Figure 174: Manage Conditional Formatting dialog

2) Select a range in the Range list and click **Edit** to redefine the conditional formatting.
3) Select a range in the Range list and click **Remove** to delete the conditional formatting. The deletion is immediate with no confirmation.
4) Select **Add** to create a new definition of conditional formatting.
5) Click **OK** to save the changes and close the dialog.

Copying cell styles

To apply the style used for conditional formatting to other cells later:

1) Click one of the cells that has been assigned conditional formatting and copy the cell to the clipboard.
2) Select the cells that are to receive the same formatting as the copied cell.
3) Go to **Edit > Paste Special > Paste Special** on the Menu bar, or right-click and select **Paste Special > Paste Special** in the context menu, or press *Ctrl+Shift+V*, to open the Paste Special dialog (Figure 174 on page 212).
4) Make sure that only *Formats* is selected and click **OK** to paste the conditional formatting into the cell.

Hiding and showing data

In Calc you can hide elements so that they are neither visible on a computer display nor printed when a spreadsheet is printed. However, hidden elements 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 to copy columns A to C. When you require a hidden element again, you can reverse the process and show the element.

Hiding data

Sheets

Select **Sheet > Hide Sheet** on the Menu bar, or right-click on the sheet tab for the sheet to be hidden and select **Hide Sheet** in the context menu. There must always be one sheet that is not hidden.

Rows and columns

1) Select a cell in the row or column you want to hide.

2) Go to **Format** on the Menu bar and select **Rows** or **Columns**.
3) Select **Hide** from the menu and the row or column can no longer be viewed or printed.
4) Alternatively, right-click on the row or column header and select **Hide Rows** or **Hide Columns** in the context menu.

Tip

To enable/disable a visual indicator of hidden columns and rows, go to **View > Hidden Row/Column Indicator**.

Cells

Hiding individual cells is more complicated. First, you need to define the cells as protected and hidden; then you need to protect the sheet:

1) Select the cells you want to hide.
2) Go to **Format > Cells** on the Menu bar, or right-click and select **Format Cells** in the context menu, or press `Ctrl+1`, to open the Format Cells dialog (Figure 175).
3) Click the *Cell Protection* tab and select an option for hiding and printing the cells.
4) Click **OK** to save the changes and close the dialog.
5) Go to **Tools > Protect Sheet** on the Menu bar, or right-click on the sheet tab and select **Protect Sheet** in the context menu, to open the Protect Sheet dialog (Figure 176).
6) Select **Protect this sheet and the contents of protected cells**.
7) Create a password and then confirm the password.
8) Select or deselect the options in the *Allow all users of this sheet to* area so that users can select protected or unprotected cells.
9) Click **OK** to save the changes and close the dialog.

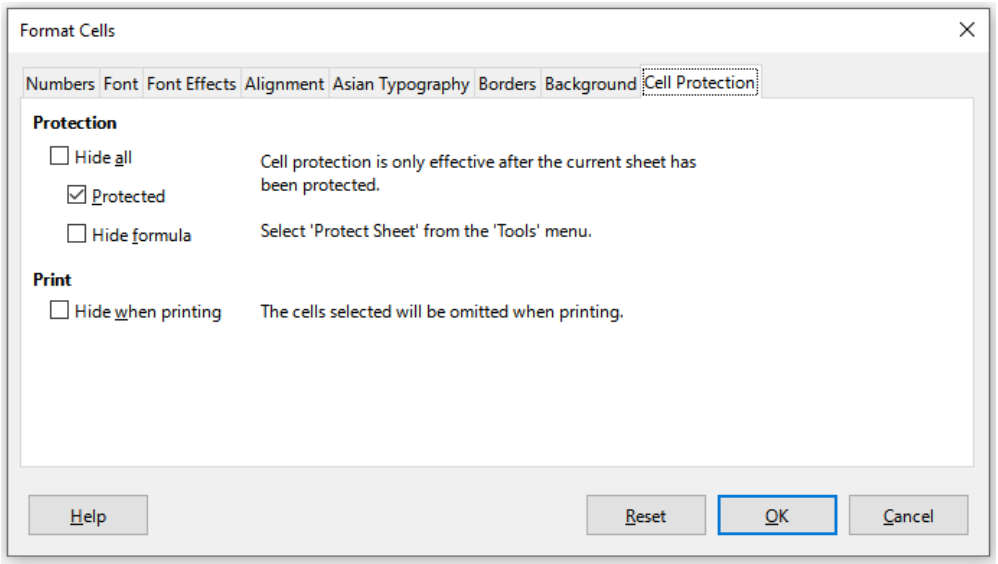


Figure 175: Format Cells dialog – Cell Protection tab

Note

When content in cells is hidden, it is only the content contained in the cells that is hidden and the protected cells cannot be modified. The blank cells remain visible in the spreadsheet.

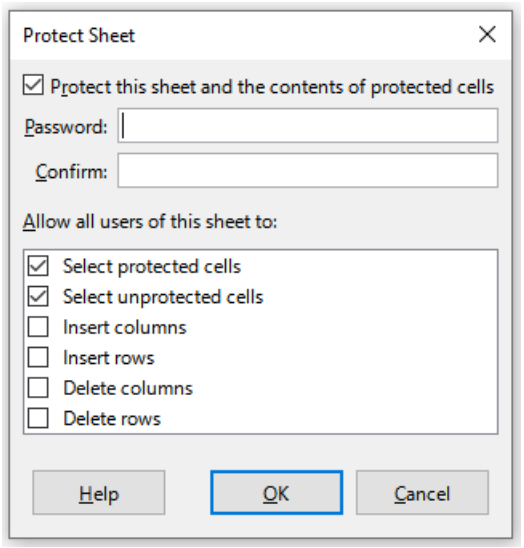


Figure 176: Protect Sheet dialog

Showing data

Sheets

Select **Sheet > Show Sheet** on the Menu bar, or right-click on any sheet tab and select **Show Sheet** in the context menu. Choose which hidden sheets to show from the list on the Show Sheet dialog. If there are no hidden sheets, the **Show Sheet** option will not appear in the context menu and will be grayed on the Menu bar.

Rows and columns

1) Select the rows or columns on each side of the hidden row or column.
2) Go to **Format** on the Menu bar and select **Rows** or **Columns**. Select **Show** in the menu and the row or column will be displayed and can be printed.
3) Alternatively, right-click on a row or column header and select **Show Rows** or **Show Columns** in the context menu.

Cells

1) Go to **Tools > Protect Sheet** on the Menu bar, or right-click on the sheet tab and select **Protect Sheet** in the context menu, to open the Protect Sheet dialog (Figure 176).
2) Enter the password to unprotect the sheet and click **OK**.
3) Go to **Format > Cells** on the Menu bar, right-click and select **Format Cells** in the context menu, or press *Ctrl+1*, to open the Format Cells dialog (Figure 175).
4) Click the *Cell Protection* tab and deselect the hide options for the cells. Click **OK**.

Note

When protecting a sheet using the Protect Sheet dialog, you can leave the password fields blank. In this case, the Protect Sheet dialog is not presented at step 1)) above and step 2)) is not necessary.



Calc Guide 7.5

Chapter 5
Using Styles and Templates

Using consistent formatting in spreadsheets

What are styles? Why use them?

A style is a set of formats that you can apply to selected elements in a document to quickly change their appearance. Applying a style often means applying a group of formats at the same time.

Many people manually format spreadsheet cells and pages without paying any attention to styles and are accustomed 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 character formatting such as bold, italic, or underline.

Using styles means that you stop applying attributes and characteristics individually (for example, *font size 14 pt, Times New Roman, bold, centered*) and start using a style, for example *Title*. Applying attributes and characteristics is time-consuming and prone to errors. In contrast, using a style, which has been defined to include the attributes and characteristics you want, will save you time and give greater consistency in formatting.

Styles also make major formatting changes easy. For example, you may decide to change the appearance of all subtotals in a spreadsheet to be *10 pt Arial* instead of *8 pt Times New Roman* after you have created a 15-page spreadsheet. Assuming that you have formatted all subtotals with a specific style, you can change all of the subtotals in the document by simply changing the properties of that style.

In addition, Calc also provides page styles, as described below.

You can modify the attributes of the supplied styles and define as many new styles as you require. Creating, modifying, and accessing styles is explained in the following sections.

Direct formatting and Style formatting

Direct formatting (also called *manual formatting*) overrides styles. You cannot remove the direct formatting by applying a style to it.

To remove manual formatting, select the text, and then do one of the following:

- Right-click and choose **Clear Direct Formatting** in the context menu.
- Press *Ctrl+M*.
- Click the **Clear Direct Formatting** icon on the Standard toolbar.
- Select **Format > Clear Direct Formatting** on the Menu bar.

Calc style types

While some components of LibreOffice offer many style types, Calc offers only two: cell styles and page styles. These style types are explained in the following sections.

Cell styles

Cell styles are similar to paragraph styles used in LibreOffice Writer. They are the most basic type of style in Calc. Cell styles are used for applying fonts, alignment, borders, background, number formats (for example, currency, date, number), and cell protection to format the data in the cells.

A basic range of cell styles is supplied with Calc. Many of these styles are shown on the **Styles** menu on the Menu bar and all are shown in the Styles deck of the Sidebar. If you create a new cell style, it will be shown in the Sidebar. To add it to the **Styles** menu, see Chapter 15, Setting up and Customizing, for instructions.

Initially, the basic styles are configured so that if you change the characteristics of the *Default* cell style, then all of the other styles, inheriting from it, will change to match.

Page styles

Page styles in Calc are applied to sheets. Although one sheet may print on several pages, only one page style can be applied to a sheet. If a spreadsheet file contains more than one sheet, then a different page style can be applied to each sheet. For example, a spreadsheet might contain some sheets to be printed in landscape orientation and other sheets to be printed in portrait orientation.

Two page styles are supplied with Calc: *Default* and *Report*. Page styles allow you to set page size and orientation, page margins, headers and footers, borders and backgrounds, and the sequence for printing sheets.

Applying cell styles

To apply cell styles in Calc, you can use the **Styles** menu on the Menu bar, the Styles deck on the Sidebar, Fill Format mode, the *Apply Style* list on the Formatting toolbar, and keyboard shortcuts.

Styles menu

By default, the **Styles** menu (Figure 177) lists many of the cell styles supplied with Calc. To apply a cell style, select the cell or group of cells to be formatted, and then choose **Styles** and click on the required style.

Styles deck in Sidebar

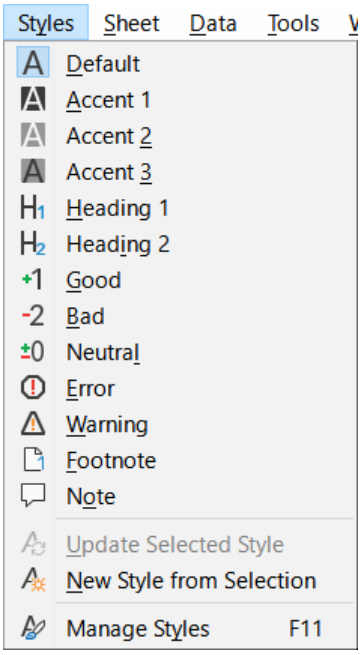


Figure 177: The Styles menu

The Styles deck on the Sidebar lists and optionally shows previews of the styles available.

1) If the Styles deck in the Sidebar is not open, do one of the following to open it:
   - Select **View > Styles** on the Menu bar.

– Select **Styles > Manage Styles** on the Menu bar.

– Press the *F11* function key.

– If another deck of the Sidebar is open, select the **Styles** icon in the tab panel at the right of the Sidebar.

2) Click the **Cell Styles** icon on top of the Styles deck to open the list of cell styles. Figure 178 shows the deck with cell styles visible.

3) In the spreadsheet, highlight the cell or group of cells where you want to apply a cell style.

4) Double-click on the cell style name in the Styles deck and the formatting attributes for that style are applied to the data contained in the highlighted cells.

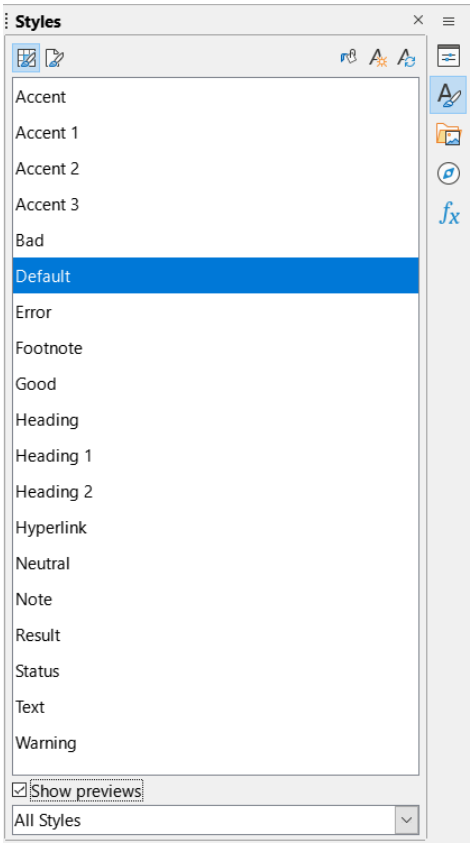


Figure 178: Styles deck in Sidebar, showing cell styles

Fill Format mode

Fill Format mode is useful when you want to apply the same style to many scattered cells.

1) Go to the Styles deck on the Sidebar (Figure 178).

2) Select the style you want to apply.

3) Click the **Fill Format Mode** icon in the top right of the Styles deck. The mouse pointer changes shape.

4) Click in each cell where you want to apply the selected style.

5) When you have finished formatting cells, click the **Fill Format Mode** icon to exit the mode.

Caution

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

Apply Style list

The *Apply Style* drop-down list is not included by default on the Formatting toolbar in Calc, but you can add it as follows:

1) Right-click on any icon on the Formatting toolbar and select **Visible Buttons** in the context menu (Figure 179).
2) Click **Apply Style**. The context menu closes and the *Apply Style* list appears at the left end of the Formatting toolbar.

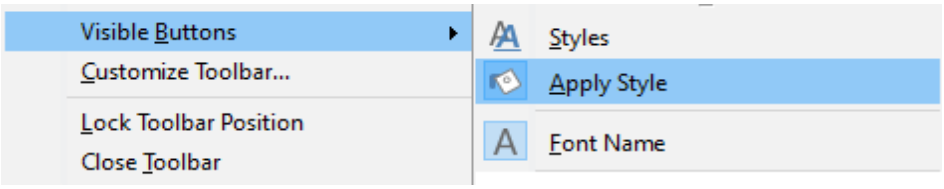


Figure 179: Adding the Apply Style list to the Formatting toolbar

To apply a style using the *Apply Style* list:

1) Select a cell or a group of cells in the spreadsheet.
2) Click the down arrow at the right of the *Apply Style* list to open the drop-down menu (Figure 180).
3) Select the required style. The formatting attributes of that style are applied to the selected cells.

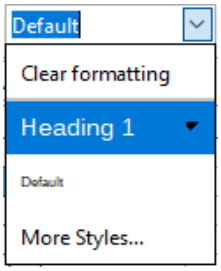


Figure 180: Using the Apply Style

Only the styles that are in use are shown on the list. Click **More Styles** to go to the Styles deck where all cell styles are available.

Keyboard shortcuts

You can create keyboard shortcuts to apply commonly-used cell or page styles, including any custom styles that you have created. See Chapter 15, Setting up and Customizing, for more information.

Applying page styles

The page style applied to a sheet within a spreadsheet is indicated on the Status Bar, as shown in Figure 181.

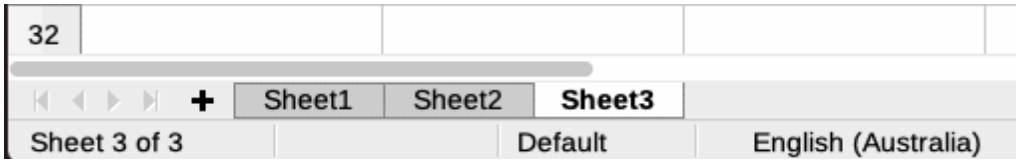


Figure 181: Page style (Default) indicated on Status Bar

To apply a different page style:

1) Select the sheet to be styled by clicking its sheet tab.
2) Go to the Styles deck on the Sidebar (Figure 178).
3) At the top of the Styles deck, click the **Page Styles** icon.
4) Double-click on the required page style.

Creating new styles

To create a new style, follow the procedure described in this section.

Note

Any new styles, and any changes to existing styles, apply only to the spreadsheet in use. To save new styles in a template, see “Creating a template” for more information.

1) Go to the Styles deck on the Sidebar (Figure 178).
2) To create a new cell style, click the **Cell Styles** icon, or to create a new page style, click the **Page Styles** icon.
3) Right-click in the Styles deck and select **New** in the context menu to open either the Cell Style dialog or the Page Style dialog.
4) Use the various tabbed pages on the dialogs to set the attributes for the new style. See “Cell style attributes” below and “Page style attributes” for more information.
5) Click **OK** to close the dialog and save the new style.

Note

Style names are case sensitive. You can define, for example, a style called *red* and another style called *Red*. Make sure all style names are sufficiently different to prevent any confusion.

Cell style attributes

The following attributes are available on the tabbed pages of the Cell Style dialog (Figure 182).

Organizer tab

- **Name** – displays the name of the selected style. If you are creating or modifying a custom style, enter a name for the style. You cannot change the name of a predefined style.
- **Inherit from** – you can choose to link the new style to an existing style and then modify some of the attributes. If you do this, any change to the parent style’s attributes will affect the new style. For example, you could make the styles identical except for the font color; if you later change the font family of the parent style, the new style’s family will also change.

- **Edit Style** – enables you to view and edit the properties of the parent style.
- **Category** – displays the category for the current style. If you are creating or modifying a new style, select *Custom Styles* from the list. You cannot change the category for a predefined style. Select *Hidden Styles* if you want that style to appear only in the Styles list.
- **Contains** – describes the formatting used in the style.

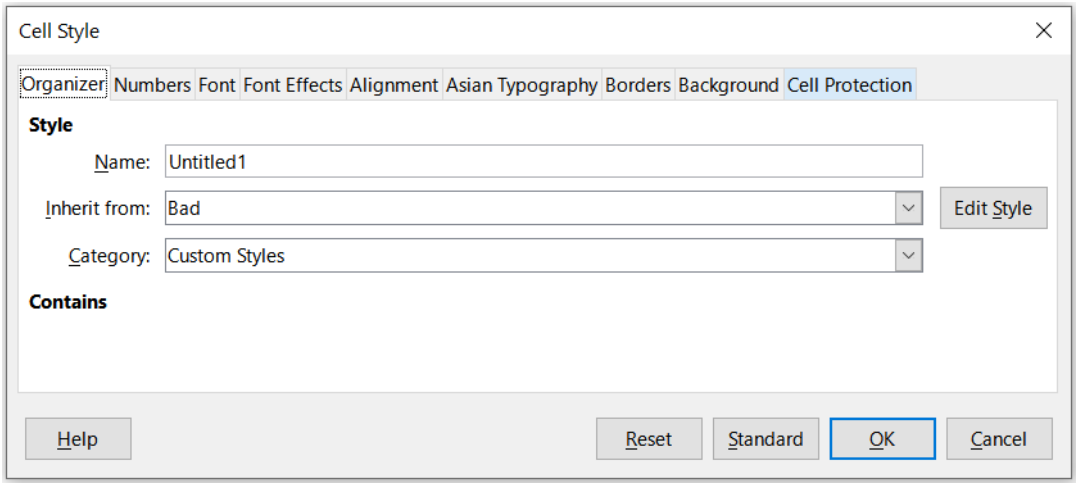


Figure 182: Cell Style dialog – Organizer tab

Numbers tab

- **Category** – select a category from the list.
- **Format** – select how you want the contents of the selected cells to be displayed.

When you select **Currency** as a category, you need to select a currency in the drop-down list and then select the format to use from the options available for that currency.

The currency format is not dependent on the language that you select in the **Language** box. The default currency format for a cell is determined by the regional settings of your operating system.

- **Language** – specifies the language settings for the selected cells. With the language set to the default, Calc automatically applies the number formats associated with the system default language. The language setting ensures that date and currency formats are preserved even when the document is opened in an operating system that uses a different default language setting.
- **Options** – specify the options for the selected format:
  - *Decimal places* – enter the number of decimal places that you want to display.
  - *Leading zeroes* – enter the maximum number of zeroes to display in front of the decimal point.
  - *Negative numbers red* – select to change the font color of negative numbers to red.
  - *Thousands separator* – select to insert a separator between thousands. The type of separator (for example, a comma or a space) depends on your language settings.
- **Format code** – displays the number format code for the selected format. You can also enter a custom format.
- **Add** – adds the number format code that you entered to the user-defined category.
- **Edit Comment** – adds a comment to the selected number format.

- **Remove** – deletes the selected number format.
- **Preview field** – displays a preview of the current selection.

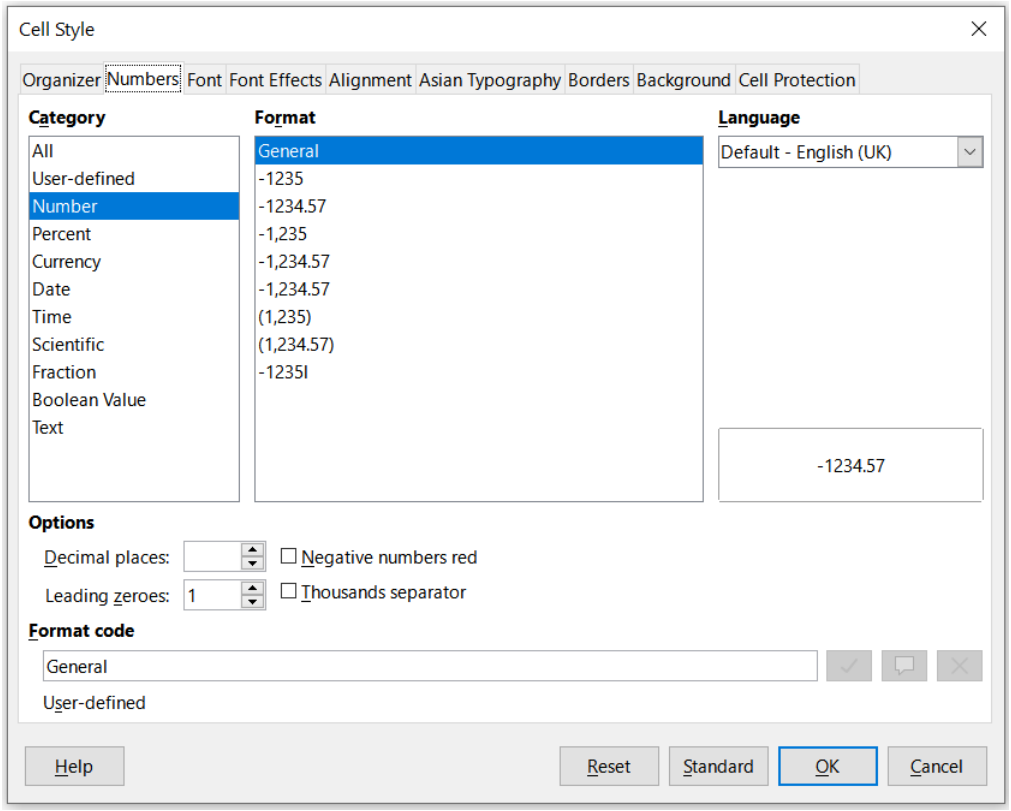


Figure 183: Cell Style dialog – Numbers tab

Font tab

Depending on your language settings, you can change the formatting for the following font types on this tab – Western text font (Latin character sets), Asian text font (Chinese, Japanese, or Korean character sets), and Complex text layout font (right-to-left text direction). Figure 184 shows the *Font* tab of the Cell Style dialog when the **Asian** and **Complex text layout** options are selected in the *Default Languages for Documents* area of the **Tools > Options > Language Settings > Languages** page. The layout of the *Font* and *Font Effects* tabs are modified if either of these two options is deselected.

- **Font** – select an installed font in the list.
- **Style** – select the formatting you want to apply, for example bold, Italic, or underline.
- **Size** – select or enter the font size that you want to apply. For scalable fonts, you can also enter decimal values. If you are creating a style that is based on another style, you can enter a percentage value or a point value (for example, 2 pt or 5 pt).
- **Language** – sets the language that the spelling checker is to use. The spelling checker works only when you have installed the corresponding language module. A language entry has a check mark in front of it if the spelling checker is activated for that language.
- **Features** – some fonts offer special features such as Discretionary Ligatures and Horizontal Kerning. Click this button to access the Font Features dialog (not shown) to select those features.
- **Preview** – displays a preview of the current selection.

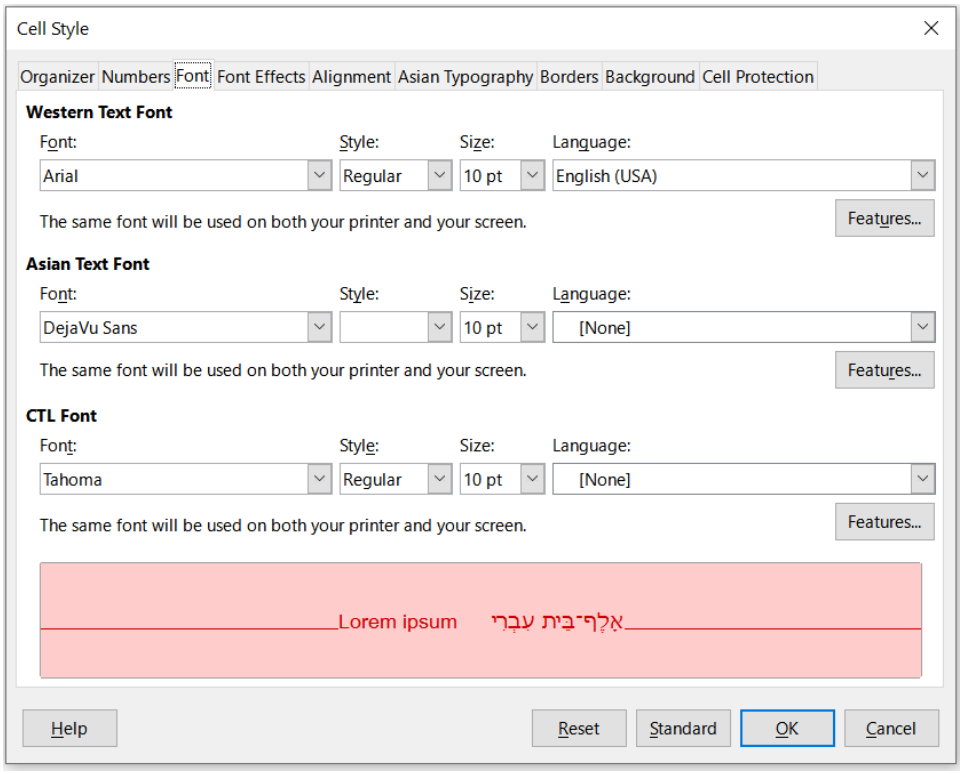


Figure 184: Cell Style dialog – Font tab

Font Effects tab

- **Font color** – sets the color for the text. If you select **Automatic**, the text color is set to black for light backgrounds and to white for dark backgrounds.
- **Transparency** – sets the transparency of the character text. The value 100% means entirely transparent, while 0% means not transparent at all.
- **Overlining** – select the overlining style that you want to apply. To apply the overlining to words only (not the spaces between them), select the option box **Individual words**.

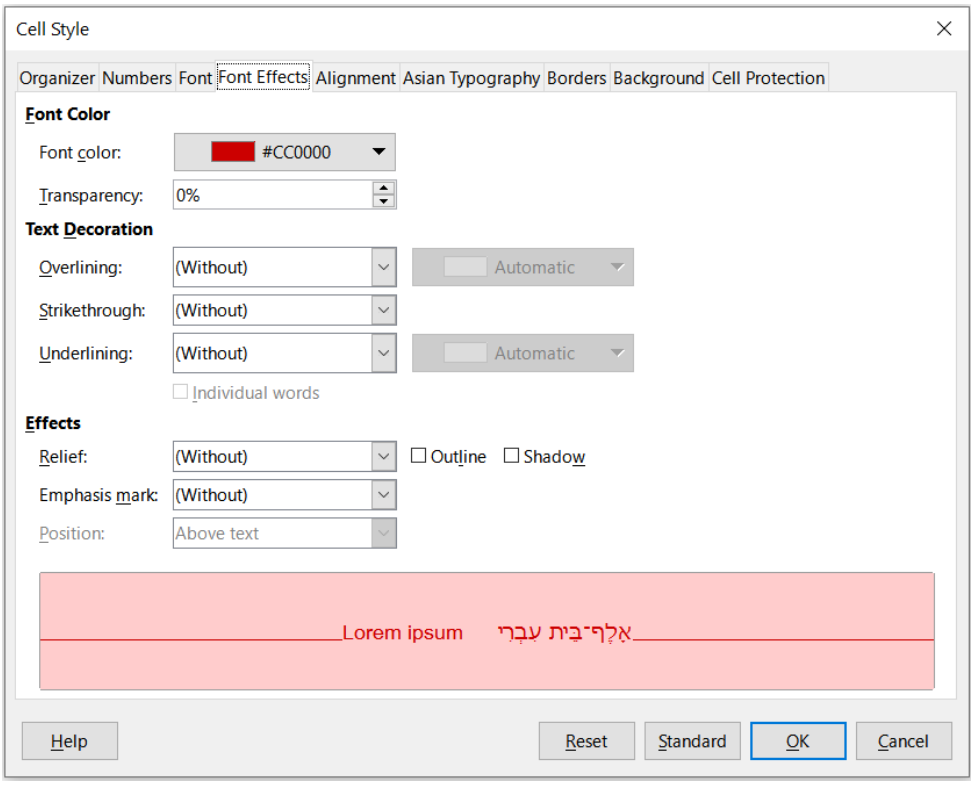


Figure 185: Cell Style dialog – Font Effects tab

- **Overline color** – select the color for the overlining, in the pallet when you click the button next to the Overlining field. **Automatic** matches the font color.
- **Strikethrough** – select a strikethrough style for the selected text. To apply the strikethrough to words only (not the spaces between them), select **Individual words**.
- **Underlining** – select the underlining style that you want to apply. To apply the underlining to words only (not the spaces between them), select **Individual words**.

  If you apply underlining to a superscript text, the underlining is raised to the level of the superscript. If the superscript is contained in a word with normal text, the underlining is not raised.
- **Underline color** – select the color for the underlining, in the pallet when you click the button next to the Underlining field. **Automatic** matches the font color.
- **Individual words** – applies the selected effect only to words and ignores spaces.
- **Relief** – select a relief effect to apply to the text. The **Embossed** relief makes the characters appear as if they are raised above the page. The **Engraved** relief makes the characters appear as if they are pressed into the page.
- **Outline** – displays the outline of the characters. This effect does not work with every font.
- **Shadow** – adds a shadow that casts below and to the right of the characters.
- **Emphasis Mark** – select a character to display over or below the entire length of the selected text.
- **Position** – specify where to display the emphasis marks.
- **Preview** – displays a preview of the current selection.

Alignment tab

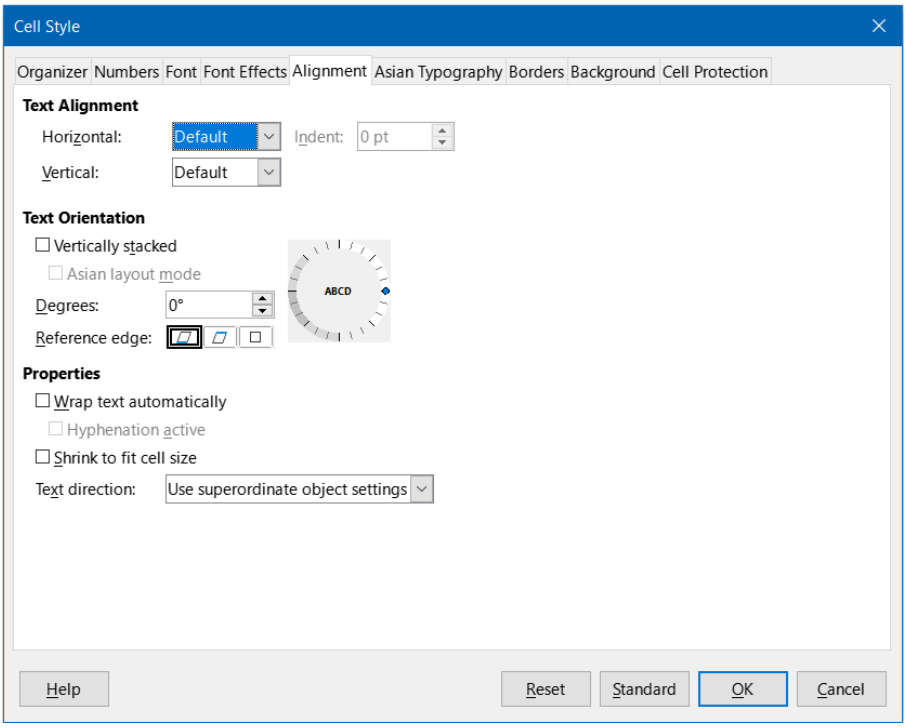


Figure 186: Cell Style dialog – Alignment tab

- **Text Alignment** – sets the alignment options for the contents of the current cell, or the selected cells.
  - *Horizontal* – select the horizontal alignment option that you want to apply to the cell contents:
  - *Default* – aligns numbers to the right and text to the left.
  - *Left* – aligns the contents of the cell to the left.
  - *Center* – horizontally centers the contents of the cell.
  - *Right* – aligns the contents of the cell to the right.
  - *Justified* – aligns the contents of the cell to the left and to the right cell borders.
  - *Filled* – repeats the cell contents (number and text) until the visible area of the cell is filled. This feature does not work on text that contains line breaks.
  - *Distributed* – aligns contents evenly across the whole cell. Unlike *Justified*, it also justifies the very last line of text.
  - *Indent* – indents from the left edge of the cell by the amount that you enter.
  - *Vertical* – select the vertical alignment option that you want to apply to the cell contents:
  - *Default* – aligns the cell contents to the bottom of the cell.
  - *Top* – aligns the contents of the cell to the upper edge of the cell.
  - *Bottom* – aligns the contents of the cell to the lower edge of the cell.
  - *Middle* – vertically centers the contents of the cell.
  - *Justified* – aligns the contents of the cell to the top and to the bottom cell borders.

- *Distributed* – similar to *Justified*, unless the text orientation is vertical. Then it behaves in a similar manner to the horizontal *Distributed* setting, with the very last line justified.

- **Text Orientation** – defines the text direction of cell contents.
  - *ABCD wheel* – click anywhere in the wheel to define the text orientation. The characters "ABCD" on the wheel correspond to the new setting.
  - *Vertically stacked* – assigns vertical text orientation for cell contents.
  - *Asian layout mode* – only available if Asian language support is enabled and the text direction is set to vertical. Aligns Asian characters one below the other in the selected cell(s). If the cell contains more than one line of text, the lines are converted to text columns that are arranged from right to left. Western characters in the converted text are rotated 90 degrees to the right. Asian characters are not rotated.
  - *Degrees* – allows you to manually enter the orientation angle.
  - *Reference edge* – specify the cell edge from which to write the rotated text:
  - *Text Extension From Lower Cell Border* – writes the rotated text from the bottom cell edge outwards.
  - *Text Extension From Upper Cell Border* – writes the rotated text from the top cell edge outwards.
  - *Text Extension Inside Cell* – writes the rotated text only within the cell.

- **Properties** – determine the text flow in a cell.
  - *Wrap text automatically* – wraps text onto another line at the cell border. The number of lines depends on the width of the cell. To enter a manual line break, press `Ctrl`+`Enter` in the cell.
  - *Hyphenation active* – enables word hyphenation for text wrapping to the next line.
  - *Shrink to fit cell size* – reduces the apparent size of the font so that the contents of the cell fit into the current cell width. You cannot apply this command to a cell that contains line breaks.
  - *Text direction* – choices are **Left-to-right**, **Right-to-left**, and **Use superordinate object settings** (the settings applied to the preceding cell).

Asian Typography tab

If Asian language support is enabled, the *Asian Typography* tab is displayed on the Cell Style dialog. For more details of the options available on this tab, see the description of the corresponding tab of the Format Cell dialog in Chapter 2, Entering and Editing Data.

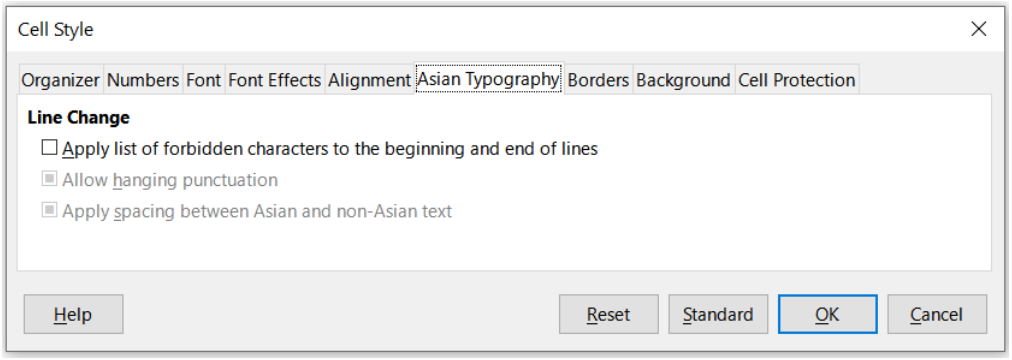


Figure 187: Cell Style dialog - Asian Typography tab

Borders tab

Sets the border attributes for the selected cells.

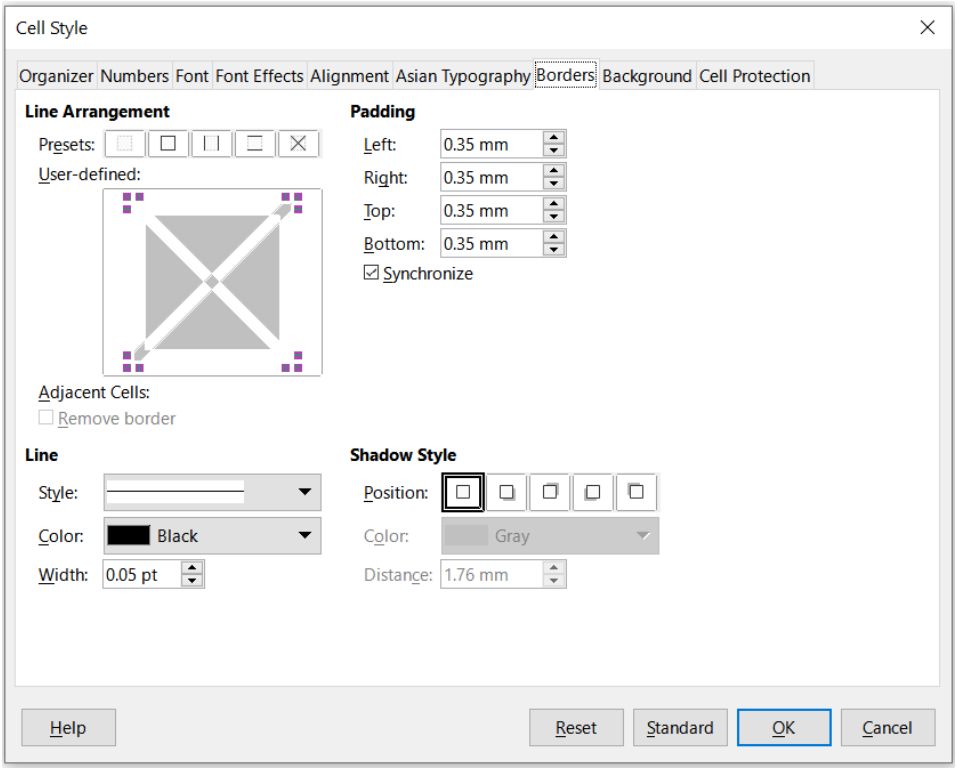


Figure 188: Cell Style dialog – Borders tab

- **Line Arrangement** - select a preset border style or define your own combination by clicking in the diagram.
- **Line** - select the line style, width, and color that you want to apply. The style is applied to the borders selected in the preview.
- **Padding** – specify the amount of space that you want to leave between the border and the contents of the cell. You can set each distance (left, right, top, bottom) individually or select **Synchronize** to apply the same padding to all four borders when you enter a new value.
- **Shadow Style** – applies a shadow effect to borders. You can specify the position of the shadow (bottom right, top right, bottom left, or bottom right), the distance it extends, and its color.

Background tab

Click **Color** to select a color to use as a background for the formatted cells. You can choose from several palettes. To change the color, select another one. To remove the background color, select **None**.

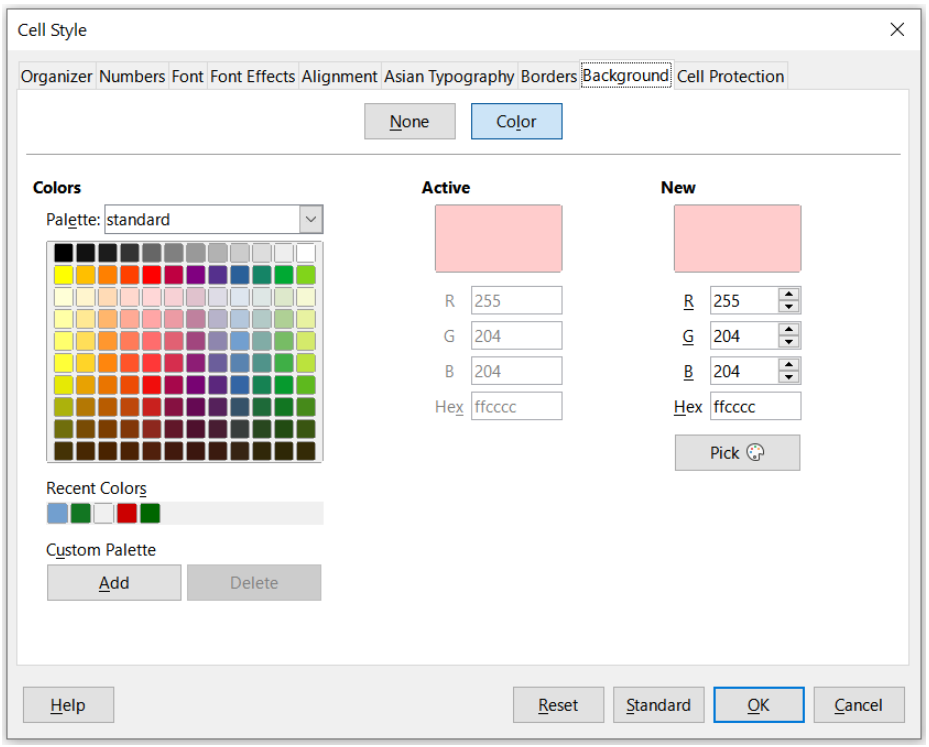


Figure 189: Cell Style dialog – Background tab

Cell Protection tab

In this tab you can set some basic protection to you spreadsheet.

- **Protection**
  - **Hide all** – hides formulas and contents of the selected cells.
  - **Protected** – prevents the selected cells from being modified. This cell protection only takes effect if you also protect the sheet.
  - **Hide formula** – hides formulas in the selected cells.
- **Print**
  - **Hide when printing** – prevents the selected cells from being printed.

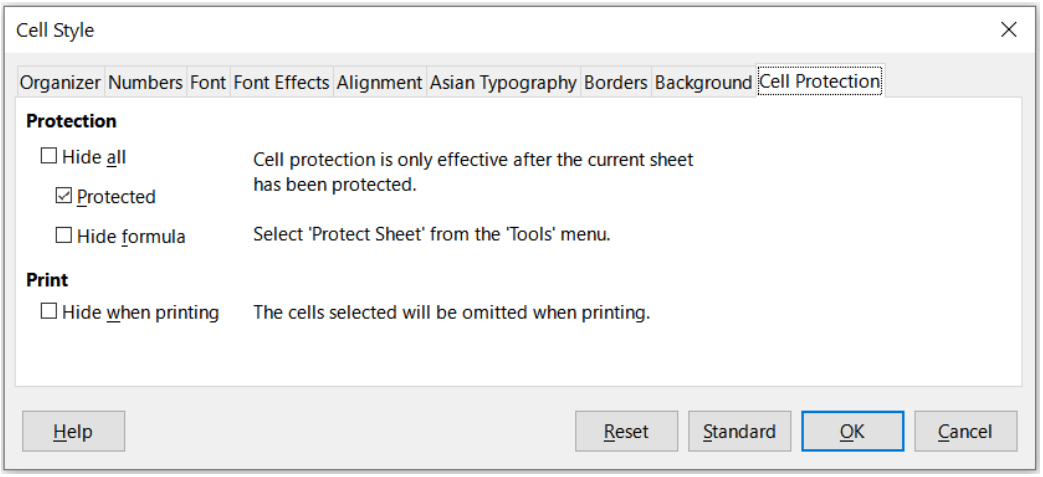


Figure 190: Cell Style dialog – Cell Protection tab

Resetting cell style attributes

The buttons at the bottom of the Cell Style dialog have the following functions:

- **Reset** – returns values on the current tab to those applicable when the dialog was opened.
- **Standard** – for a style that inherits settings from a parent style, updates the settings on the current tab to match those of the parent style.
- **Cancel** – cancels any changes made (to all tabs in the dialog) since the last save of this dialog (by clicking **OK**).
- **OK** – saves all changes made (to all tabs in the dialog).

Page style attributes

The following attributes are available on the tabs of the Page Style dialog (Figure 191).

Organizer tab

This tab is similar to the Organizer tab for the Cell Style dialog, although page styles cannot inherit settings from other styles.

- **Name** – displays the name of the selected style. If you are creating or modifying a custom style, you can enter or change the name of the style. You cannot change the name of a predefined style.
- **Category** – displays the category of the current style. If you are creating or modifying a new style, select *Custom Styles* in the list. You cannot change the category for a predefined style.
- **Contains** – describes the formatting used in the style.

Page tab

You can define page layouts for single and multiple-page spreadsheets, as well as page numbering and paper formats.

- **Paper Format** – select from a list of predefined paper sizes, or define a custom paper format.
  - *Format* – select a predefined paper size, or create a custom format by entering the dimensions for the paper in the *Height* and *Width* boxes.
  - *Width* – displays the width of the selected paper format. To define a custom (user) format, enter a width here.
  - *Height* – displays the height of the selected paper format. To define a custom (user) format, enter a height here.
  - *Orientation* – *Portrait* displays and prints the spreadsheet with the paper oriented vertically. *Landscape* displays and prints the spreadsheet with the paper oriented horizontally.
  - *Text direction* – select the text direction that you want to use in your document. The "right-to-left (vertical)" text flow direction rotates all layout settings to the right by 90 degrees, except for the header and footer. This option is only available if **Complex text layout** is selected at **Tools > Options > Language Settings > Languages.**
  - *Preview Field* – displays a preview of the current selection.

– *Paper tray* – select the paper source for your printer. You can assign different paper trays to different page styles. For example, you can assign a different tray for the first page style in the spreadsheet and load the tray with your company letterhead paper.

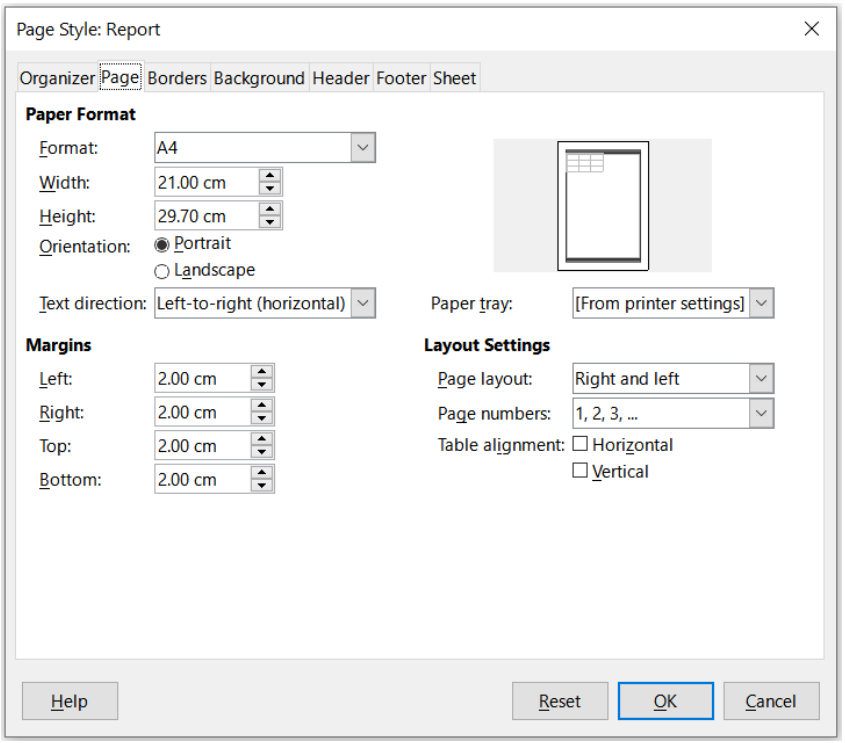


Figure 191: Page Style dialog – Page tab

- **Margins** - specify the amount of space to leave between the edges of the paper and the spreadsheet contents.
  - *Left/Inner* – the space between the left edge of the page and the spreadsheet. If you are using **Mirrored** page layout, enter the space between the inner edge of the paper and the spreadsheet. You may want to have a wider space as the left/inner margin if you will be punching or binding the pages.
  - *Right/Outer* – the space between the right edge of the paper and the spreadsheet. If you are using **Mirrored** page layout, enter the space between the outer edge of the paper and the spreadsheet.
  - *Top* - enter the space between the upper edge of the paper and the spreadsheet.
  - *Bottom* - enter the space between the lower edge of the paper and the spreadsheet.
- **Layout settings** - select the page layout style to use for the spreadsheet.
  - *Page layout – Right and left* - both odd (right) and even (left) pages have the same margins on all four sides. *Mirrored* - odd and even pages with inner and outer margins as specified (Use this layout if you want to bind the printed pages like a book. Enter the binding space as the *Inner* margin). *Only right* - the current page style shows only odd (right) pages (Even pages are shown as blank pages). *Only left* - the current page style shows only even (left) pages (Odd pages are shown as blank pages).
  - *Page numbers* - select the page numbering format to use for the page style. Typically this will be 1,2,3; or a,b,c; or i,ii,iii.

– *Table alignment – Horizontal* centers the cells horizontally on the printed page. *Vertical* centers the cells vertically on the printed page (the *Preview Field* will change according to the selected in this option).

Borders and Background tabs

The *Borders* and *Background* tabs of the Page Style dialog are similar to those on the cell Style dialog. See “Borders tab” and “Background tab” in “Cell style attributes” above for information on how to set the borders and background for page styles. Page styles can have a bitmap background, which is not available for cell styles.

Header and Footer tabs

Adds a header or footer to the page style. A header is an area in the top page margin where you can add text or graphics. A footer is a similar area in the bottom page margin. See Chapter 7, Printing, Exporting, Emailing, and Signing for details.

Sheet tab

Specifies the elements to be included in the printout of all sheets with the page style. Additionally, you can set the print order, the first page number, and the page scale. See Chapter 7, Printing, Exporting, E-mailing, and Signing for details.

Using themes

Calc comes with a predefined set of formatting themes that you can apply to spreadsheets. It is not possible to add new themes to Calc and the predefined styles cannot be modified. You can modify styles after you apply them to a spreadsheet, but the modified styles are only available for use for that spreadsheet.

To apply a theme to a spreadsheet:

1) Go to **Format > Spreadsheet Theme** on the Menu bar, or click the **Spreadsheet Theme** icon on the Tools toolbar, to open the Theme Selection dialog (Figure 192), which lists the available themes for the whole spreadsheet.
2) Select the theme that you want to apply. As soon as you select a theme, the theme styles are applied to the spreadsheet and are immediately visible.
3) Click **OK**.

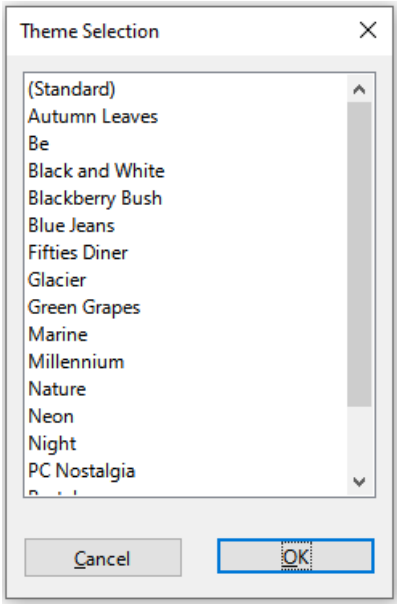


Figure 192: Theme Selection dialog

The themes tool is effective when you format a range in the spreadsheet as a table. The tool adds new styles to the spreadsheet and modifies the Default cell style. The added cell styles are:

- **"Card" cell styles**: *Column Header*, *Top*, *Bottom*, *Left*, *Right*, *Top Right*, *Top Left*, *Bottom Right*, *Bottom Left* of the selected range.
- **Background**: The background style of the range. Apply this style to the table contents not in the table edges.
- **Input**: used for data input. This cell style has the cell protection property unchecked.

If you wish, you can now use the Styles deck on the Sidebar to modify specific styles. These modifications do not modify the theme; they only change the appearance of the style in the spreadsheet you are creating.

Managing styles

Modifying styles

1) Go to the Styles deck on the Sidebar and click the icon for the type of style you want to modify.
2) Right-click on the name of the style and select **Modify** in the context menu to open either the Cell Style dialog (Figure 182) or the Page Style dialog (Figure 191).
3) Make the necessary changes to the style attributes. For more information on style attributes, see “Cell style attributes” above and “Page style attributes” above.
4) Click **OK** to save the changes and close the dialog.

Note

The **Modify** command is unavailable if one or more sheets are protected, even if the cell style to be modified is being used in an unprotected sheet.

Renaming styles

You can rename custom styles, but not the styles supplied with Calc.

1) Go to the Styles panel on the Sidebar (Figure 178) and click the icon for the type of style you want to rename.
2) Right-click on the style you want to rename and select **Modify** in the context menu to open either the Cell Styles dialog or the Page Styles dialog.
3) On the *Organizer* tab, rename the style, and click **OK**.

Deleting styles

You can delete custom styles, but not the styles supplied with Calc. Custom cell styles can only be deleted if they are not applied. If an applied page style is deleted, affected sheets revert to the *Default* page style.

1) Go to the Styles deck in the Sidebar (Figure 178) and click the icon for the type of style you want to delete.
2) Right-click on the style you want to delete and select **Delete** in the context menu.
3) Select **Yes** on the warning message, if displayed.

Hiding and showing cell styles

You can shorten the list of cell styles by hiding some of them. Only styles that are not being used in the spreadsheet can be hidden.

1) Go to the Styles deck in the Sidebar and click on the **Cell Styles** icon.
2) Right-click on an unused cell style and select **Hide** in the context menu. The style is then moved to the *Hidden Styles* category in the Styles deck.

To show hidden cell styles:

1) Go to the Styles deck on the Sidebar.
2) Click on the drop-down list at the bottom of the panel and select **Hidden Styles** in the list.
3) To revert, right-click on the hidden style you want to show and select **Show** in the context menu.

Filtering the list of styles

You can filter the list of styles as follows:

1) Go to the Styles deck on the Sidebar.
2) Click on the drop-down list at the bottom of the panel.
3) Select the category of styles to display on the Styles deck:
   - **Hierarchical** – lists the styles in their hierarchical relationship, for example *Heading 1* and *Heading 2* under *Heading*, or *Accent 1*, *Accent 2*, *Accent 3* under *Accent*.
   - **All Styles** – lists all the styles that are available in Calc and in the spreadsheet, except for hidden styles, in alphanumeric order.
   - **Hidden Styles** – lists all the styles that have been hidden in the spreadsheet.
   - **Applied Styles** – lists only the styles that have been applied to the spreadsheet. Not applicable for page styles.
   - **Custom Styles** – lists only the user-defined styles defined for the spreadsheet.

What is a template? Why use one?

A template is a model that you use to create other documents in a standard format. For example, you can create a template for invoices that has your company logo and address at the top of the page. This means that any new spreadsheets (invoices) created from this template will have the company logo and address on the first page of the spreadsheet.

Templates can contain anything that regular documents can contain, such as text, graphics, styles; user-specific setup information such as measurement units, language, 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, then that new spreadsheet is based on the included Calc default template. This default template consists of a blank spreadsheet which you can customize to your needs and then, if you wish, use as a basis to create a custom default template.

Using a template to create a spreadsheet

A new installation of LibreOffice may not include any spreadsheet templates other than the Calc default, but you can create your own (see “Creating a template”) or install templates obtained from other sources (see “Adding templates obtained from other sources”).

When you have an available spreadsheet template, you can use it to create a new spreadsheet from the Templates dialog or the LibreOffice Start Center.

Creating a spreadsheet from the Templates dialog

To use a template to create a spreadsheet:

1) On the Menu bar, choose **File > New > Templates,** or click the small arrow next to the **New** icon on the Standard toolbar and select **Templates**, or press *Ctrl+Shift+N*. The Templates dialog (Figure 193) opens.
2) In the *Filter* lists at the top of the Templates dialog, select **Spreadsheets** and the category of template you want to use. All the templates in that category are then listed on the page, as shown in Figure 193.
3) Select the required template and click **Open**, or double-click the required template, or right-click the required template and select **Open** in the context menu. A new spreadsheet based on the template opens in Calc.

In the spreadsheet, the template it is based upon is listed in **File > Properties > General**. The connection between a template and a spreadsheet remains until that template is modified. The next time a spreadsheet based on that template is opened, you can choose either to update, or not update, the spreadsheet to match the modifications.

Figure 193 shows the default configuration for the Templates dialog, with the available templates represented by thumbnails. It is also possible to view the available templates in a list format that includes additional information which may help identify the template of interest, as shown in Figure 194. To switch between these two views, use the **Thumbnail View** and **List View** icons located at the bottom right of the dialog.

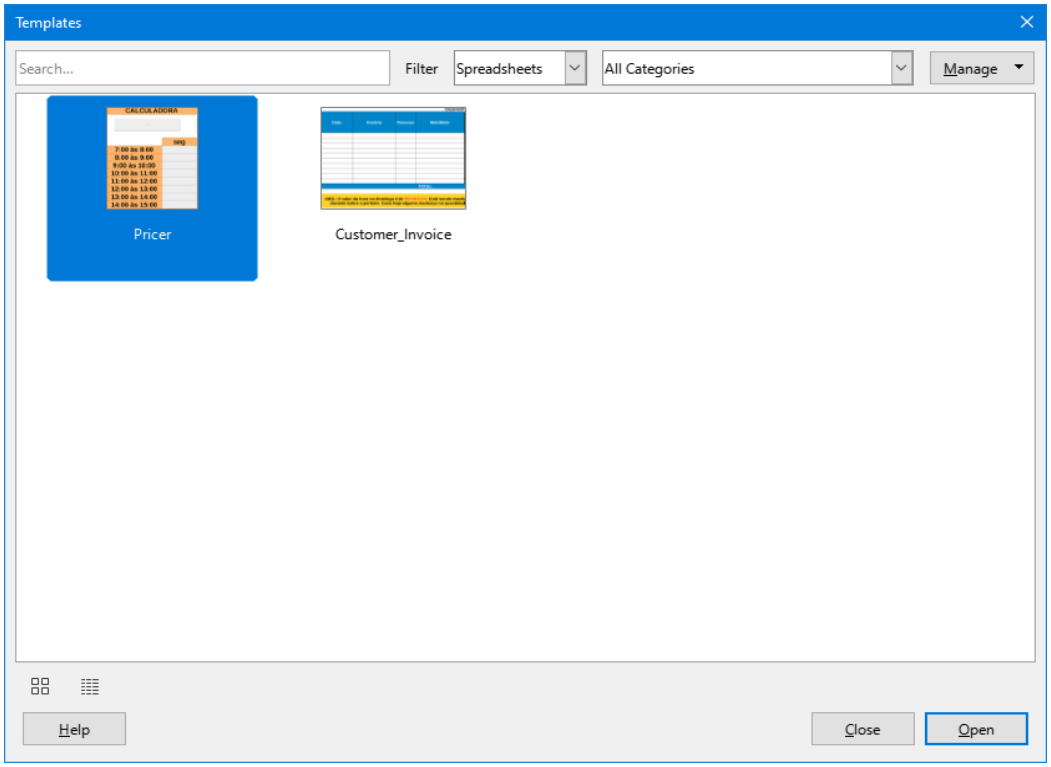


Figure 193: Templates dialog, showing a selected template in thumbnail view

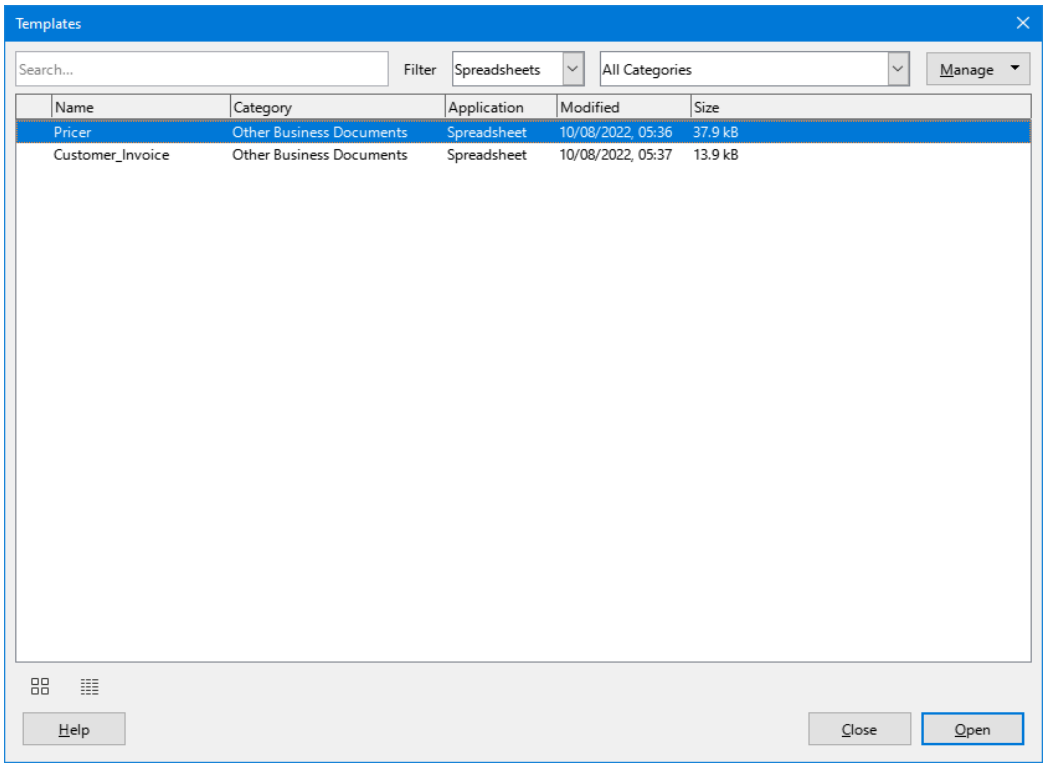


Figure 194: Templates dialog, list view

Creating a spreadsheet from a template in the Start Center

You can create a spreadsheet from the Template view of the LibreOffice Start Center, which is visible when no other document is open. (See Chapter 1, Introduction.)

Click the **Templates** button in the left pane and icons are displayed in the Start Center for all available LibreOffice templates. The top right of the Start Center offers a drop-down list to select the templates of a given type of document. If you select the **Spreadsheets** option on the list, only the available spreadsheet templates are displayed in the Start Center. Click on the required template to create a new document based on that template.

Creating a template

You can easily create a template from any spreadsheet:

1) Open a new or existing spreadsheet that you want to use as a base for the template.
2) Add any necessary pre-defined content that you want to appear in a spreadsheet each time you use the new template, for example company logo and name, company information, page numbers, and so on. Delete any information that you do not want in the template.
3) Create or modify the cell and page styles that you want to use in the template.
4) On the Menu bar, choose **File > Templates > Save as Template**, or click the down arrow at the right of the **Save** button on the Standard toolbar and select **Save as Template**, or press *Shift+F11*. The Save As Template dialog (Figure 195) opens, displaying the existing template categories and a name box.
5) Type a name for the new template and select the required template category. You can also choose to make this the default template (see “Setting the default template” for more information).
6) Click **Save** to save the new template.

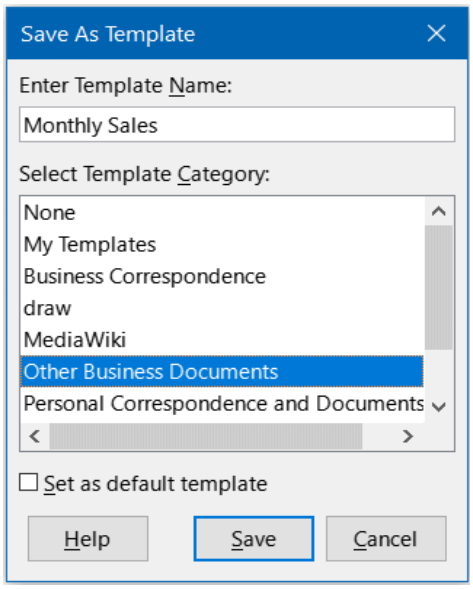


Figure 195: Save As Template dialog

Note

Although the **Save as Template** dialog shows no document type when saving a new template of any type, the template will appear on the correct tab (Spreadsheets, in this case) when you return to the Templates dialog. It is unnecessary to save or do anything further with the spreadsheet file you have been using to create the new template. It can be safely closed without saving.

Note

You can also save a template through the Save As dialog, accessed by a variety of interactions including selecting **File > Save As** on the Menu bar or pressing *Ctrl+Shift+S*. Select the **ODF Spreadsheet Template** option in the *Save as type* menu and navigate to the appropriate template folder before clicking the **Save** button.

Editing a template

You can edit a template's styles and content. If you wish, you can then apply the new styles to spreadsheets that were created from the original template (see below for details).

To edit a template:

1) On the Menu bar, choose **File > Templates > Manage Templates**, or press *Ctrl*+*Shift*+*N*, to open the Templates dialog. You can also manage templates from the Start Center.

2) Navigate to the spreadsheet template that you want to edit. Right-click to open the context menu and choose **Edit** (Figure 196). The template opens in Calc.

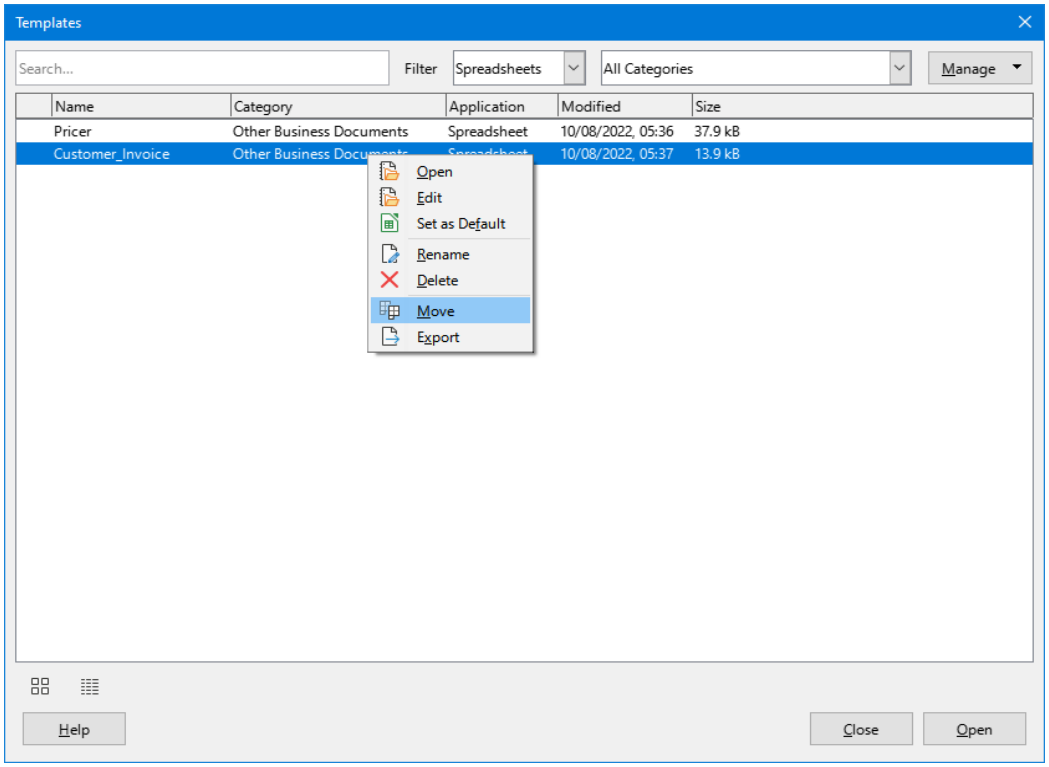


Figure 196: Templates dialog – Editing templates

3) Edit the template as you would edit any other spreadsheet. To save the changes, choose **File > Save** on the Menu bar or perform any equivalent action. To save the edited template as a new template, choose **File > Save As Template** or perform any equivalent action.

Updating styles from a changed template

If you make any changes to a template and its styles, the next time you open a spreadsheet that was created before you changed the template, a confirmation message is displayed.

1) Click **Update Styles** to apply the changed styles in the template to the spreadsheet.
2) Click **Keep Old Styles** if you do not want to apply the changed styles in the template to the spreadsheet.

Caution

If you select **Keep Old Styles**, the confirmation message will not appear again the next time you open the spreadsheet using the same changed template. Although the template is still listed under **File > Properties > General**, the spreadsheet is no longer connected to the template, so it will not update. You can still import styles manually from the template, but to reconnect the spreadsheet to the template, you need to use one of the procedures described in "Changing the template assigned to a document" below.

Changing the template assigned to a document

You can change the template assigned to a document, or reconnect a document to a template, in two ways: manually or using the Template Changer extension to LibreOffice.

To change or reassign a template manually, first create a new, blank document from the required template, as described above. Then copy the contents of the old document into the new document.

To use the Template Changer extension, first you need to download and install it, then restart LibreOffice to activate it. After that, you can open the document and use **File > Templates > Change template (current document)** on the Menu bar.

The Template Changer extension works with Writer, Calc, Draw, and Impress.

Adding templates obtained from other sources

LibreOffice refers to sources of templates as repositories. A repository can be local (a directory on your computer to which you have downloaded templates) or remote (a URL from which you can download templates).

To get to the official LibreOffice template repository, type https://extensions.libreoffice.org/en in your browser's address bar. This opens the Extensions web page (Figure 197). In the *Search* section, click the **Templates** tag filter. You can narrow your search by also choosing other tag filters. After setting the filters, click the **Search** button. In the search results, find the required template and click on its name to display a page with details; click the **Download** button to put the template anywhere on your computer. Proceed to "Installing templates" below.

You can also use the **Extensions** button in the lower right of the Templates dialog, as shown in Figure 198, to open an Extensions: Templates dialog, where you can scroll through a list of extensions. In this version of LibreOffice, there is no easy way to filter this list, so you may prefer to go directly to the web page, as described above.

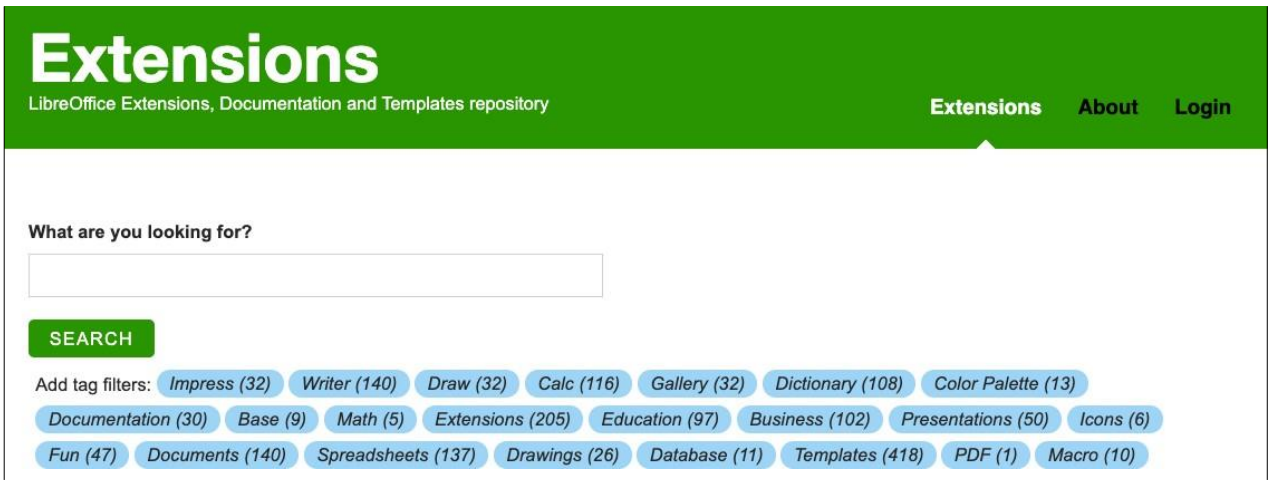


Figure 197: Searching for templates in the repository

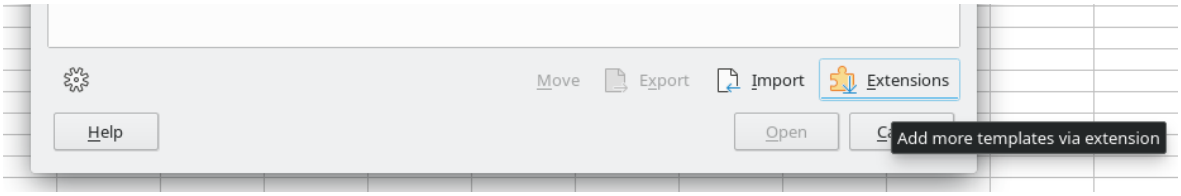


Figure 198: Getting more templates for LibreOffice

On other websites you may find collections of templates that have been packaged into extension (.OXT) or .ZIP files.

Installing templates

You can import and add templates to your collection as follows:

1) Find and download the template you want to use, as described in the previous section.
2) Open the Templates dialog and click the **Import** icon near the bottom right.
3) In the pop-up dialog, select the category where you want to store the template. (You can change this later, as described in "Moving a template" below.)
4) A file browser opens. Navigate to the location of the downloaded template on your computer.
5) Select the template and click **Open**. After import, the template becomes available in the Templates dialog.

Tip

You can manually copy new templates into the template folders. The location varies with your computer's operating system. To learn where the template folders are stored on your computer, go to **Tools > Options > LibreOffice > Paths**.

Installing collections of templates

The Extension Manager provides an easy way to install collections of templates that have been packaged as extensions. Follow these steps:

1) Download the extension package (.OXT file) and save it anywhere on your computer.
2) In LibreOffice, select **Tools > Extension Manager** on the Menu bar, or press `Ctrl+Alt+E`. In the Extension Manager dialog, click **Add** to open a file browser window.

3) 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, you may need to restart LibreOffice. The templates are available for use through the Templates dialog and the extension is listed in the Extension Manager.

See Chapter 15, Setting up and Customizing, for more about the Extension Manager.

Tip

Some extensions are packaged as .ZIP files.

Setting the default template

If you create a new spreadsheet using **File > New > Spreadsheet** on the Menu bar or an equivalent action, Calc creates the document from the default template for spreadsheets. You can set any template as the default template. You can also reset the default template to the Calc default template.

Setting a template as the default

Most default settings, such as page size and page margins, can be changed but those changes normally apply only to the spreadsheet you are working on. To make those changes the default settings for spreadsheets, you need to replace the default Calc template with a new one.

You can set any template displayed in the Templates dialog to be the default for that document type:

1) On the Menu bar, choose **File > Templates > Manage Templates** or press *Ctrl+Shift+N*.

2) In the Templates dialog, open the category containing the template that you want to set as the default.

3) Right-click on the template and click the **Set As Default** option (Figure 196). The template is now indicated by a green check mark in the upper left.

The next time you create a spreadsheet by choosing **File > New**, by clicking the **New** icon on the Standard toolbar, or by pressing *Ctrl+N*, it will be created from this template.

Resetting the default template

To set the default spreadsheet template back to the default template supplied with Calc:

1) In the Templates dialog, click the **Manage** button on the upper right (Figure 200).

2) Point to **Reset Default Spreadsheet** in the drop-down menu. The green check mark is removed from the template.

This choice does not appear unless a custom template has been set as the default, as described in the previous section.

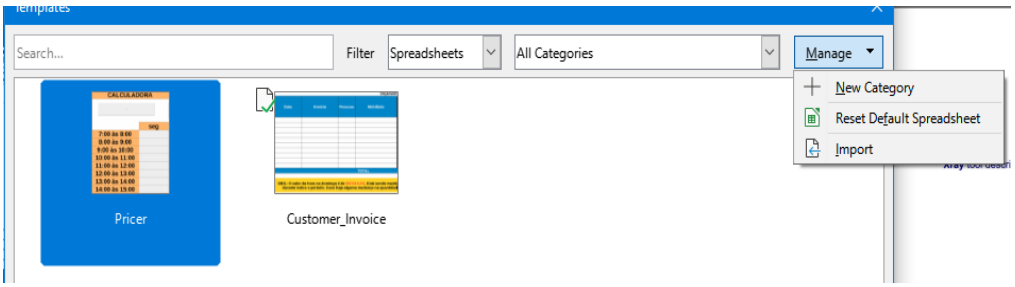


Figure 199: Resetting the default template for spreadsheets

You can also reset the default template as follows:

1) Go to the Templates dialog and open the category containing the template you set as default. It is indicated by a green check mark.
2) Right-click on this template and select **Reset Default** in the context menu. The next time that you create a new spreadsheet, it will be created using the Calc default template.

Note

Resetting the default template back to the Calc default template is only available if the default has been changed previously.

Organizing templates

LibreOffice can only manage templates that are in its template folders (categories), although you can create a spreadsheet from a template that is not in one of these folders. You can create new template folders and use them to organize your templates and import templates into these folders. For example, you might have one template folder for sales templates and another for invoice templates. You can also export templates.

Tip

The location of template folders in LibreOffice depends on the operating system of your computer. If you want to know where the template folders are located, go to **Tools > Options > LibreOffice > Paths**.

To begin, choose **File > Templates > Manage Templates**, or press `Ctrl+Shift+N`, to open the Templates dialog.

Creating a template category

1) Click the **Settings** button in the lower left of the Templates dialog.
2) Click **New Category** in the context menu (Figure 201).
3) In the pop-up dialog (not shown), type a name for the new category and click **OK**. The new category now appears in the list of categories.

Note

You cannot create a sub-category inside a template category.

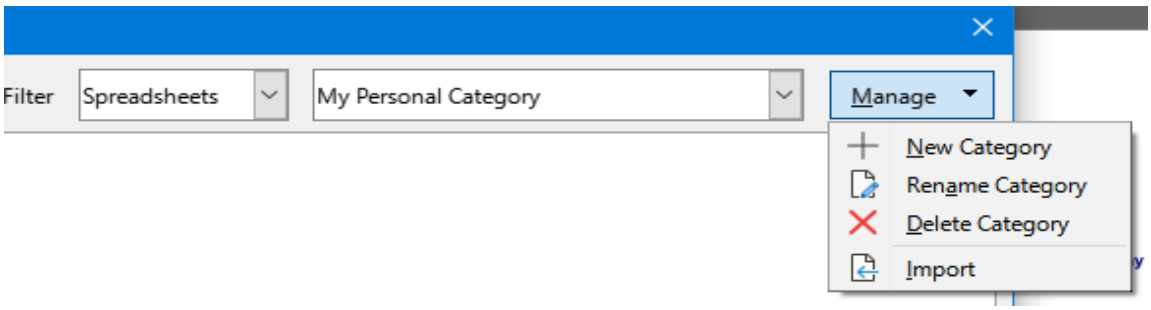


Figure 200: Creating a new category

Deleting a template category

You cannot delete template categories supplied with LibreOffice. Nor can you delete categories added by the Extension Manager unless you first remove the extension that installed them.

However, you can delete a category that you created:

1) Click the **Manage** button on the Templates dialog and select **Delete Category** in the context menu (Figure 200).
2) Select the category to be deleted in the Delete Category dialog (not shown) and click **OK**.
3) Select **Yes** in the confirmation dialog to confirm the deletion.
4) Calc displays a warning if it is unable to delete the category.

Moving a template

To move a template from one template category to another:

1) Open the Templates dialog and select the template you want to move.
2) Click the **Move** icon near the bottom of the dialog, select the destination category from the popup dialog (Figure 201), and click **OK**. The selected template is moved to the folder. You can also create a new category into which to move the template.

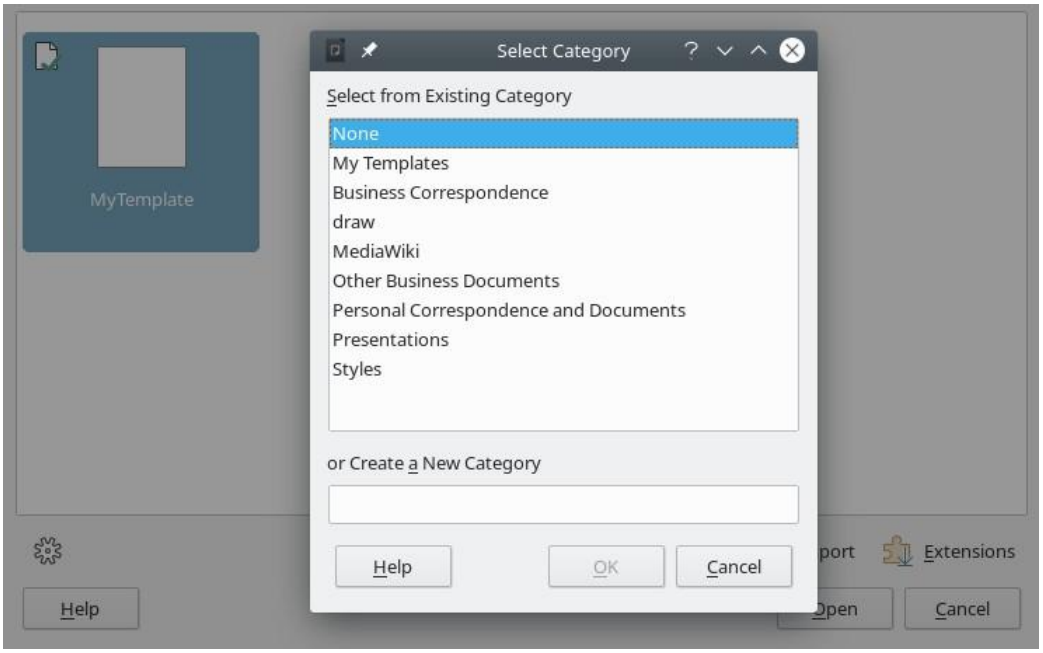


Figure 201: Moving a template to another category

Deleting a template

You cannot delete templates supplied with LibreOffice. Nor can you delete any templates installed by the Extension Manager except by removing the extension that installed them. You can only delete templates that you have created or imported.

1) In the **Filter** drop-down lists at the top of the Templates dialog, select the category that contains the template you want to delete.
2) Right-click on the template that you want to delete to open the context menu and click **Delete** (Figure 196).
3) A message box appears and asks you to confirm the deletion. Click **Yes**.

Note

Moving or deleting a template has no impact on any document that was created from that template. The spreadsheet will retain the style definitions that it inherited from the moved or deleted template. The *Template* field on the **File > Properties > General** page can continue to show the name of a template that no longer exists.

Exporting a template

The easiest way to send a template to someone else, or to store it on a network, is to export it:

1) Open the Templates dialog and find the template that you want to export.
2) Select the template and right click on it.
3) The Select Folder dialog opens. Navigate to the location where you want to export the template and click **Select Folder**. You can also rename the template.

Note

Exporting a template does not remove it from the Templates dialog. The action places a copy of the template in the location you specify.



Calc Guide 7.5

Chapter 6
Using Images and Graphics

Introduction

Calc is used to present and analyze data and to make forecasts and predictions. Graphics can turn an average spreadsheet into a more memorable document. Calc can import various vector (line drawing) and raster (bitmap or photo) file formats. Commonly used graphic formats include GIF, JPG, and PNG. See the LibreOffice Help for a full list of the formats that Calc can import.

Graphics in Calc are of three basic types:

- Image files, such as photographs, drawings, and scanned images
- Diagrams created using LibreOffice's drawing tools
- Charts and graphs created using LibreOffice's Chart facility; see Chapter 3, Creating Charts and Graphs, for more information

Using graphics in Calc is similar to using graphics in other components of LibreOffice. For more detailed descriptions, please refer to the *Getting Started Guide* or the *Draw Guide*.

Note

In LibreOffice, the terms *graphics* and *images* refer 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) to a spreadsheet

Images, such as corporate logos and photographs, are probably the most common types of graphics added to a spreadsheet. They may be downloaded from the Internet, scanned, created with a graphics program, photographs taken with a digital camera, or clip art in the Gallery.

Inserting an image file

When the image is in a file stored on the computer, you can insert it into a spreadsheet using one of the following methods.

Drag and drop

1) Open a file browser and locate the image you want to insert.
2) Drag the image into the spreadsheet and drop it where you want it to appear.

This method embeds (saves a copy of) the image file in the document. To link the file instead of embedding it, hold down the *Ctrl*+*Shift* keys while dragging the image. See "Linking or embedding an image file" below for more information.

Insert Image dialog

1) Click in the spreadsheet where you want the image to appear.
2) Choose **Insert > Image** on the Menu bar.
3) On the Insert Image dialog (Figure 202), navigate to the file to be inserted, and select it.
4) Select the **Link** option if you want to link the file instead of embedding it.
5) Select the required option in the *Anchor* menu: **To cell**, **To cell (resize with cell)**, or **To page**. See "Anchoring images" below for more information about these options.
6) Click **Open**. The image is inserted into the spreadsheet.

Note

If you have selected to link the image, Calc may present a confirmation dialog with options to continue with the link or to embed the image instead. An option is provided on this dialog to prevent it being displayed in future.

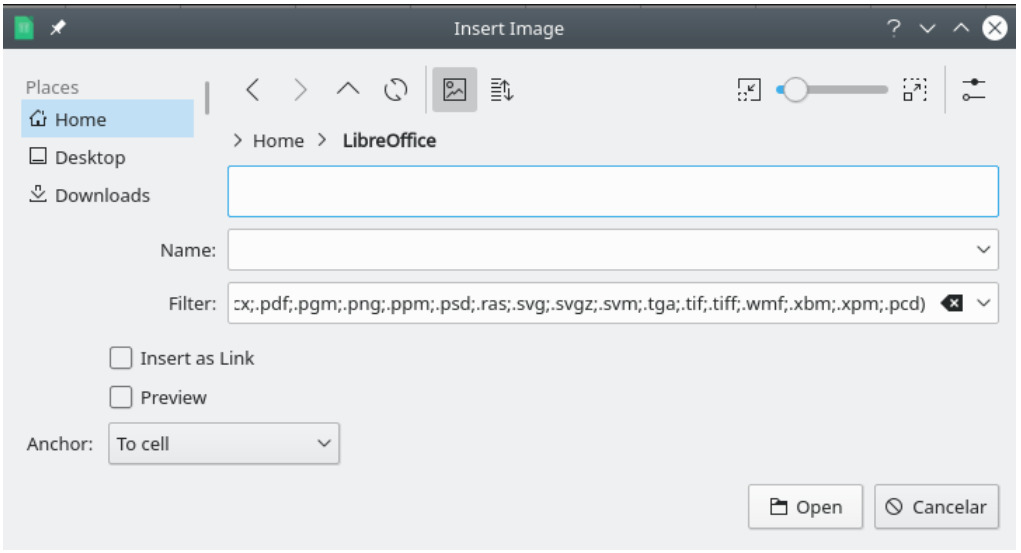


Figure 202: Insert Image dialog

Linking or embedding an image file

Embedding an image into a spreadsheet makes the image a permanent part of the spreadsheet file. Any changes you make to an embedded image will appear only in that spreadsheet; the original image will not be affected.

If you select the **Link** option in the Insert Image dialog, or use `Ctrl+Shift` during the drag and drop method, Calc creates a link to the file containing the image instead of embedding it. The image is 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, and they are merged together only when you open the document again.

Linking an image has two advantages and one disadvantage:

- **Advantage** – You can modify the image file separately. The modified image will appear on the next time you open the spreadsheet. This can be a big advantage if you (or someone else, perhaps a graphic artist) is updating images.
- **Advantage** – Linking can reduce the file size of the spreadsheet when it is saved, because the image file itself is not included. However, file size is usually not a problem on modern computers, and Calc can easily handle 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 and keep the same file structure. For example, you might keep image files in a subfolder named *Images* inside the same folder containing the Calc document. Any recipient of the spreadsheet needs to put the image files in a subfolder with the same name in the same named folder as the spreadsheet.

Note

When inserting the same image several times in a 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 other copies of the same file.

Embedding linked images

If you originally linked the images, you can easily embed one or more of them later.

1) Open the spreadsheet in Calc.
2) Choose **Edit > Links to External Files** on the Menu bar to open the Edit Links dialog (Figure 203), which shows all the linked files.

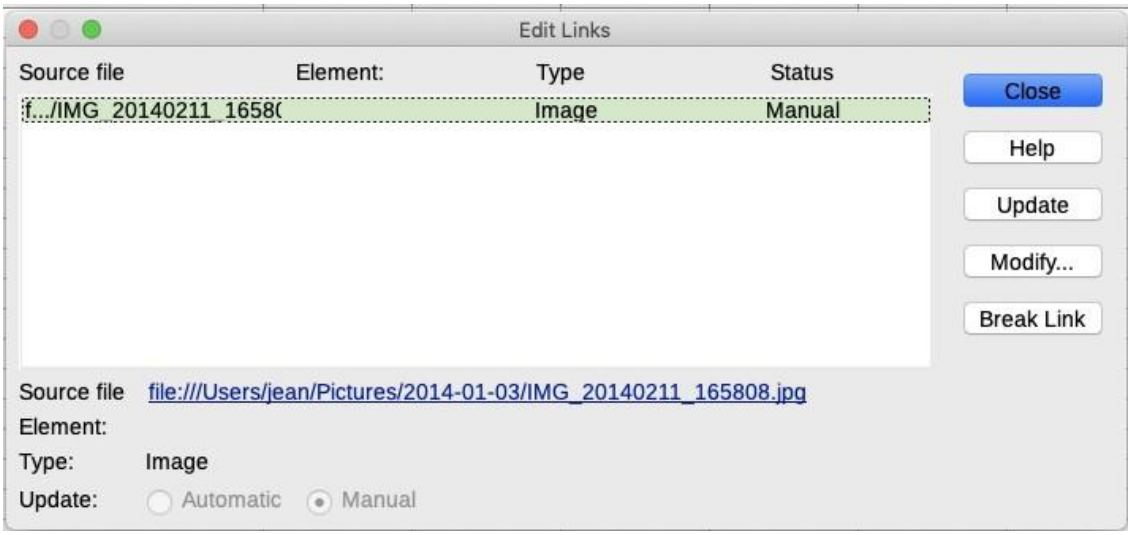


Figure 203: Edit Links dialog

3) Select the files you want to change from linked to embedded.
4) Click **Break Link** and confirm you want to remove the selected link. The file then becomes embedded into the spreadsheet.

Note

Going from embedded to linked images is not so easy. You must replace them one at a time, selecting the **Insert as Link** option when you reinsert each file.

Inserting an image from the clipboard

Using the clipboard, you can copy images into a Calc spreadsheet from another LibreOffice document and from other programs. To do this:

1) Open both the source document and the target document.
2) In the source document, copy the image to the clipboard – the exact interactions will vary from program to program.
3) Switch to the target document and click to place the cursor in the cell where the image is to be anchored.
4) Select **Edit > Paste** on the Menu bar, or click the **Paste** icon on the Standard toolbar, or right-click and select **Paste** in the context menu, or press *Ctrl*+*V*.

Caution

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

Inserting an image using a scanner

If a scanner is connected to your computer, Calc can call the scanning application and insert the scanned item into the document as an image. To start this procedure, choose **Insert > Media > Scan > Select Source**. After selecting the scanner, place the cursor where you want the image to be inserted, and choose **Insert > Media > Scan > Request**.

Although this practice is quick and easy, it is unlikely to result in a high-quality image of the correct size. You may get better results by passing scanned material into a graphics program and cleaning it up there, before inserting the resulting image into Calc.

Inserting an image from the Gallery

The Gallery (Figure 204) provides a convenient way to group reusable objects such as images and sounds that you can insert into your documents. The Gallery is available in all components of LibreOffice. You can add your own images as well as using the ones supplied with LibreOffice. For more information, see the *Getting Started Guide* Chapter 11, Images and Graphics.

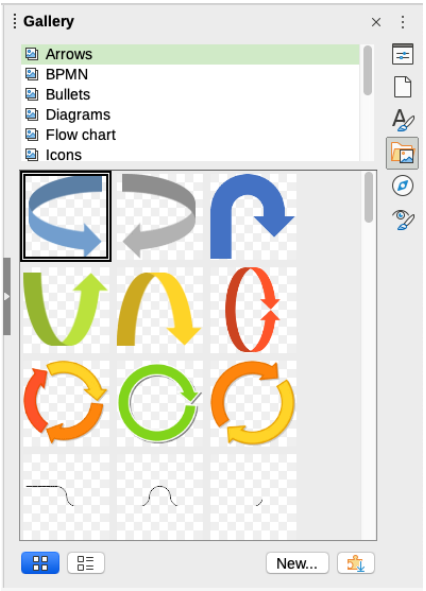


Figure 204: The Gallery in the Sidebar

To insert an image from the Gallery:

1) Click the **Gallery** icon on the Sidebar, or select **View > Gallery** on the Menu bar.
2) Select a theme.
3) Select an object with a single click.
4) Drag and drop the image into the document.
5) Alternatively right-click on the object in the Gallery and choose **Insert** in the context menu, in which case the image will be positioned according to the cells selected in the spreadsheet.

Tip

If you wish to use gallery images from earlier versions of LibreOffice, go to https://extensions.libreoffice.org/ and search for items with a tag filter of "Gallery" or click on the **Add more galleries via extension** button, on the bottom right of the Gallery to open the Extensions: Gallery dialog.

Modifying images

When you insert a new image, you may need to modify it to suit the document. Any changes made in Calc do not affect the original image, whether it is an embedded or a linked image file.

Calc provides several tools for working with images. These tools are sufficient for most requirements. However, for professional results it is generally better to use Draw or other software designed to modify image files, and then insert the result into Calc.

Using the Image toolbar

When you insert an image or select one already present in the spreadsheet, the Image toolbar (Figure 205) replaces the Formatting toolbar. If it does not appear, go to **View > Toolbars > Image** on the Menu bar. The tools available on the Image toolbar are described below.



Figure 205: Image toolbar

Note

Changes to image properties affect only the display and printing of the image. The original image file remains unchanged.

- **Anchor** – choose between anchoring the image to a cell (with or without resize) or to a page. See "Anchoring images" below.
- **Align Objects** – if two or more images are selected, you can adjust the horizontal and vertical alignment of the images in relation to each other. See "Aligning images" below.
- Six buttons for arrangement (positioning images in the stacking order): **Bring to Front**, **Forward One**, **Back One**, **Send to Back**, **To Foreground**, **To Background**. See "Arranging images" below.
- **Line Style**, **Line Width**, **Line Color** – set the attributes of the border around the image.
- **Area Style / Filling** – sets the color or other characteristics of the background area that contains the image, not the image itself. To see the background, you must set the transparency of the image to a suitably high value. See the *Draw Guide* for more information on how to modify areas.
- **Shadow** – sets the default shadow effect around the image. To adjust the shadow effect, open the Area dialog (**Format > Object > Area**) and choose the *Shadow* tab.
- **Filter** – opens the Image Filter toolbar. See the *Draw Guide* for details on image filters.
- **Image Mode** – changes the display of the image from color (*Default*) to grayscale, black and white, or a watermark. This setting affects only the display and printing of the image; the original image file remains unchanged.
- **Crop Image** – places cropping handles around the image. Drag a handle to crop (hide) the edges of the image.

- **Flip Horizontally** and **Flip Vertically** – changes the orientation of the image.
- **Rotate** – places rotation handles around the image.
- **Transparency** – adjusts the degree of transparency of the image between 0% (opaque) and 100% (fully transparent).
- **Color** – opens the Color toolbar (Figure 206) to adjust the values of the red, green, blue colors, brightness, contrast and gamma.

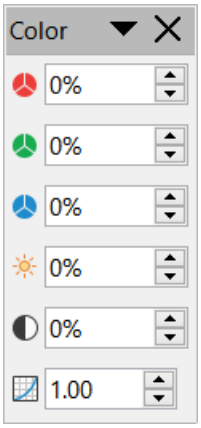


Figure 206: Color toolbar

Using the Properties deck in the Sidebar

Some of the settings in the Image toolbar are also available in the Properties deck on the Sidebar when an image is selected. The options in the Properties deck include the **Image**, **Line**, **Position and Size,** and **Columns** settings.

Adding text

You can add text to an image or drawing object. That text will move with the image when the image is re-positioned. For more information on adding text to images, see the *Draw Guide*.

1) Double-click on the image. The text cursor flashes in the center of the image. The Text Formatting toolbar automatically opens at the top of the spreadsheet.



Figure 207: Text Formatting toolbar for images

2) Type your text and use the tools on the Text Formatting toolbar to format it. Most of the tools are the same as those for formatting text in cells.
3) To adjust the position of the text or how it appears in the image, right-click on the image (when the text cursor is flashing) and select **Text** in the context menu to open the Text dialog (Figure 208).
4) Make any necessary changes and click **OK** to close the dialog.

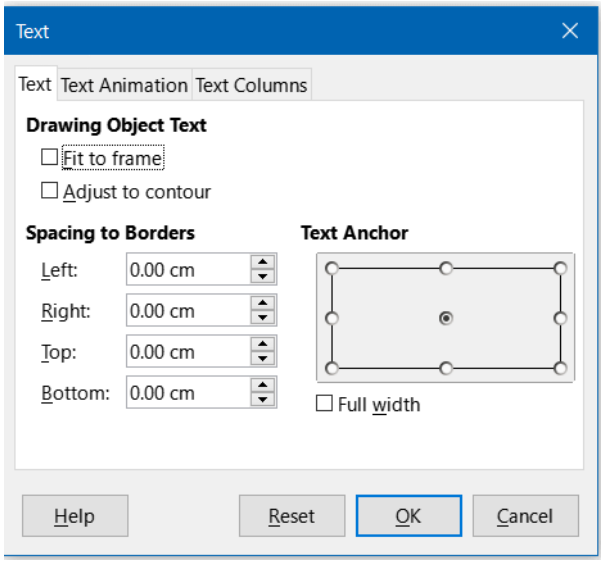


Figure 208: Text dialog

Positioning, resizing, and arranging images

Using the mouse

To move an image to a new position in your spreadsheet, click on the image and drag it to a new position. The image will still be anchored as it was originally.

To resize an image:

1) Click on the image to display the selection handles.
2) Position the mouse pointer over one of the selection handles. The pointer changes shape, giving a graphical representation of the direction of the resizing. The corner handles resize both the width and the height of the image simultaneously. The top, bottom, left and right handles only resize one dimension at a time.
3) Click and drag to resize the image.

Tip

To retain the original proportions of the image, click and drag one of the corner handles. If you want to change the original proportions, `Shift+Click` one of the corner handles, then drag.

Using the Position and Size dialog

To accurately position and size an image in your spreadsheet, click on the image and then go to **Format > Object > Position and Size** on the Menu bar, or right-click on the image and select **Position and Size** in the context menu.

On the *Position and Size* tab (Figure 209) of the Position and Size dialog, you can set these values:

- **Position** - the location of the selected image on the spreadsheet.
  - *Position X* - the horizontal distance from the base point selected in the grid.
  - *Position Y* - the vertical distance from the base point selected in the grid.

- **Size** – the width and height of the image with respect to the selected base point.
- **Protect** – to prevent accidental movement or resizing of the image, select the relevant option.

The units of measurement used for X / Y coordinates and the width and height of the image are set by going to **Tools > Options > LibreOffice Calc > General > Measurement unit**.

The default location of the base points for position and size is the upper left corner of the spreadsheet. You can temporarily change this base point to make positioning or dimensioning simpler by clicking on a position corresponding to the location of the base point you want to use. This change in base point is only valid for single use and the base point is reset to the standard position of top left corner when you close the Position and Size dialog.

You can also rotate or slant an image (using the *Rotation* or *Slant & Corner Radius* tabs of the Position and Size dialog). See the *Draw Guide* for details.

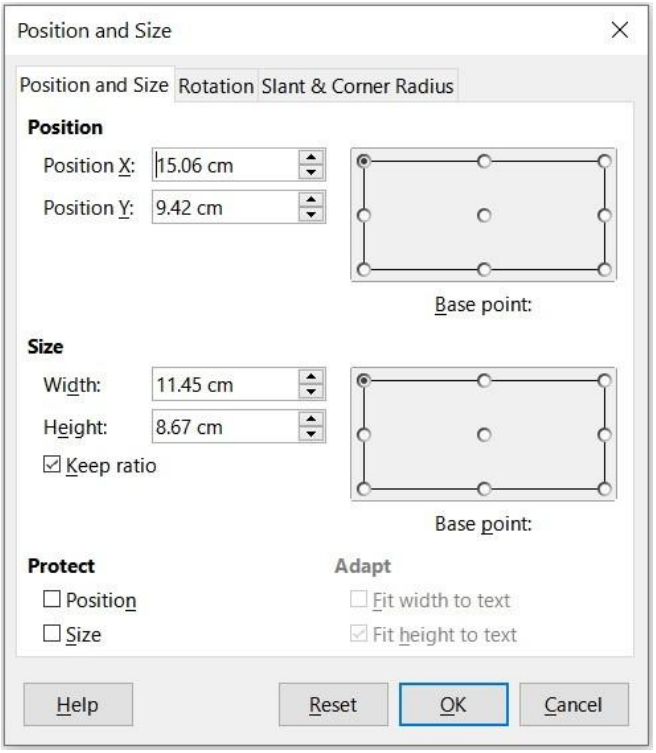


Figure 209: Position and Size dialog – Position and Size tab

Arranging images

Each image that you place in a spreadsheet is successively stacked on the preceding image, whether or not they overlap. Use the arrange commands to change the stacking order of images. You cannot change the stacking order of text.

1) Select the image you want to change.
2) Go to **Format > Arrange** on the Menu bar, or right-click on the image and select **Arrange** in the context menu, then select one of the available arrangement options.
3) Alternatively, click on one of the six arrangement icons on the Image toolbar to quickly move the image up or down the stacking order.

The arrangement options are as follows:

- **Bring to Front** - moves the selected image to the top of the stacking order, so that it is in front of other images.
- **Forward One** - moves the selected image up one level, so that it is closer to top of the stacking order.
- **Back One** - moves the selected image down one level, so that it is closer to the bottom of the stacking order.
- **Send to Back** - moves the selected image to the bottom of the stacking order, so that it is behind the other images.
- **To Foreground** - moves the selected image in front of text.
- **To Background** – moves the selected image behind text. To select a background image so that you can modify or replace it, you have to use the Navigator. Other methods of selection, such as clicking or double-clicking, do not work.

Anchoring images

Anchor images so they stay in their position in relation to other items.

- **To Page** – anchor an image to the page to position it in a specific place. The image does not move when cells are added or deleted; it will always stay in the same position on the page where it is placed.
- **To Cell** – anchor an image to a cell to ensure that the image always stays with the content it is originally anchored to. If an image is anchored to cell B10, and a new row is inserted above row 10, the image will then be anchored to cell B11.
- **To Cell (resize with cell)** - similar to **To Cell** but with the additional property that the image resizes as you resize the cell to which it is anchored.

To anchor a selected image or change the type of anchor used:

- Go to **Format > Anchor** on the Menu bar, or right-click on the image and select **Anchor** in the context menu, or click on the **Anchor** icon on the Image toolbar.
- Select **To Page**, **To Cell**, or **To Cell (resize with cell)** in the menu.

Tip

Use Fit to Cell Size in the graphic (image) context menu to resize the image to the cell dimensions. You may want to adjust the row height and column width accordingly.

Aligning images

When you have more than one image in your spreadsheet, you can align these images to give your spreadsheet a more professional look. The options include three for aligning the images horizontally (left, centered, right) and three for aligning the images vertically (top, center, bottom).

1) Select all of the images to be aligned (select one and hold down the `Shift` key while selecting others).
2) Go to **Format > Align Text** on the Menu bar, or click the down arrow at the right of the **Align Objects** icon on the Image toolbar, or right-click on one of the images and select **Align Objects** in the context menu.
3) Select one of the options available for alignment.

Tip

Press the main area of the **Align Objects** icon on the Image toolbar (to the left of its down arrow) to quickly left align the selected images.

Grouping and ungrouping images

To group several images so that they become a single object in the spreadsheet:

1) Select the images you want to group (select one and hold down the `Shift` key while selecting others).
2) Go to **Format > Group > Group** on the Menu bar, or right-click on one of the selected images and select **Group** in the context menu.

Note

When grouping images, the resulting image is anchored To Page. You can change the anchor as usual.

To ungroup images:

1) Select the image group you want to ungroup.
2) Go to **Format > Group > Ungroup** on the Menu bar, or right-click on one of the selected images and select **Ungroup** in the context menu.

To edit an image in a group:

1) Select the image group where you want to edit an image within the group.
2) Go to **Format > Group > Enter Group** on the Menu bar, or right-click on one of the selected images and select **Enter Group** in the context menu.
3) Select the image you want to make changes to and make the changes.
4) Go to **Format > Group > Exit Group** on the Menu bar, or right-click on one of the selected images and select **Exit Group** in the context menu.

Using LibreOffice's drawing tools

Calc, like all other components of LibreOffice, has a range of tools to create drawings such as simple diagrams, using rectangles, circles, lines, text, and other shapes. You can group several drawing objects to make sure they maintain their relative position and proportion if you move or resize them.

You can also use the drawing tools to annotate photographs, screen captures, or other illustrations produced by other programs, but this is not recommended. If you need to create complex drawings, it is recommended to use LibreOffice Draw and then insert the drawing into your spreadsheet. For a more detailed explanation, see the *Draw Guide*.

Drawing toolbar

To begin using the drawing tools, go to **View > Toolbars > Drawing** to open the Drawing toolbar, which appears in its default position at the bottom of the spreadsheet. You can make this toolbar a floating toolbar and move it to a more convenient position.

When the Drawing toolbar opens, it displays a default set of tools as shown in Figure 210. Hover the mouse pointer over a tool to see a tooltip describing its function. Icons with small arrows on the right side open with palettes of tools. To add tools to the Drawing toolbar, right-click in an empty area on the toolbar and select **Visible Buttons** from the context menu.



Figure 210: Drawing toolbar

To use a drawing tool:

1) Click on the tool in the Drawing toolbar (Figure 210). The mouse pointer changes to a drawing-functions pointer and the normal Formatting toolbar changes to the Drawing Object Properties toolbar (Figure 212).
2) Move the cross-hair pointer to the place in the document where you want the drawing object to appear and then click and drag to create the object. Release the mouse button. The selected drawing function remains active, so that you can draw another object of the same type.
3) To cancel the selected drawing function, click on the tool's icon again, press the `Esc` key, or click on the **Select** icon (the arrow) on the Drawing toolbar.
4) You can now change the properties (fill color, line type and weight, anchoring, and others) of the drawing object using the Drawing Object Properties toolbar (Figure 212), the Properties deck on the Sidebar, or the choices reached by right-clicking on the drawing object.

Setting the properties of drawing objects

For more information on the properties of drawing objects, see the *Draw Guide*.

You can set some default properties for a drawing object before you draw an object. These default properties are applied only to the current spreadsheet and are not retained when you close the spreadsheet. The properties apply only to drawing objects.

1) Click **Select** on the Drawing toolbar (Figure 210).
2) On the Drawing Object Properties toolbar (Figure 211), some controls are active, so you can set the default values you want to use for each property. When you select area or line properties, palettes open where you can choose the values to be used for areas or lines.



Figure 211: Drawing Object Properties toolbar – some controls are available for setting default properties

3) After you draw an object or group it with another object, more properties become active. These appear on the toolbar (Figure 212) and some are shown in the Properties deck of the Sidebar (Figure 213).



Figure 212: Drawing Object Properties toolbar after inserting an object

You can change the properties of an existing drawing object (fill color, line type and weight, anchoring, and so on) using the Drawing Object Properties toolbar (Figure 211), the Properties deck on the Sidebar, or the context menu when you right-click on the drawing object.

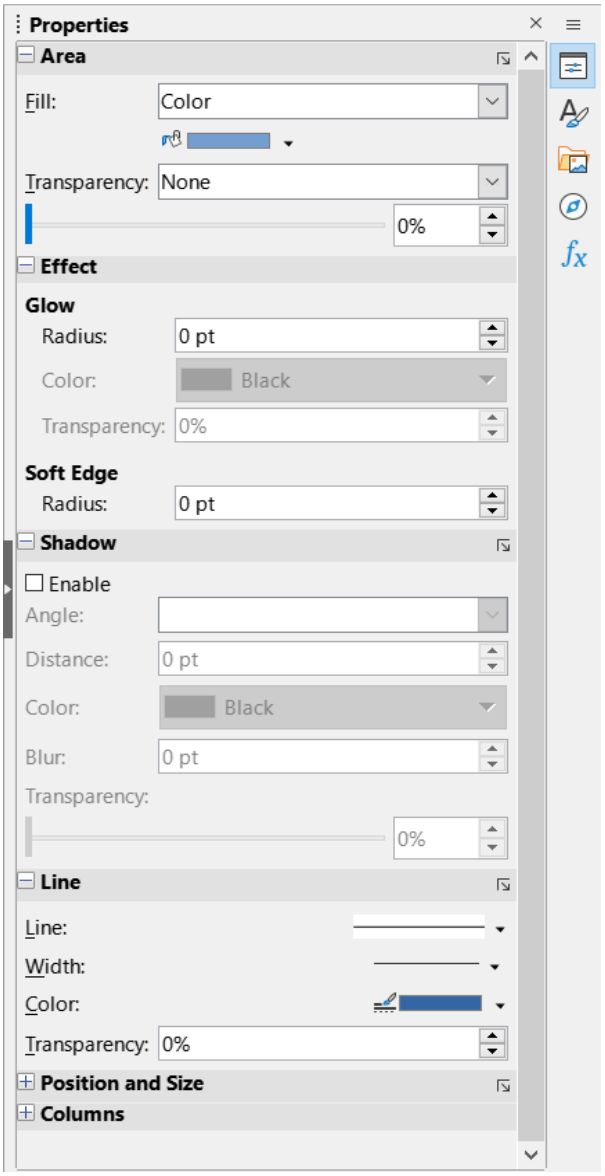


Figure 213: Properties deck in Sidebar for drawing object

Resizing drawing objects

Select the object and click on one of the selection handles then drag the object 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 information, see “Positioning, resizing, and arranging images” above.

Grouping and ungrouping drawing objects

For grouping, ungrouping, and editing grouped drawing objects, see “Grouping and ungrouping images” above.

Additional tools

Some additional tools are available when you right-click on an image or drawing object and open the context menu.

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

Name
You can add a custom name to be assigned to an image; this will make the image easier to find in the Navigator. Also, assigning names to images helps identify them when teams of people are working on the same multi-page spreadsheet.

Rotate or Flip
You can rotate the image or flip it horizontally or vertically.

Assign Macro
Opens the Assign Macro dialog so you can add programmable functionality to the graphic. Calc has a very good macro functionality. For more information, see Chapter 13, Macros.

Edit Hyperlink
You can define a hyperlink from an image to another location in your spreadsheet, another document, or a web page. Select **Edit Hyperlink** in the context menu to open the Hyperlink dialog. See Chapter 11, Linking Data, for more information on hyperlinks.

Compress
You can compress images to reduce the file size of the spreadsheet. Select **Compress** in the context menu to open a Compress Image dialog where you can set the compression options. (Option not available for drawing objects.)

Edit with External Tool
You can edit an image with an external tool. The dialog that opens will depend on your computer setup. (Option not available for drawing objects.)

Using Fontwork

With Fontwork, you can create graphical text art objects to make your work more attractive. There are many different settings for text art objects (line, area, position, size, and more), so you have a large choice.

Fontwork is available with each component of LibreOffice, but you will notice small differences in the way that each component displays it.

Creating a Fontwork object

1) On the Fontwork toolbar (**View > Toolbars > Fontwork**, see Figure 214) or the Drawing toolbar (**View > Toolbars > Drawing**), click the **Insert Fontwork Text** icon.



Figure 214: Fontwork toolbar

2) In the Fontwork Gallery (Figure 215), select a Fontwork style, then click **OK**. The Fontwork object will appear in the document.

3) Double-click the object to edit the Fontwork text (Figure 216). Select the text and type your own text in place of the black Fontwork text that appears over the object.

4) Click anywhere in a free space or press *Esc* to apply your changes.



Figure 215: The Fontwork Gallery



Figure 216: Editing Fontwork text

Editing a Fontwork object

Now that the Fontwork object is created, you can edit some of its attributes. To do this, you can use the Fontwork toolbar, the Formatting toolbar, or menu options. For more information, see Chapter 11, Images and Graphics, in the Getting Started Guide.

Generating a QR or Barcode

The QR and Barcode generation feature allows you to encode any text string or URL as a barcode or QR code and insert it into your spreadsheet as an image.

Choose **Insert > OLE Object > QR and Barcode** on the Menu bar to open the QR and Barcode dialog (Figure 217).

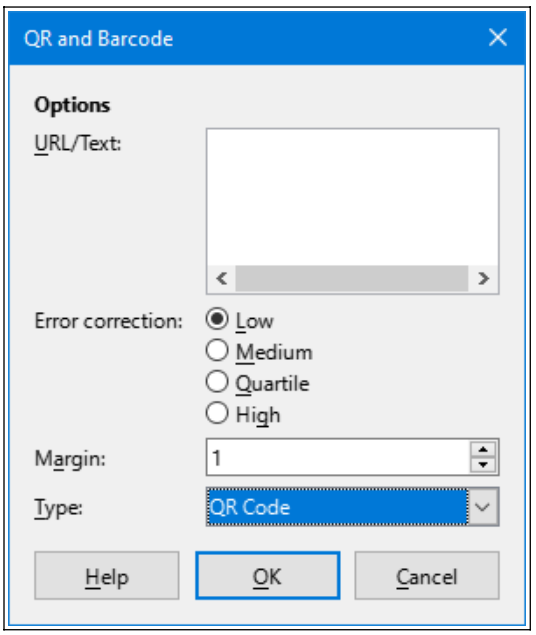


Figure 217: QR and Barcode dialog

Fill in the *URL/Text* field, select an Error correction factor (the complexity of the graphic generated), enter the width in dots of the border around it, and then click **OK**. Figure 218 shows the code generated by the inputs in Figure 217.



Figure 218: QR code example

After the QR or Barcode has been generated, it is possible to edit it by right-clicking in its image and selecting **Edit Barcode**.



Calc Guide 7.5

Chapter 7
Printing, Exporting, Emailing, and Signing

Printing

Quick printing

To quickly print a spreadsheet, click on the **Print Directly** icon (not visible by default) on the Standard toolbar to send the entire spreadsheet to the default printer that is defined for your computer.

Note

You can change the action of the **Print Directly** icon to send a document to the printer defined for the document instead of the default printer for the computer. Go to **Tools > Options > Load/Save > General** and select the **Load printer settings with the document** option.

Controlling printing

For more control over printing, select **File > Print** on the Menu bar, or click the **Print** icon on the Standard toolbar, or press `Ctrl+P`, to open the Print dialog (Figure 219).

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**. For details, see Chapter 15, Setting up and Customizing.

The Print dialog has multiple tabs where you can choose a range of options, as described in the following sections. Depending on your computer's operating system, the number of tabs and the layout of each tab may be different from the illustrations shown in this chapter.

The Print dialog includes a **Preview** checkbox which enables you to turn on/off a preview of how your data will appear on the printed page. The preview appears on the left hand side of the dialog. Adjacent controls allow you to navigate through multiple pages.

General tab

On the *General* tab of the Print dialog (Figure 219), you can choose from the following options:

- **Printer**
  - Select the printer to use, from the list of those available.
  - Click the **Properties** button to change any required settings of the selected printer. The options available through this interaction will depend on your printer and system.
- **Range and Copies**
  - Select which sheets and pages to print; single or double sided printing; the number of copies to print; whether to collate multiple copies; and the page order for printing. (See "Selecting what to print" below.)
- **Page Layout**
  - Select page layout properties such as paper size, portrait, or landscape orientation; how many pages are printed per sheet of paper; the order in which the pages are printed on a sheet of paper; and whether a border is drawn around each page.

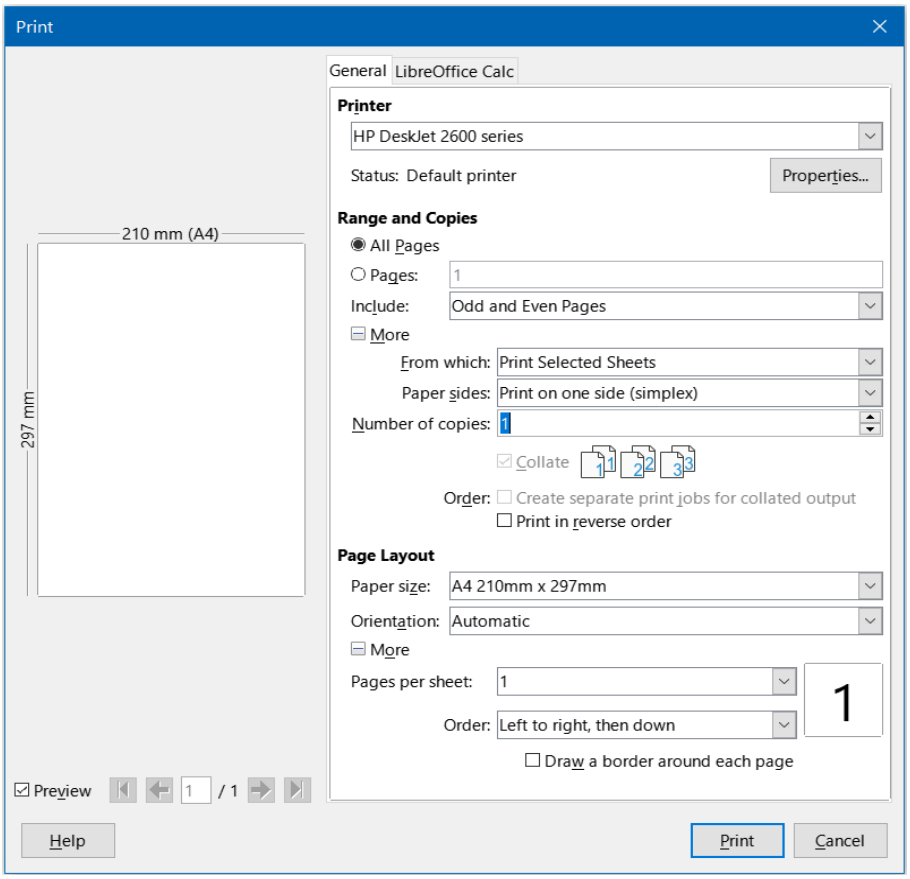


Figure 219: Print dialog – General tab

LibreOffice Calc tab

On the *LibreOffice Calc* tab of the Print dialog (Figure 220), you can select whether to suppress the output of empty pages when you print the spreadsheet.

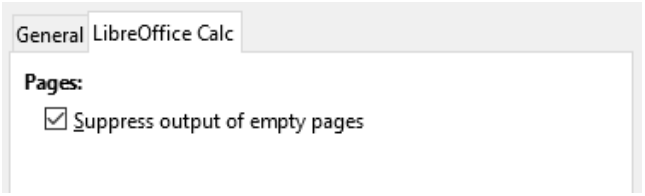


Figure 220: Print dialog – LibreOffice Calc tab

Printing multiple pages on a single piece of paper

To print multiple pages of a spreadsheet on one piece of paper:

1) Use **File > Print** on the Menu bar, or click the **Print** icon on the Standard toolbar, or press `Ctrl+P`, to open the Print dialog.
2) In the *Page Layout* section of the *General* tab, select the number of spreadsheet pages to print per sheet of paper in the *Pages per sheet* drop-down list. The preview panel on the right shows how the pages will look in the printed document.
3) When printing more than one page per sheet, select the order in which the pages are printed on a sheet in the *Order* drop-down list (Figure 221).
4) To distinguish each page on a sheet, select the **Draw a border around each page** option.

5) Click **Print**.

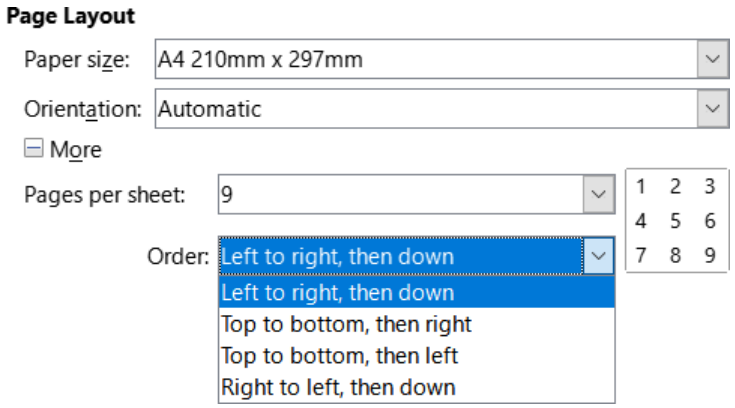


Figure 221: Printing more than one spreadsheet page per sheet of paper

Tip

To access some of the options on the *General* tab of the Print dialog, you may need to click one of the **More** buttons. For simplicity, these clicks are deliberately omitted from the descriptions in this chapter.

Selecting what to print

In the *Range and Copies* area of the *General* tab of the Print dialog, choose **Print All Sheets** in the *From which* drop-down to print all sheets in the document. In addition to printing a full spreadsheet document, you can choose single sheets, multiple sheets, and selections of cells for printing.

To print an individual sheet:

1) In the spreadsheet, click on the sheet tab to select the sheet you want to print.
2) Choose **File > Print** on the Menu bar, or click the **Print** icon on the Standard toolbar, or press `Ctrl`+`P`, to open the Print dialog.
3) In the *Range and Copies* area of the *General* tab of the Print dialog, choose **Print Selected Sheets** in the *From which* drop-down.
4) Click **Print**.

To print a range of sheets:

1) In the spreadsheet, select the sheets to print. For details on how to select multiple sheets, see Chapter 1, Introduction.
2) Choose **File > Print** on the Menu bar, or click the **Print** icon on the Standard toolbar, or press `Ctrl`+`P`, to open the Print dialog.
3) In the *Range and Copies* area of the *General* tab of the Print dialog, choose **Print Selected Sheets** in the *From which* drop-down.
4) Click **Print**.

To print a selection of cells:

1) In the spreadsheet, select the cells to print.

2) Choose **File > Print** on the Menu bar, or click the **Print** icon on the Standard toolbar, or press *Ctrl+P*, to open the Print dialog.

3) In the *Range and Copies* area of the *General* tab of the Print dialog, choose **Print Selected Cells** in the *From which* drop-down.

4) Click **Print**.

Printing in grayscale on a color printer

You may wish to print a spreadsheet in grayscale on a color printer. You can do this in two ways.

Note

Some color printers may print in color regardless of the settings you choose.

For an individual file, you can change the printer settings to print in black and white or grayscale:

1) Choose **File > Print** on the Menu bar, or click the **Print** icon on the Standard toolbar, or press `Ctrl+P`, to open the Print dialog.

2) Click **Properties** to open the Properties dialog for the printer. The available choices vary from one printer to another, but you should find options for the color settings. See your printer's help or user manual for more information.

3) The choices for color might include black and white, or grayscale. Choose grayscale.

4) Click **OK** to confirm your choice and return to the Print dialog.

5) Click **Print** to print the document.

You can change the LibreOffice settings to print all color text and graphics as grayscale:

1) Choose **Tools > Options > LibreOffice > Print**.

2) In the *Defaults* section, select **Convert colors to grayscale**. Click **OK** to save the change.

Caution

This changes the print settings for all components of LibreOffice, not just Calc

Previewing pages/sheets before printing

To preview the sheets in Calc before printing:

1) Choose **File > Print Preview** on the Menu bar, or click the **Toggle Print Preview** icon on the Standard toolbar, or press `Ctrl+Shift+O`.

2) The Calc window now displays the Print Preview toolbar instead of the Formatting toolbar.



Figure 222: Print Preview toolbar

3) To print the document from this view, select **File > Print** on the Menu bar, or click the **Print** icon on the Standard toolbar, or press `Ctrl+P`, to open the Print dialog.

4) Choose the print options and click the **Print** button.

5) Click the **Toggle Print Preview** icon again, or click the **Close Preview** icon on the right-hand side of the Print Preview toolbar, to return to the normal spreadsheet view.

Using print ranges

You can define which range of cells on a spreadsheet are to be printed or exported to a PDF. The cells on the sheet that are not part of the defined print range are not printed or exported. Also, any sheets without a defined print range are not printed or exported. Creating a user-defined print range will replace any existing defined print range.

Defining and printing a print range

To set a user-defined print range:

1) Select the range of cells to be used in the print range.
2) Go to **Format > Print Ranges > Define** on the Menu bar. If **Tools > Options > LibreOffice Calc > View > Page breaks** is enabled, then automatic page break lines are displayed on the screen, defining the cells included in the print range.
3) Click on the **Print Directly** icon on the Standard toolbar to print the defined print range, or open the Print dialog and click **Print** to print the defined print range.

Tip

You can check the print range by using **Toggle Print Preview** or the Preview pane in the Print dialog. Calc will display only the cells in the print range. See "Viewing print ranges" below.

Editing a print range

At any time, you can edit the print range, For example to add or remove cells, or define rows and columns to repeat (such as column or row headings). For more details on how to define repeated rows and/or columns, see "Repeat printing of rows or columns" below.

1) Go to **Format > Print Ranges > Edit** on the Menu bar to open the *Edit Print Ranges* dialog (Figure 223).

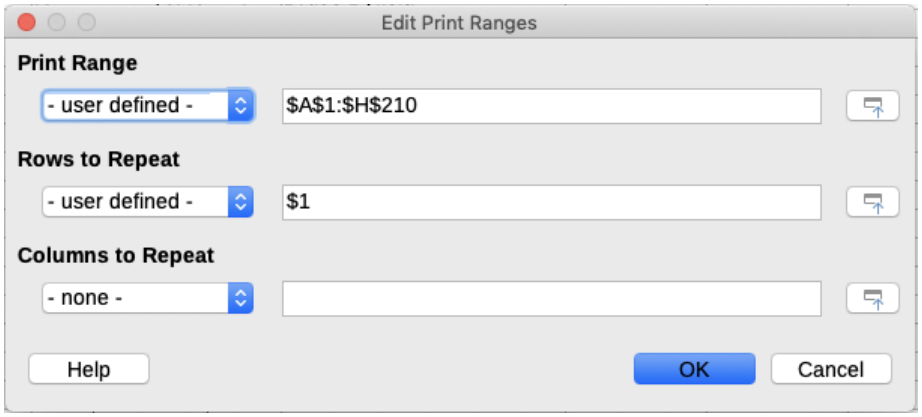


Figure 223: Edit Print Ranges dialog

2) If only a single range is defined, then clicking anywhere in the *Print Range* text box displays the defined print range bounded in blue, as shown in Figure 224.

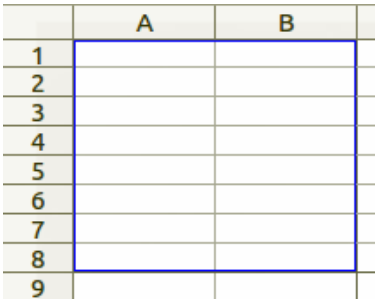


Figure 224: Single print range marked by a bounding box

3) Multiple cell ranges can also be defined by separating each range with a single comma. This can be done with the keyboard by typing in a comma and the cell references, using the same format as the print ranges already defined in the *Print Range* text box. Remember to separate the cell references with a colon. New cell ranges can also be added by holding `Ctrl` as you select the cell range using the cursor.

4) To remove a print range, select the print range in the *Print Range* text box and delete it. Make sure the remaining print ranges are separated by a single comma and there is not a comma at the end of the sequence.

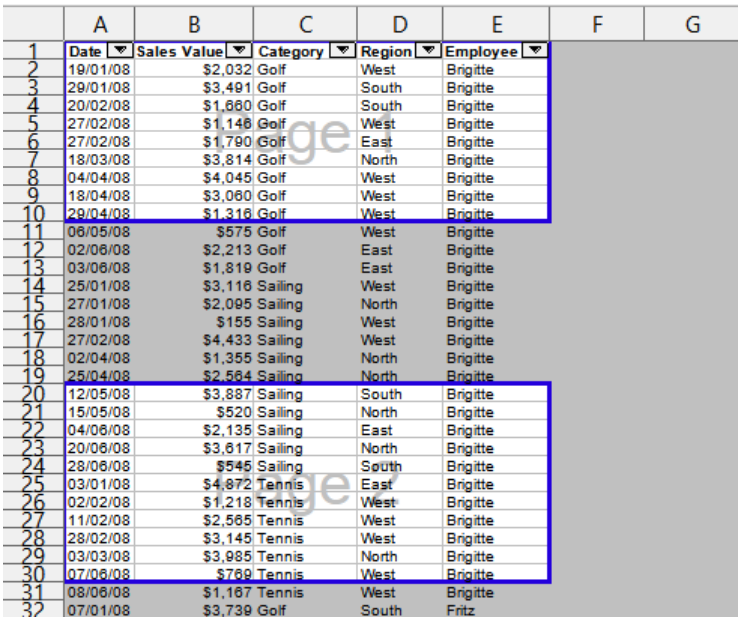
5) Click **OK** to save your changes and close the dialog.

Viewing print ranges

After print ranges have been defined, they are formatted with automatic page breaks. To view the page breaks, go to **View > Page Break** on the Menu bar to open the preview (Figure 225).

The print ranges are outlined by default with a blue border and contain a pale gray page number in the center of each page. The non-printing area of the spreadsheet normally has a gray background.

To exit the page break preview, go to **View > Normal** on the Menu bar.



	A	B	C	D	E
1	Date	Sales Value	Category	Region	Employee
2	19/01/08	$2,032	Golf	West	Brigitte
3	29/01/08	$3,491	Golf	South	Brigitte
4	20/02/08	$1,660	Golf	South	Brigitte
5	27/02/08	$1,146	Golf	West	Brigitte
6	27/02/08	$1,790	Golf	East	Brigitte
7	18/03/08	$3,814	Golf	North	Brigitte
8	04/04/08	$4,045	Golf	West	Brigitte
9	18/04/08	$3,060	Golf	West	Brigitte
10	29/04/08	$1,316	Golf	West	Brigitte
11	06/05/08	$575	Golf	West	Brigitte
12	02/06/08	$2,213	Golf	East	Brigitte
13	03/06/08	$1,819	Golf	East	Brigitte
14	25/01/08	$3,116	Sailing	West	Brigitte
15	27/01/08	$2,095	Sailing	North	Brigitte
16	28/01/08	$155	Sailing	West	Brigitte
17	27/02/08	$4,433	Sailing	West	Brigitte
18	02/04/08	$1,355	Sailing	North	Brigitte
19	25/04/08	$2,564	Sailing	North	Brigitte
20	12/05/08	$3,887	Sailing	South	Brigitte
21	15/05/08	$520	Sailing	North	Brigitte
22	04/06/08	$2,135	Sailing	East	Brigitte
23	20/06/08	$3,617	Sailing	North	Brigitte
24	28/06/08	$545	Sailing	South	Brigitte
25	03/01/08	$4,872	Tennis	East	Brigitte
26	02/02/08	$1,218	Tennis	West	Brigitte
27	11/02/08	$2,565	Tennis	West	Brigitte
28	28/02/08	$3,145	Tennis	West	Brigitte
29	03/03/08	$3,985	Tennis	North	Brigitte
30	07/06/08	$769	Tennis	West	Brigitte
31	08/06/08	$1,167	Tennis	West	Brigitte
32	07/01/08	$3,739	Golf	South	Fritz

Figure 225: Page break preview

Named print ranges

In addition to defining a print range for each print job, you can also define a range of cells to be used repeatedly, without having to select a range of cells every time. This is useful if different areas of a large spreadsheet have to be printed for different reports; several named print ranges can be defined to meet this need.

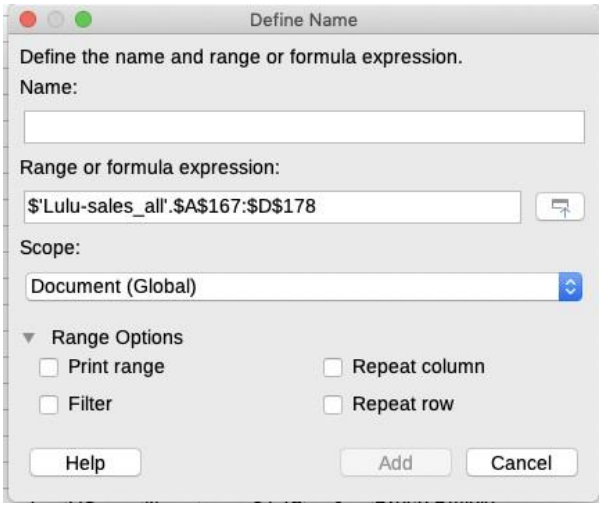


Figure 226: Define Name dialog

Defining and naming

1) Select the cells you want to define and name as a print range, then go to **Sheet > Named Ranges and Expressions > Define** on the Menu bar to open the Define Name dialog (Figure 226). The selected cells are displayed in the *Range or formula expression* box.

   Alternatively, open the Define Name dialog, then select the cells you want to define and name. The selected cells are then displayed in the *Range or formula expression* box.

2) Type a name for the range in the *Name* box. Use only letters, numbers, and underscores in the name; no spaces, hyphens, or other characters are allowed.

3) If necessary, you can edit or set the range of selected cells for the print range in the *Range or formula expression* box. See “Editing a print range” above for more information.

4) Make sure **Document (Global)** is selected in the *Scope* drop-down list.

5) Select **Print range** from *Range Options* to define the settings as a print range.

6) Click **Add** to accept the data and close the dialog.

Printing a named range

To select a named range for printing:

1) Go to **Format > Print Ranges > Edit** on the Menu bar to open the Edit Print Ranges dialog (Figure 227).

2) Select the defined and named print range in the *Print Range* drop-down list.

3) Click **OK** to close the dialog.

4) Open the Print dialog, which will show only the named range in the preview area. Click **Print**.

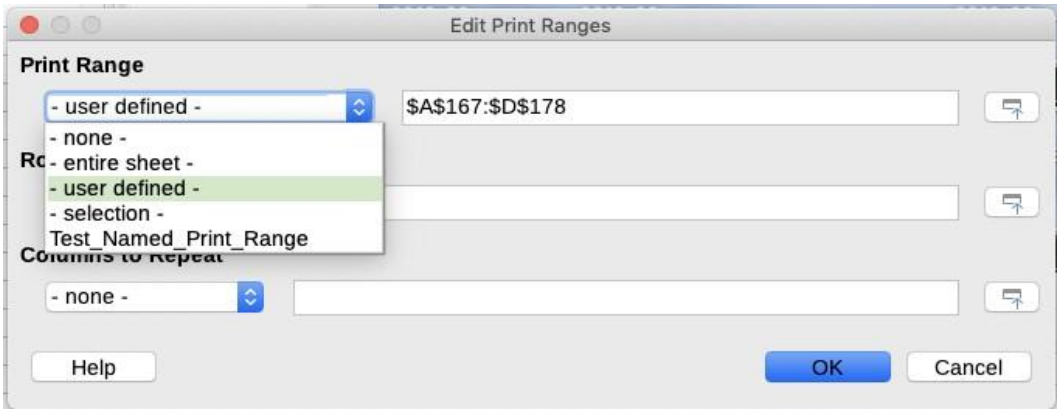


Figure 227: Choosing a named range for printing

Deleting a named print range

To delete a named print range if it is no longer required:

1) Go to **Sheet > Named Ranges and Expressions > Manage** on the Menu bar, or press *Ctrl*+*F3*, to open the Manage Names dialog (Figure 228).

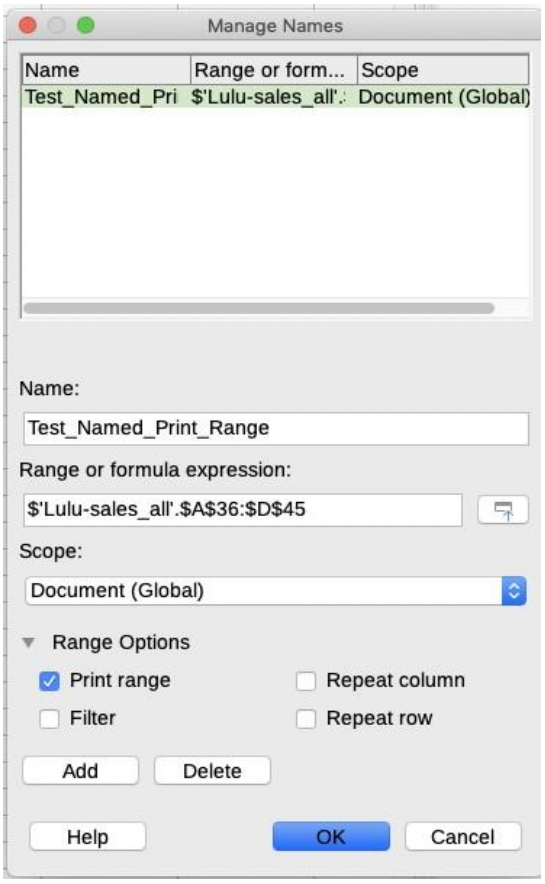


Figure 228: Manage Names dialog

2) Select the named print range you want to delete and confirm it is a print range by checking the options from the *Range Options*.

3) Click **Delete** and then click **OK** to close the dialog.

Removing print ranges

It may become necessary to remove a defined print range, for example if the whole sheet needs to be printed later, or you no longer want to print some of the added ranges.

Go to **Format > Print Ranges > Clear** on the Menu bar to remove all of the defined print ranges in the spreadsheet, except for named print ranges. After the print range is removed, the default page break lines for the selected paper size will appear on the screen (assuming that **Tools > Options > LibreOffice Calc > View > Page breaks** is enabled).

To remove named print ranges, see "Deleting a named print range" above.

Repeat printing of rows or columns

If a spreadsheet is printed on multiple pages, you can define specific rows or columns (for example, headings) to repeat print on each printed page.

Using print ranges

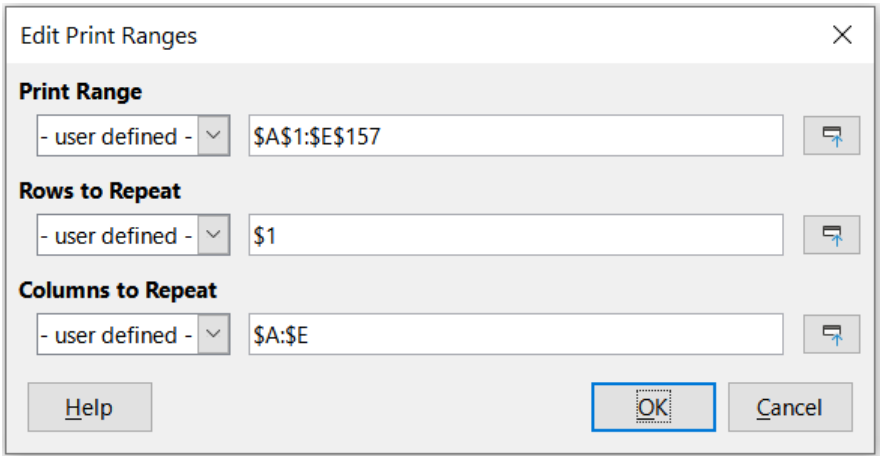


Figure 229: Repeat printing of rows and columns

1) Go to **Format > Print Ranges > Edit** to open the Edit Print Ranges dialog (Figure 229).
2) In the *Rows to Repeat* box, type the references for the rows to be repeat printed. For example, to repeat rows 1, 2 and 3, type `$1:$3`. This automatically changes the *Rows to Repeat* drop-down from *- none -* to *- user defined -*.

   You can also place the cursor in the *Rows to Repeat* box and then, using the mouse, select a cell in each row you want to be repeat printed. It is not necessary to select the whole row.
3) In the *Columns to Repeat* box, type the references for the columns to be repeat printed. For example, to repeat column A, type `$A`. This automatically changes the *Columns to Repeat* drop-down from *- none -* to *- user defined -*.

   You can also place the cursor in the *Columns to Repeat* box and then, using the mouse, select a cell in each column you want to be repeat printed.
4) Click **OK** to save your changes and close the dialog.

Using named print ranges

You can also define named print ranges to use for repeat printing of rows or columns as follows:

1) Define and name the rows and/or columns you want to repeat print. See "Named print ranges" above for more information. Similar to user defined print ranges, it is sufficient to select one cell from the row or column you want to be repeat printed.

2) Select **Repeat column** and / or **Repeat row** from *Range Options* to define the columns and/or rows for repeat printing in the Define Name dialog (Figure 226 on page 278).
3) Click **Add** to accept the data and close the dialog.
4) Go to **Format > Print Ranges > Edit** to open the Edit Print Ranges dialog (Figure 229).
5) Select the defined and named print ranges from the *Rows to Repeat* and/or *Columns to Repeat* drop-down lists.
6) Click **OK** to save your changes and close the dialog.

Page breaks

While defining a print range can be a powerful tool, you may sometimes need to manually adjust the page breaks to make sure the spreadsheet prints the way you want it to look. You can insert two types of page breaks into a spreadsheet:

- **Row break** – inserts a horizontal page break above a selected cell in a row. For example, if the selected cell is H15, then a row break is created between rows 14 and 15.
- **Column break** – inserts a vertical page break to the left of the selected cell in a column. For example, if the selected cell is H15, then a column break is created between columns G and H.

When a manual break is inserted, it appears as a blue line or as a bold line between the rows or columns on the display. The actual appearance depends on your computer setup. To see manual break lines more easily on your display, you can change their appearance. Go to **Tools > Options > LibreOffice > Application Colors** and scroll down to the *Spreadsheet* section where you can change how page breaks appear.

Inserting page breaks

1) Select the cell where you want to insert a manual break in the spreadsheet.
2) Go to **Sheet > Insert Page Break** on the Menu bar.
3) Select **Row Break** to insert a row break above the cell or **Column Break** to insert a column break to the left of the cell.

Alternatively, go to **View > Page Break** on the Menu bar. Select the cell where you want to insert a manual break, right-click in the spreadsheet and select **Row Break** or **Column Break** in the context menu. Remember to go to **View > Normal** on the Menu bar and return to the standard spreadsheet view.

Deleting page breaks

1) Select the cell where you want to delete a manual break from the spreadsheet.
2) Go to **Sheet > Delete Page Break** on the Menu bar.
3) Select **Row Break** to delete a row break from above the cell or **Column Break** to delete a column break from the left of the cell.

Note

The **Column Break** or **Row Break** options are grayed if an appropriate cell has not been selected, either to the right of a column break or below a row break.

Deleting multiple page breaks

Multiple manual row and column breaks can exist in the same spreadsheet. If you want to remove all breaks from the spreadsheet:

1) Go to **View > Page Break** on the Menu bar.
2) Right-click in the spreadsheet and select **Delete Page Breaks** in the context menu to remove all manual breaks from your spreadsheet.
3) Go to **View > Normal** on the Menu bar to return to the standard spreadsheet view.

Printing options for page styles

When using page styles for your spreadsheets, you can include printing options within the page style. For example, page order, details, scale to be printed, and so on. Using page styles allows you to quickly set up and change the printing options of different sheets within your spreadsheet. See Chapter 5, Using Styles and Templates, for more information about page styles.

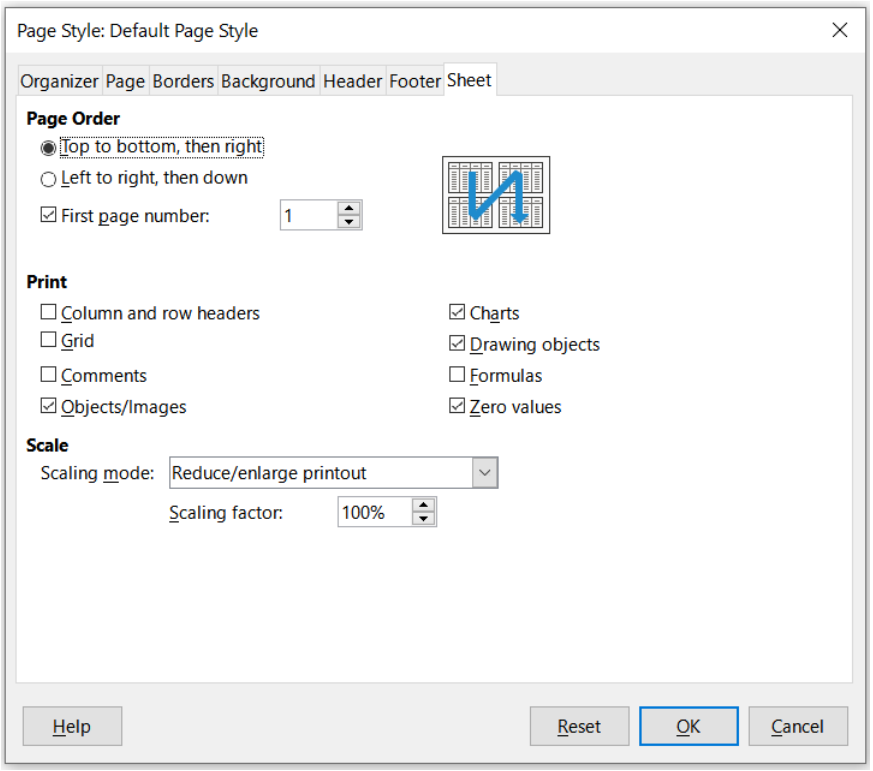


Figure 230: Page Style dialog – Sheet tab

Make sure you have selected the correct sheet within the spreadsheet before setting the print options. Go to **Format > Page Style** on the Menu bar to open the Page Style dialog, then click on the *Sheet* tab (Figure 230) to set the printing options for a page style. The dialog title indicates the name of the page style you are about to change.

Tip

You can also open the Page Style dialog by going to the Styles deck of the Sidebar, right-clicking the relevant page style, and selecting **Modify** in the context menu. Another alternative is to double-click the name of the page style on the Status Bar.

- **Page Order** – defines the order in which data in a sheet is numbered and printed when it does not fit on one printed page. A preview of the page order is shown in the graphic on the top right of the dialog in Figure 230.
  - **Top to bottom, then right** – prints vertically from the left column to the bottom of the sheet.
  - **Left to right, then down** – prints horizontally from the top row of the sheet to the right column.
  - **First page number** – select this option if you want the first page to start with a number other than 1. Enter the number of the first page in the box.
- **Print** – defines which elements of the spreadsheet are to be printed.
  - **Column and row headers** – prints the column and row headers.
  - **Grid** – prints the borders of the individual cells as a grid. For the view on screen, make your selection under **Tools > Options > LibreOffice Calc > View > Grid lines**.
  - **Comments** – prints the comments defined in the spreadsheet. Comments will be printed on a separate page, along with the corresponding cell reference.
  - **Objects/Images** – includes all inserted objects (if printable) and graphics with the printed spreadsheet.
  - **Charts** – prints the charts that have been inserted into your spreadsheet.
  - **Drawing objects** – includes all drawing objects in the printed spreadsheet.
  - **Formulas** – prints the formulas contained in the cells, instead of the results of any formulas used in the spreadsheet.
  - **Zero values** – specifies that cells with a zero value are printed with a zero (0) in the cell.
- **Scale** – defines a page scale for the printed spreadsheet.
  - *Scaling mode* – select a scaling mode in the drop-down list. Appropriate controls for the scaling mode selected will be shown below the drop-down list box.
    i) **Reduce/enlarge printout** – specifies a scaling factor to scale all printed pages. Enter the scaling factor as a percentage in the box, in the range 10% to 400%. Factors less than 100% reduce the pages, while higher factors enlarge the pages.
    ii) **Fit print range(s) to width/height** – specifies the maximum number of pages horizontally (width) and vertically (height) on which every sheet with the current page style is to be printed.

  The print ranges are always scaled proportionally, so the resulting number of pages may be less than specified. You may clear one of the boxes; then the unspecified dimension will use as many pages as necessary. If you clear both boxes, the scaling factor will be 100%.

    iii) **Fit print range(s) on number of pages** – specifies the maximum number of pages to be printed for each sheet that uses the same page style. The scale will be reduced as necessary to fit the defined number of 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 and footers are set the same way and you can have different content on left and right pages that use the same page style.

Setting headers and footers

To turn the headers or footers on in your spreadsheet:

1) Select the sheet where you want to turn on the header or footer.
2) Open the Page Style dialog using one of the following methods:
   - Select **Format > Page Style** on the Menu bar.
   - Go to the Styles deck of the Sidebar, right-click the relevant page style, and select **Modify** in the context menu.
   - Double-click the name of the page style on the Status Bar.
3) Select the *Header* (or *Footer*) tab (Figure 231). The *Header* and *Footer* tabs on the Page Style dialog are identical.
4) Select the **Header on** or **Footer on** option.
5) Enter the values for the other options according to your requirements. These options are described below.
6) Click **OK** to save your changes and close the dialog.

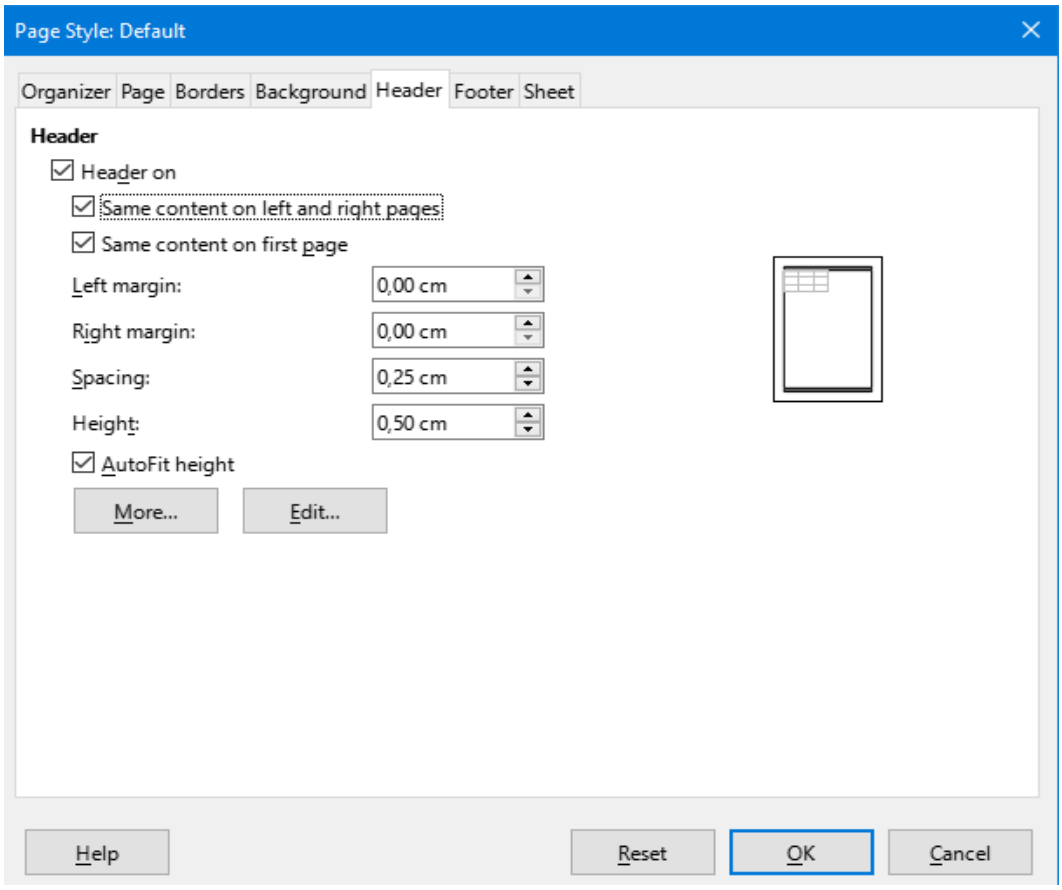


Figure 231: Page Style dialog – Header tab

- **Header on** or **Footer on** – adds a header or footer to the current page style.
- **Same content on left and right pages** – causes left and right pages to share the same header or footer content. To assign a different header or footer to left and right pages, deselect this option and then click **Edit**. See “Header or footer contents” below for more information.
- **Same contents on first page** – causes the first page to have a different header or footer than the remaining pages. To assign a different header or footer to the first page, deselect this option and then click **Edit**. See “Header or footer contents” below for more information.
- **Left margin** – enter the amount of space to leave between the left page margin and the left edge of the header or footer.
- **Right margin** – enter the amount of space to leave between the right page margin and the right edge of the header or footer.
- **Spacing** – enter the amount of space to maintain between the bottom edge of the header and the top edge of the spreadsheet, or the top edge of the footer and the bottom edge of the spreadsheet.
- **Height** – enter the height for the header or footer.
- **AutoFit height** – automatically adjusts the height of the header or footer to fit the content.
- Preview box – shown on the right side of Figure 231, this area displays a preview of the current selection.
- **More** – opens the Border/Background dialog, where you can define the appearance of borders and background colors or images for headers or footers. See Chapter 5, Using Styles and Templates, for more information.
- **Edit** – opens the Header or Footer dialog where you can add, edit, or format text that is placed in the header or footer. See “Header or footer contents” below for more information.

Header or footer contents

The headers and footers in a Calc spreadsheet have three columns for text. Each column can either be empty or have different contents than the other columns.

1) Select the sheet where you want to turn on the header or footer.
2) Open the Page Style dialog (Figure 231), then select *Header on* or *Footer on* and the options for the header or footer. See “Setting headers and footers” above.
3) Click **Edit** to open the Header or Footer dialog (Figure 232). If **Same content on left and right pages** and / or **Same contents on first page** is deselected in the Page Style dialog, the Header or Footer dialog will have tabbed pages where you can set the header or footer contents for the first page as well as right and left pages.

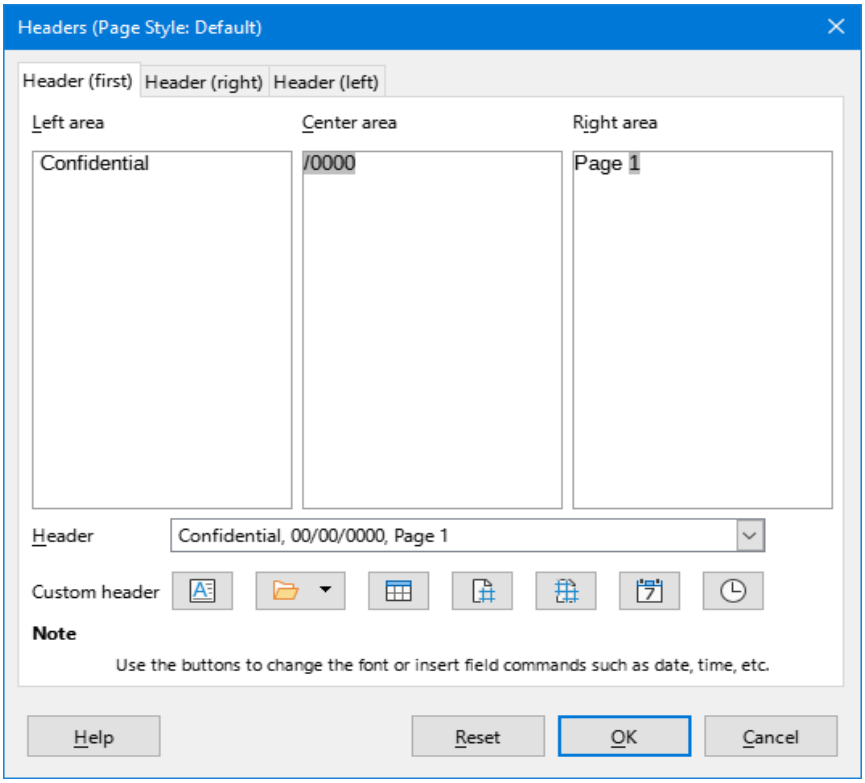


Figure 232: Header dialog

4) To enter standard contents into the header or footer, select an option from the *Header* or *Footer* drop-down list.
5) To enter customized contents into the header or footer, click in one of the area boxes and type your text, or click in one of the area boxes and click one of the **Custom header** or **Custom footer** icons. These icons are explained below.
6) To change the appearance of the text in the header or footer, click the **Text Attributes** icon to open the Text Attributes dialog, where you can set the font, font effects and font position.
7) Click **OK** to save the changes to text attributes and close the Text Attributes dialog.
8) Click **OK** to save the changes to the contents of the header or footer and close the Header or Footer dialog.
9) Click **OK** to save the changes to your header or footer and close the Page Style dialog.

The options available for a *Custom header* or *Custom footer* are as follows:

- **Text Attributes** – opens a Text Attributes dialog where you can assign formats to new or selected text. The Text Attributes dialog contains tabs for *Font*, *Font Effects*, and *Position*.
- **Title** – inserts a file name placeholder in the selected area. Click and select either **Title**, **File Name**, or **Path/File Name** in the drop-down menu that opens. If a title has not be assigned to the spreadsheet, the file name for the spreadsheet will be inserted instead.
- **Sheet Name** – inserts a placeholder in the selected area for the sheet name of the selected sheet in the spreadsheet.
- **Page** – inserts a placeholder in the selected area for the page number. This allows continuous page numbering in a spreadsheet.
- **Pages** – inserts a placeholder in the selected area for the total number of pages in the spreadsheet.

- **Date** – inserts a placeholder in the selected area for the current date, which will be repeated in the header/footer on each page of the spreadsheet.
- **Time** – inserts a placeholder in the selected area for the current time, which will be repeated in the header/footer on each page of the spreadsheet.

Exporting to PDF

Calc can export documents to PDF (Portable Document Format). This industry-standard file format is ideal for sending a file to someone else, for viewing using Adobe Acrobat Reader or any other PDF viewer.

Caution

By default, a document in PDF format is not protected against contents tampering or editing. The PDF document contents can be edited by specialized software tools, including LibreOffice Draw.

Tip

Unlike **Save As**, the **Export** command writes a copy of the current document in a new file with the chosen format, but keeps the current document and format open in your session.

Quick export to PDF

Click the **Export Directly as PDF** icon on the Standard toolbar to export the entire spreadsheet using the PDF settings most recently selected on the PDF Options dialog (see below). You are asked to enter the file name and location for the PDF, but you do not get a chance to choose a page range, 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 six tabs (*General*, *Initial View*, *User Interface*, *Links*, *Security*, and *Digital Signatures*). Select the appropriate settings, and then click **Export**. Then enter the location and file name of the PDF to be created, and click **Save** to export the file.

Tip

You can also access the PDF Options dialog by going to **File > Export** on the Menu bar and then then selecting the **PDF - Portable Document Format** entry in the *Save as type* drop-down menu.

General tab of PDF Options dialog

On the *General* tab (Figure 229), 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. For more information, see the *Getting Started Guide* or the Help. In most cases, the defaults will be what you need.

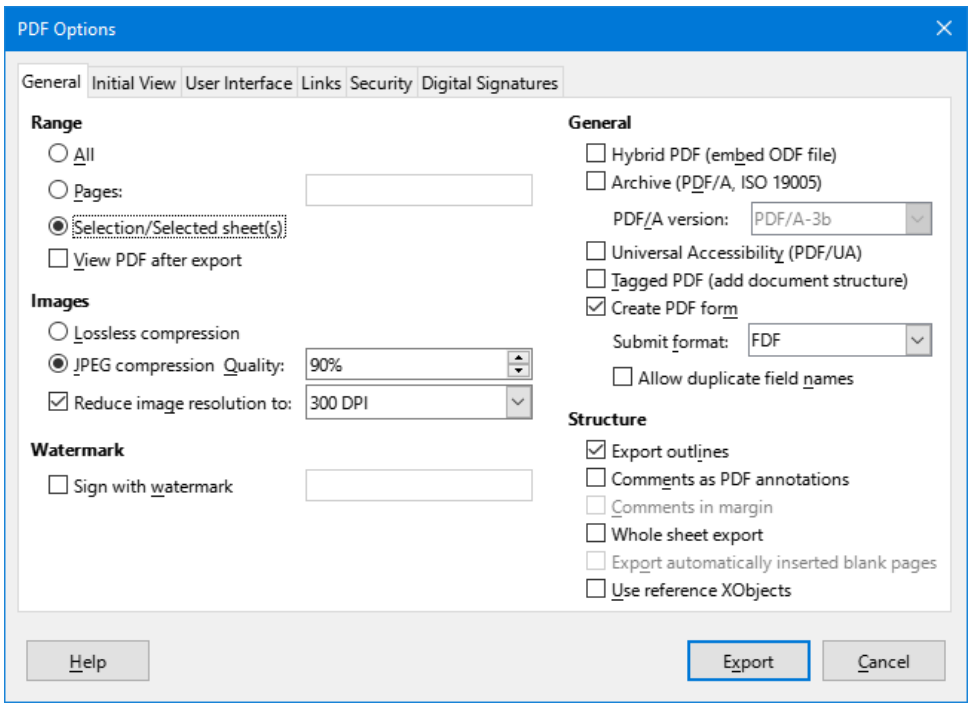


Figure 233: PDF Options dialog – General tab

Range section

- **All***:* Exports the entire document to PDF.
- **Pages***:* To export a range of pages within a selected sheet, use the format 3-6 (pages 3 to 6). To export single pages, use the format 7;9;11 (pages 7, 9, and 11), or a combination of the two formats.
- **Selection/Selected sheet(s)**: Exports the selected material (one or more sheets or part of a sheet).
- **View PDF after export**: If selected, your default PDF viewer will open and display the newly exported PDF.

Images section

- **Lossless compression**: Images are stored without any loss of quality. This option can lead to large files when used with photographs. Recommended for other kinds of images or graphics.
- **JPEG compression**: Allows for varying degrees of quality, in the range 1 to 100%. A setting of 90% works well with photographs (small file size, little perceptible loss of quality).
- **Reduce image resolution**: Select the required value from the options in the drop-down menu. Lower DPI (dots per inch) images have lower quality. Higher DPI settings can greatly increase the size of the exported file.

Watermark section

- **Sign with watermark**: When this option is selected, a transparent overlay of the text you enter into the text box will appear on each page of the PDF.

General section

- **Hybrid PDF (embed ODF file)**: Use this setting to export the document as a PDF file containing two file formats: PDF and ODF. In PDF viewers it behaves like a normal PDF file, and it remains fully editable in LibreOffice.

- **Archive (PDF/A, ISO 19005**): 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. Also select which version of the standard to use, **PDF/A-1b**, **PDF/A-2b**, or **PDF/ A-3b**.
- **Universal Accessibility (PDF/UA)**: Use this setting to create a universal accessibility-compliant PDF file that follows the requirements of the PDF/UA standard (formerly ISO 14289).
- **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**: Use the drop-down menu to choose the format of submitting forms from within the PDF file (**FDF**, **PDF**, **HTML**, or **XML**).
- **Allow duplicate field names** – If enabled, the same field name can be used for multiple fields in the generated PDF file. If disabled, field names will be exported using generated unique names.

Structure section

- **Export outlines**: Generally not used in Calc.
- **Comments as PDF annotations**: Exports comments as PDF notes. You may not want this!
- **Comments in margins**: Not available in Calc.
- **Whole Sheet Export**: The setting allows you to export your Calc spreadsheet to PDF, with the content of a sheet exported as one page in the PDF. This facility is not intended for printing but allows you to easily see and review the full content of a spreadsheet document in a PDF form, without the usual slicing of the sheets into printable pages. Preview pages will have different sizes, as do the source sheets.

Note:

Selecting the **Whole Sheet Export** option causes Calc to disregard many of the other settings on the PDF Options dialog.

- **Export automatically inserted blank pages**: Not available in Calc.
- **Use reference XObjects**: Reference XObjects enable one PDF file to import content from another. More information can be found in the ISO 32000 standard that defines the core specifications of PDF files. If you are not familiar with reference XObjects, leave this box unchecked.

Initial View tab of PDF Options dialog

On the *Initial View* tab (Figure 234), you can select how the PDF file opens by default in a PDF viewer. The options should be self-explanatory.

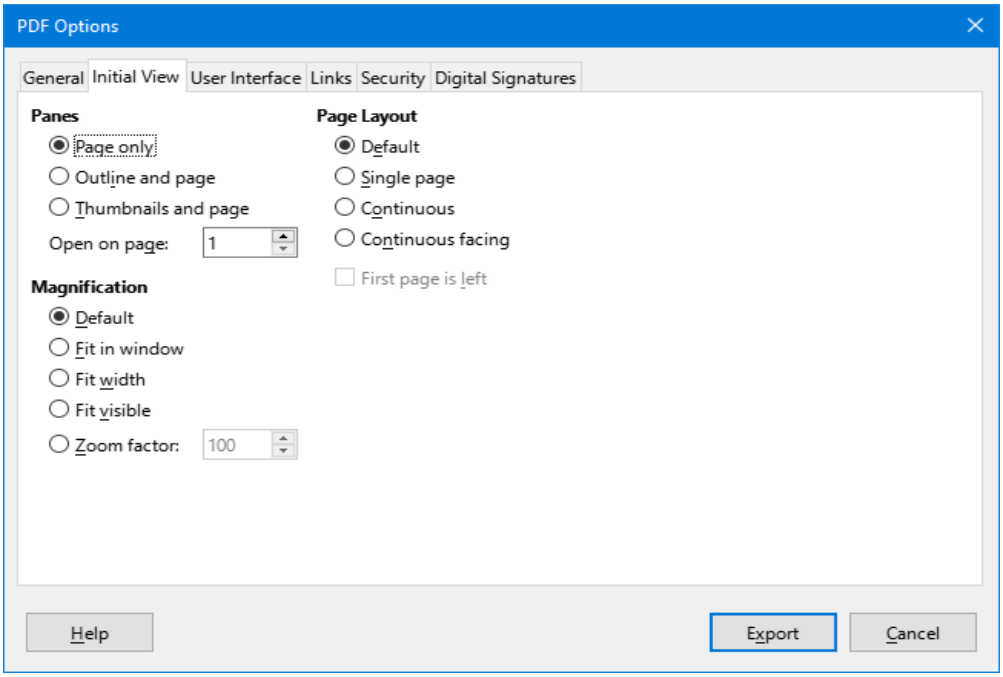


Figure 234: PDF Options dialog – Initial View tab

User Interface tab of PDF Options dialog

On the *User Interface* tab (Figure 235), you can select options to control how a PDF viewer displays the file. Some of these options are useful when you are creating a PDF to be used as a presentation or a kiosk-type display.

Window Options

- **Resize window to initial page**: the PDF reader window displays the whole first page.
- **Center window on screen**: the PDF is shown in a reader window centered on screen.
- **Open in full screen mode**: the PDF reader window is in front of all other windows.
- **Display document title**: the PDF is shown with the document title in the reader title bar.

Transitions

Not used in Calc.

User Interface Options

- **Hide menubar**: hides the reader menu bar when the document is active.
- **Hide toolbar**: hides the reader toolbar when the document is active.
- **Hide window controls**: hides the reader controls when the document is active.

Collapse Outlines

- **Show All**: shows all outline levels when the reader opens the PDF.
- **Visible levels**: shows outline levels down to the selected level (in the range 1 to 10) when the reader opens the PDF.

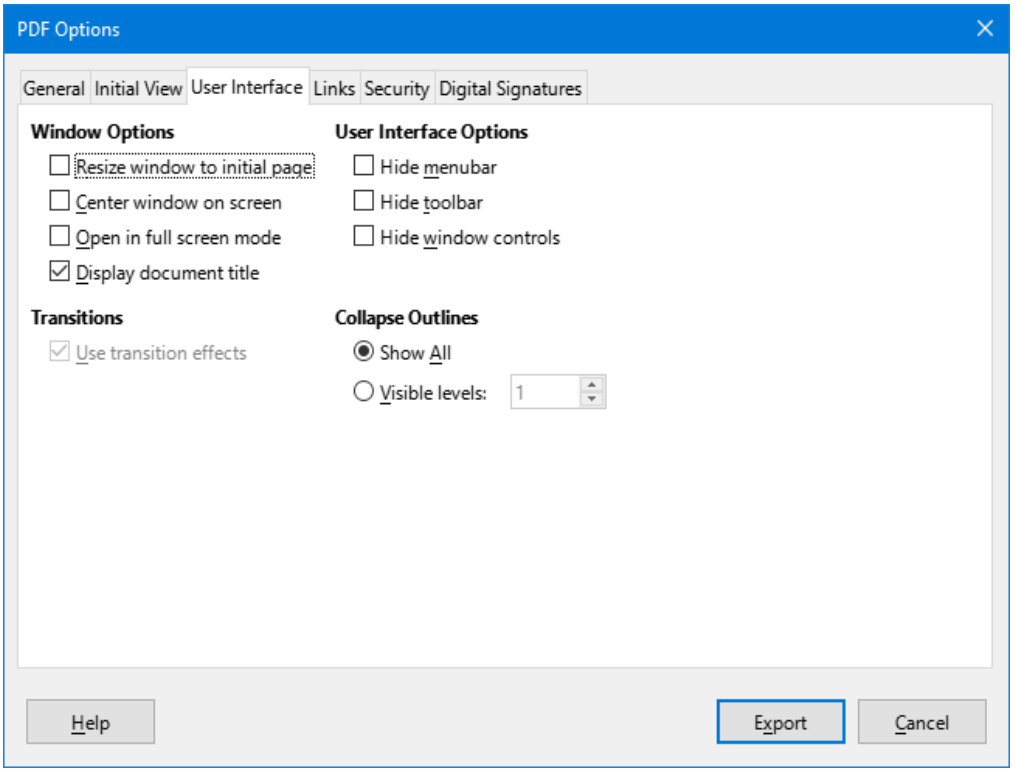


Figure 235: PDF Options dialog – User Interface tab

Note

Outlines are generally not used in Calc.

Links tab of PDF Options dialog

On the *Links* tab (Figure 236) you can select how bookmarks and hyperlinks are exported to PDF.

General

- **Export outlines as named destinations:** If you have defined Calc sheet names, this option exports them as “named destinations” to which Web pages and PDF documents can link. Generally not used in Calc.
- **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 extensions 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. See *Relative hyperlinks* in the Calc Help for more information.

Cross-document links

Defines the behavior of links clicked in PDF files. Select one among the following alternatives:

- **Default mode**: The PDF links will be handled as specified in your operating system.
- **Open with PDF reader application**: Use the same application used to display the PDF document to open linked PDF documents.
- **Open with Internet browser**: Use the default Internet browser to display linked PDF documents.

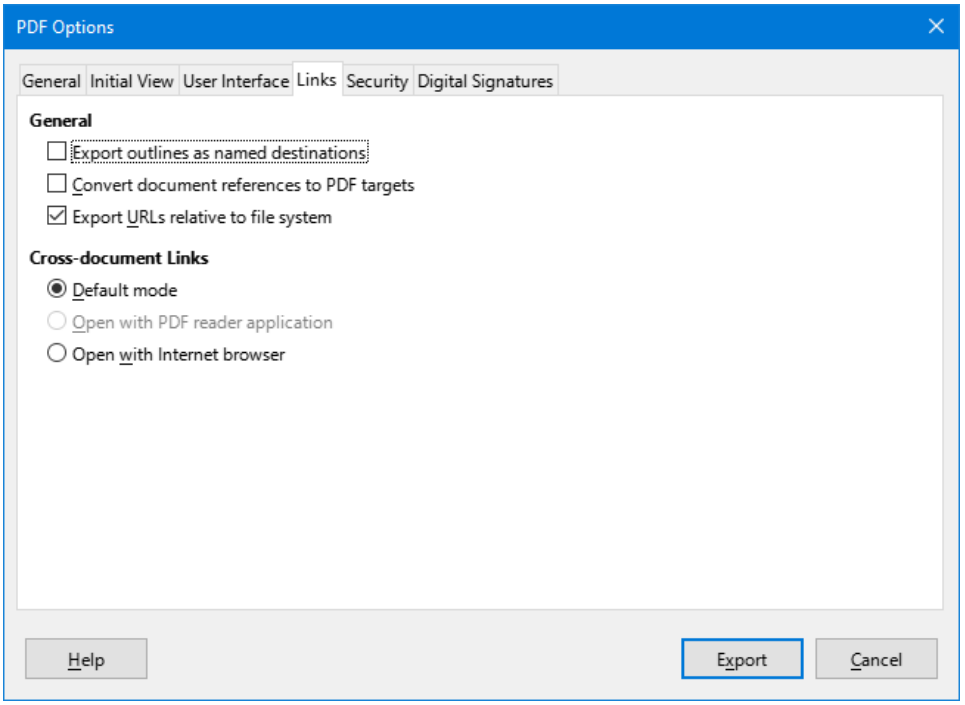


Figure 236: PDF options dialog - Links tab

Security tab of PDF Options dialog

Use the *Security* tab (Figure 237) to encrypt and set passwords when you export your spreadsheet and create the PDF file. Setting encryption and passwords also allows you to apply restrictions on printing and if changes or copying can be carried out on the PDF file.

Click the **Set Passwords** button to open the Set Passwords dialog (Figure 238), where you enter the passwords. You can enter a password (**Set open password**) to open the file and an optional password (**Set permission password**) to restrict what readers can do with the PDF file.

- 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 permission password set, the PDF can be opened by anyone, but its permissions can be restricted. See Figure 237. After you set a password for permissions, the other choices on the right half of the *Security* tab become available.
- 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.

The options on the *Security* tab become available only when passwords have been set.

Note

Permissions settings are effective only if the user's PDF viewer respects the settings.

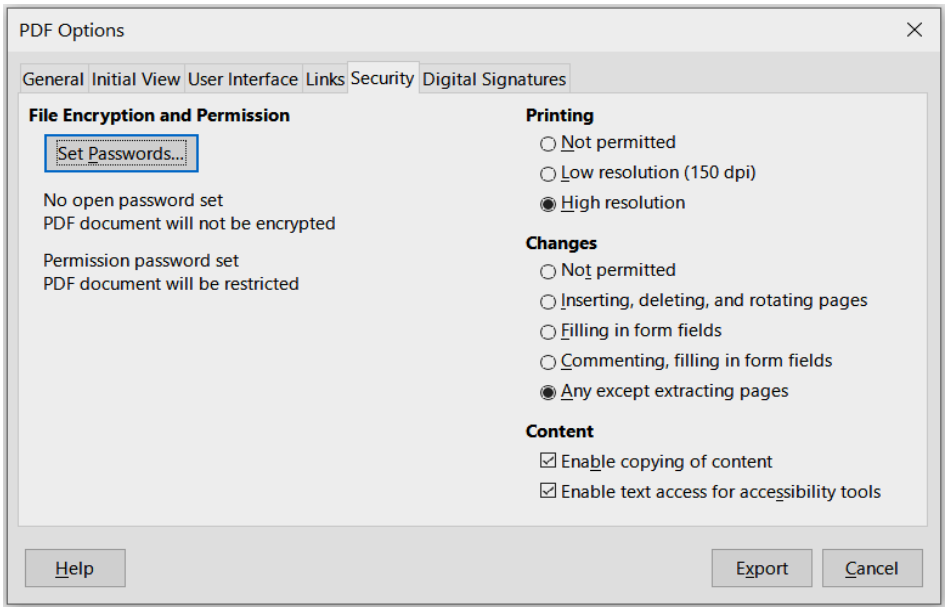


Figure 237: PDF Options dialog – Security tab

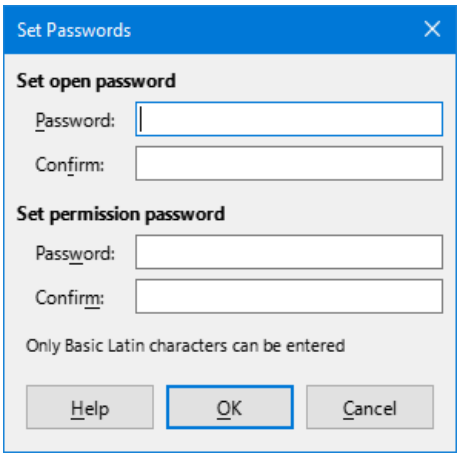


Figure 238: Set Passwords dialog

Digital Signatures tab of PDF Options dialog

The *Digital Signatures* tab contains the options related to exporting a digitally signed PDF.

Digital signatures are used to ensure that the PDF was really created by the original author (that is, you), and that the document has not been modified since it was signed.

The signed PDF export uses the keys and X.509 certificates already stored in your default key store location or on a smartcard. The key store to be used can be selected under **Tools > Options > LibreOffice > Security > Certificate Path**. (Not available on Microsoft Windows systems, where LibreOffice will access the system certificate storage.) When using a smartcard, it must already be configured for use by your key store. This is usually done during installation of the smartcard software. Details about using these features is outside the scope of this chapter.

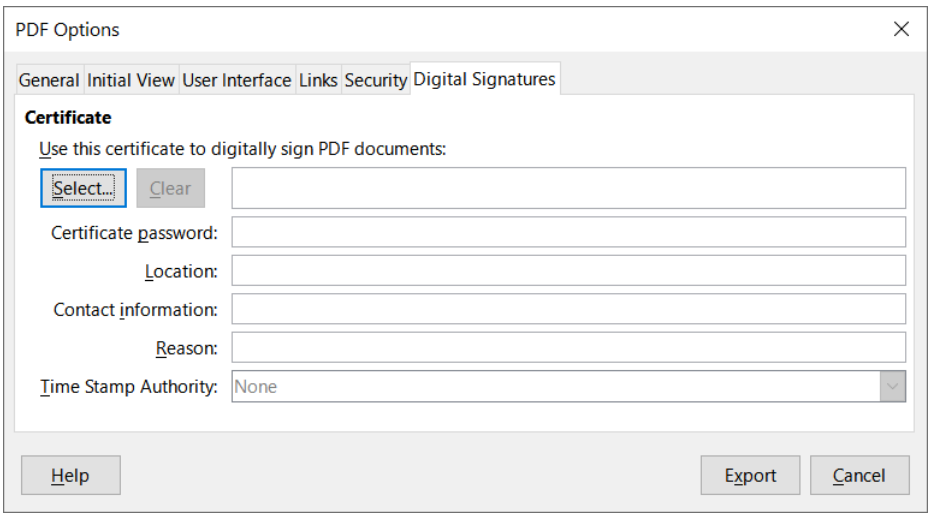


Figure 239: PDF Options dialog – Digital Signatures tab

- **Use this certificate to digitally sign PDF documents:** Click **Select** to open the Select X.509 Certificate dialog, where all certificates found in your selected key store are displayed. If the key store is protected by a password, you are prompted for it. When using a smartcard that is protected by a PIN, you are also prompted for that.

  Select the certificate to use for digitally signing the exported PDF, then click **Select**.

  All other fields on the *Digital Signatures* tab are accessible only after a certificate has been selected.

- **Certificate password:** Enter the password used for protecting the private key associated with the selected certificate. Usually this is the key store password. If the key store password has already been entered in the Select X.509 Certificate dialog, the key store may already be unlocked and not require the password again.

  When using a smartcard, enter the PIN here. Some smartcard software will prompt you for the PIN again before signing.

- **Location**, **Contact information**, **Reason**: Optionally enter additional information about the digital signature that will be applied to the PDF. This information will be embedded in the appropriate PDF fields and will be visible to anyone viewing the PDF. Each or all of the three fields may be left blank.

- **Time Stamp Authority:** Optionally select a Time Stamping Authority (TSA) URL. During the PDF signing process, the TSA will be used to obtain a digitally signed timestamp that is then embedded in the signature. Anyone viewing the PDF can use this timestamp to verify when the document was signed.

  The list of TSA URLs that can be selected is maintained under **Tools > Options > LibreOffice > Security > TSAs**. If no TSA URL is selected (the default), the signature will not be timestamped, but will use the current time from your local computer.

Exporting to other formats

LibreOffice uses the term “export” for some file operations involving a change of file type. If you want to use another spreadsheet file format (for example, Microsoft Excel), use **File > Save As**. If you want to create web pages from your spreadsheet, use **File > Export**.

Emailing spreadsheets

LibreOffice provides several ways to send a document quickly and easily as an email attachment in OpenDocument format (LibreOffice default format), other spreadsheet formats, or as a PDF file. You can also email a document to several recipients. For more information, see the *Getting Started Guide*.

To send the spreadsheet as an email attachment:

1) Go to **File > Send** on the Menu bar and select from the following options. LibreOffice opens your default email program (if set) with the spreadsheet attached in the selected format.
   - *Email Document*: the spreadsheet is sent in its current format.
   - *Email as OpenDocument Spreadsheet*: the spreadsheet is sent in the ODF format (.ods).
   - *Email as Microsoft Excel*: the spreadsheet is sent in the Excel format (.xlsx).
   - *Email as PDF*: The PDF Options dialog opens. Select the parameters to be used for the PDF file. See “Controlling PDF content and quality” above.
2) In your email program, enter the recipient, subject, and any text you want to add, then send the email.

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 the public key with the public key that is published on the web site of the certificate authority.

Whenever someone changes something in the document, the change breaks the digital signature.

On Windows operating systems, the Windows features for validating a signature are used. On Linux systems, files that are supplied by Mozilla Thunderbird or Firefox are used to validate the signature. For a more detailed description of how to get and manage a certificate, and signature validation, see *About Digital Signatures* in the LibreOffice Help.

Applying a digital signature

The following procedure is only an example of how to digitally sign a document. The actual procedure depends on how your computer is set up and the computer’s operating system.

1) Open the file that you want to digitally sign.
2) Go to **File > Digital Signatures > Digital Signatures** on the Menu bar.

- If you have set LibreOffice to warn you when the document contains certain types of information (see “Removing personal data” below), you may see a message box asking whether you want to continue signing the document. Click **Yes** to continue, or click **No** to exit and take appropriate action to remove the private information and restart this procedure.
- If you have not saved the document since the last change, a message box appears. Click **Yes** to save the file. When you have saved the file, the Digital Signatures dialog opens (Figure 240). It lists existing signatures and their descriptions (if they have any).

3) On the Digital Signatures dialog, click **Sign Document** to open the Select X.509 Certificate dialog (Figure 241).

   Select the certificate you want to use and click **Sign** to close the Select X.509 Certificate dialog.

   The certificate used is displayed in the Digital Signatures dialog with an icon next to its name. This icon indicates the status of the digital signature.

   - An icon with a red seal indicates that the document was signed and the certificate was validated.
   - An icon with a yellow caution triangle overlaying the red seal indicates that the document is signed but that the certificate could not be validated.
   - An icon with a yellow caution triangle by itself indicates an invalid digital signature.

4) Click **Close** to close the Digital Signatures dialog and digitally sign your file.

A signed document shows an icon in the status bar. You can double-click the icon to view the certificate. More than one signature can be added to a document.

Note

If you make any changes to the document after digitally signing, the digital signature is removed automatically and you have to repeat the above procedure to digitally sign it again.

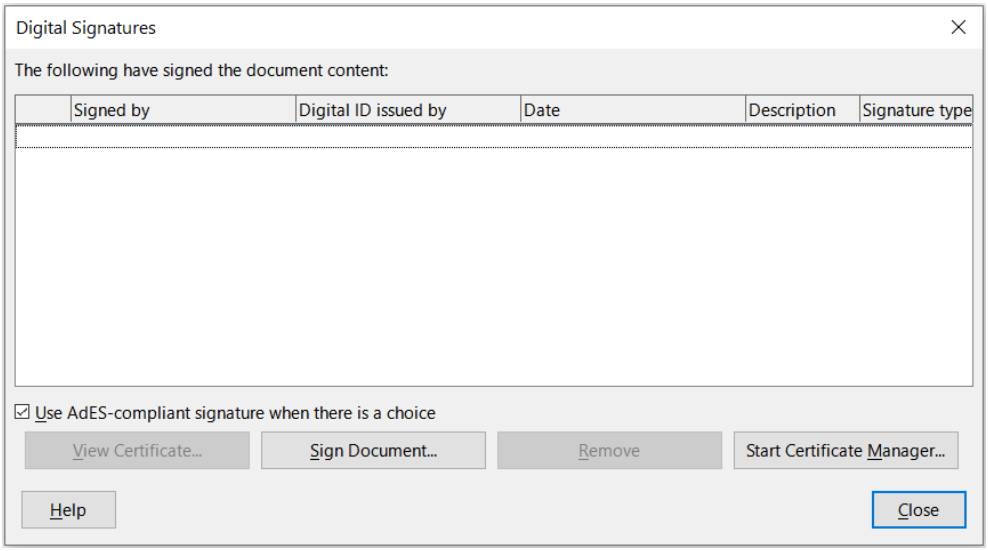


Figure 240: Digital Signatures dialog

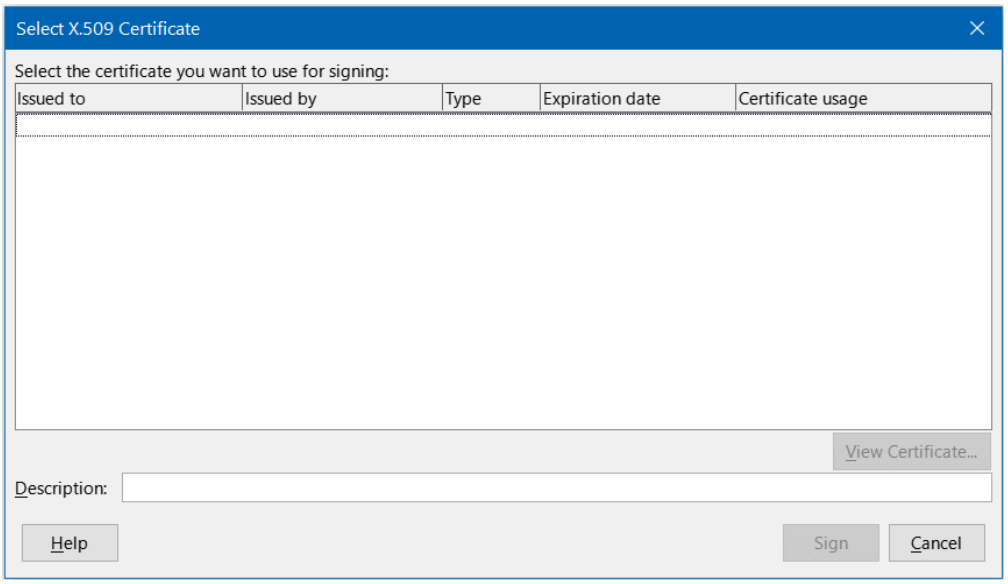


Figure 241: Select X.509 Certificate dialog

Signing multiple times with the same signature

In the past, LibreOffice prohibited creating multiple signatures by the same author on a document, because there was no semantic meaning of signing the same document multiple times. LibreOffice now provides a signature description, so multiple signatures from the same author are allowed, because each signature can have a different meaning.

When you select **File > Digital Signatures > Digital Signatures**, the dialog (Figure 240) lists existing signatures together with their description (if they have any).

When you click the **Sign Document** button, the dialog (Figure 241) for certificate selection now also asks for an optional description.

Changing the value of an existing description invalidates the signature.

Digitally signing macros

Normally, macros are part of a document. If you sign a document, the macros inside the document are signed automatically. If you want to sign only the macros, but not the document, go to **Tools > Macros > Digital Signature** on the Menu bar and apply the signature as described above.

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 you when files contain certain information and to remove personal information automatically on saving.
- To remove personal and some other data from a file, go to **File > Properties**. On the *General* tab, deselect **Apply user data** and then click **Reset Properties**. This removes any names in the created and modified fields, deletes the modification and printing dates, and resets the *Total editing time* to zero, the creation date to the current date and time, and the *Revision number* to 1.

- To remove version information, either go to **File > Versions** on the Menu bar, select the versions from the list and click **Delete**, or go to **File > Save As** and save the file with a different name.



Calc Guide 7.5

Chapter 8
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. All you have to do is add the arguments, and the calculation is made automatically. 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-sheet system in Calc, it is worth planning ahead a little. Make sure to:

- Avoid typing fixed values into formulas
- Include documentation (notes and comments) describing what the system does, including what input is required and where the formulas come from (if not created from scratch)
- Incorporate a system of error-checking of formulas 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 are also 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 minimize errors and aid troubleshooting.

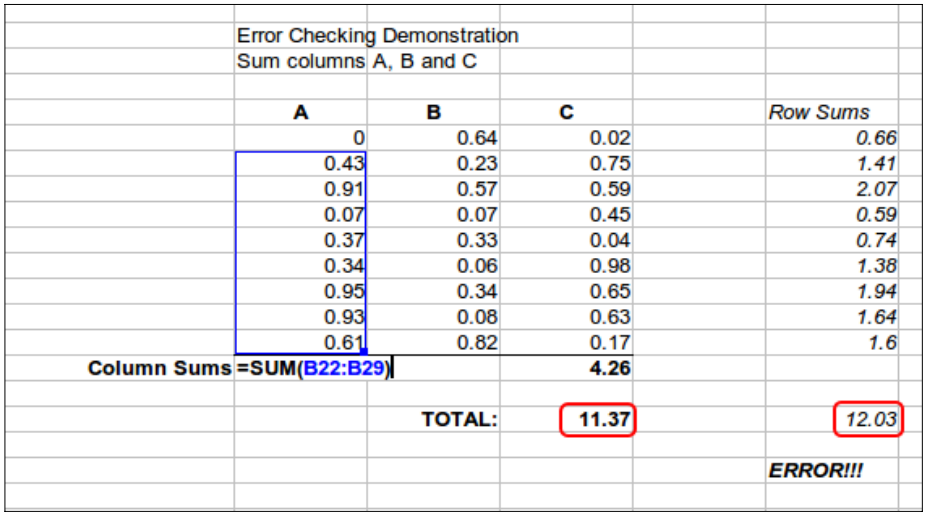
Lack of documentation

Lack of documentation is a very common point of failure. Many users prepare a simple sheet 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 later be easily 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 sheet 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 the function 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 values –row total and column total–must agree. If they do not, you have an error somewhere.

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 242).



	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 242: Error checking of formulas

Creating formulas

You can enter formulas in two ways. One method is to use the Function Wizard or the equivalent facilities in the Functions deck of the Sidebar. The second method is to type directly into the cell or into the Input line. A formula must begin with an = symbol. When typing directly, you normally need to start a formula with =. However, if your formula begins with a + or – (for example `-2*A1`), then Calc automatically adds the = symbol. An = is not added if you simply enter a positive or negative number (such as -2 or +3). Starting with anything else causes your intended formula to be treated as if it were text.

Operators in formulas

Each cell in the sheet can be used as a data holder or a place for data calculations. To enter data, simply type in the cell and move to the next cell or press *`Enter`*. With formulas, the equals sign indicates that the cell will be used for a calculation. An example of a mathematical calculation like 15 + 46 is shown in Figure 243.

While the calculation on the left used 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 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 using formulas are shown in Table 9.

These cell references allow formulas to use data from anywhere in the sheet being worked on, or from any other sheet in the document that is opened. If the data needed was in different sheets, they would be referenced by referring to the name of the sheet, for example `=$Sheet2.B12+$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.

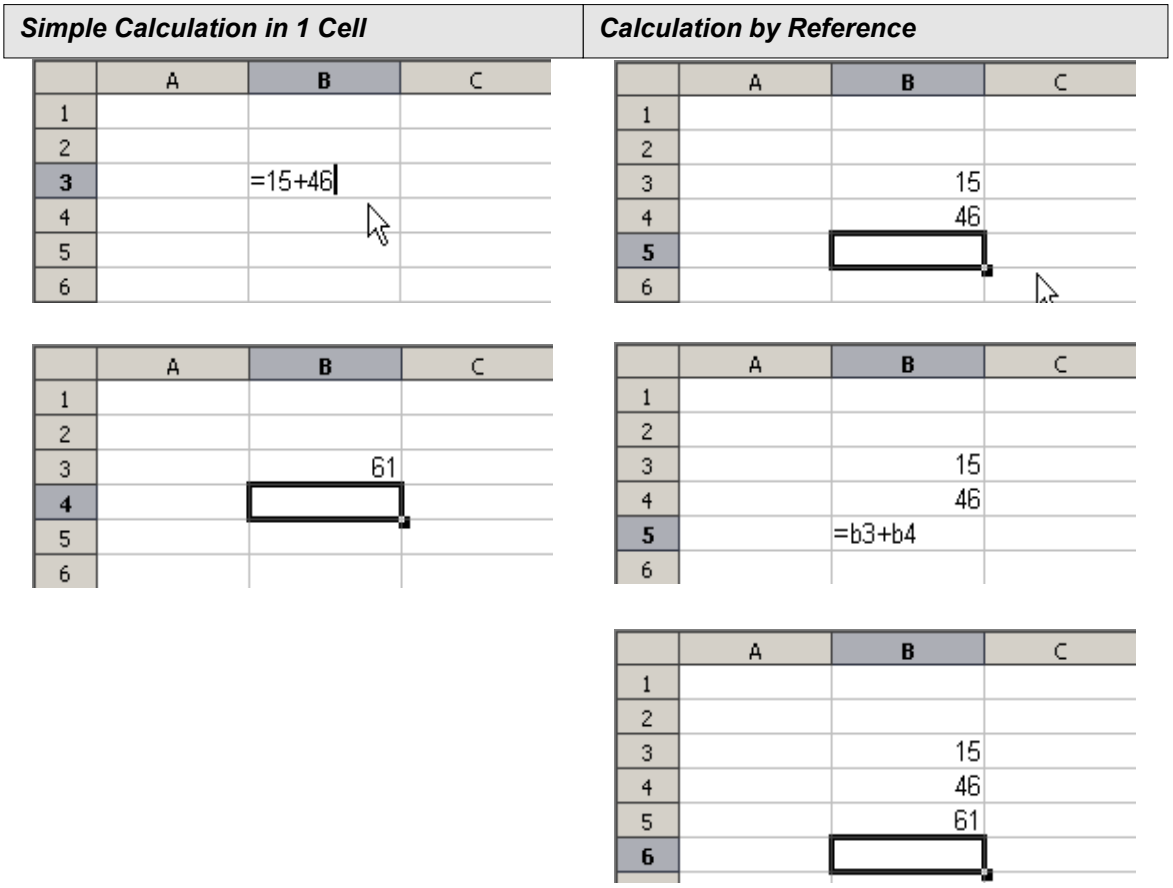


Figure 243: A simple calculation

Table 9: Common ways to use 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 multiplying the contents of A1 and A2.
`=ROUND(A1,1)`	Displays the contents of cell A1 rounded to one decimal place.
`=EFFECT(5%,12)`	Calculates the effective interest for 5% annual nominal interest with 12 payments a year.

Formula	Description
`=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.
`=SUM(B1:B1048576)`	Sums all numbers in column B.
`=AVERAGE(BloodSugar)`	Displays the average of a named range defined under the name *BloodSugar*. It is possible to establish ranges for inclusion by naming them using **Sheet > Named Ranges and Expressions > Define**, for example *BloodSugar* representing a range such as B3:B10.
`=IF(C31>140, "HIGH", "OK")`	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. In this example, if the contents of C31 is greater than 140, then HIGH is displayed, otherwise OK is displayed.

Operator types

You can use the following operator types in Calc: arithmetic, comparative, 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 10: Arithmetic operators

Operator	Name	Example
+ (Plus)	Addition	`=1+1`
- (Minus)	Subtraction	`=2-1`
- (Minus)	Negation	`-5`
* (Asterisk)	Multiplication	`=2*2`
/ (Slash)	Division	`=10/5`
% (Percent)	Percent	`15%`
^ (Caret)	Exponentiation	`=2^3`

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 11: Comparative operators

Operator	Name	Example	Result (A=4, B=5)
=	Equal	`A1=B1`	FALSE
>	Greater than	`A1>B1`	FALSE
<	Less than	`A1<B1`	TRUE
>=	Greater than or equal to	`A1>=B1`	FALSE
<=	Less than or equal to	`A1<=B1`	TRUE
<>	Inequality	`A1<>B1`	TRUE

If cell A1 contains the numerical value 4 and cell B1 contains 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 244 shows an example.

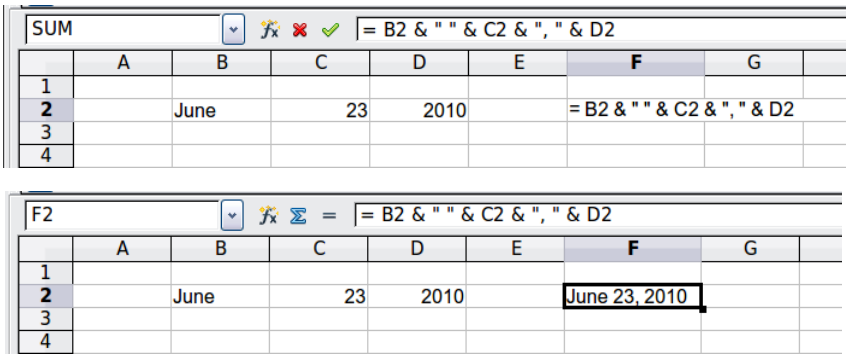


Figure 244: Text concatenation

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.

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 reference for the upper left cell is A1.

Thus 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.

Reference range operator

The range operator is written as a colon. An expression using the range operator has the following syntax:

```
reference upper left : reference lower 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.

In the upper left corner of Figure 245 the reference A1:D12 is shown, corresponding to the cells included in the drag operation with the mouse to highlight the range.

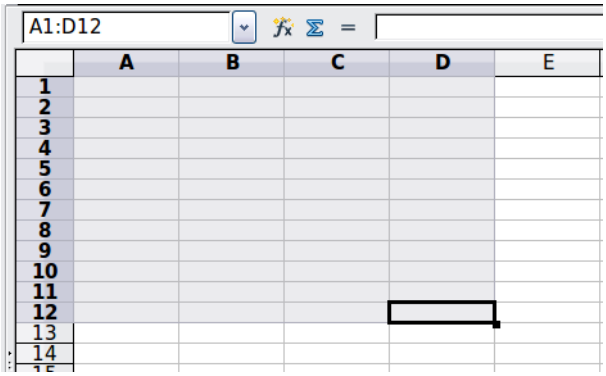


Figure 245: Reference operator for a range

Table 12: Reference range operator examples

Example	***Description***
A2:B4	Reference to a rectangle range with 6 cells, 2 column width × 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 × 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 × 2 row height × 3 sheets depth. (Assumes that sheets *Sheet1*, *Sheet2*, and *Sheet3* appear in that order on the Sheet tabs area.)
B:B	Reference to all cells of column B.
A:D	Reference to all cells of columns A to D.
20:20	Reference to all cells of row 20.
1:20	Reference to all cell of rows 1 to 20.

When you enter B4:A2, B2:A4, or A4:B2 directly, 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. For more information on naming cells, see “Named ranges” below.

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.

The reference concatenation also applies to whole rows and whole columns. For example `SUM(A:B~D:D)` is the sum of all cells in columns A and B and the column D.

Reference 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:D6. This is illustrated in Figure 246, in which the cells in the range A2:B4 have orange backgrounds and the cells in the range B3:D6 have thick black borders. The cells that have both an orange background and a thick black border (B3:B4) form the intersection of the two ranges.

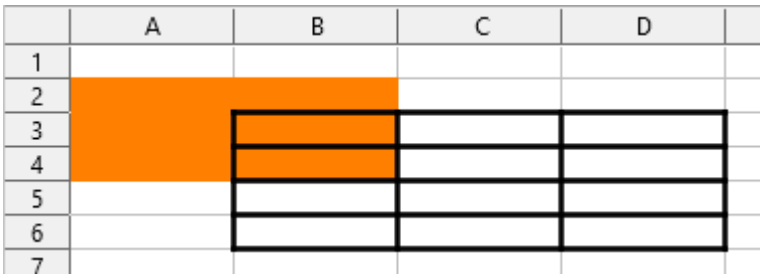


Figure 246: Simple example of reference intersection operator

```
(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`.

```
A:B ! 10:10
```

Calculates the intersection of columns A and B with line 10, thus selecting A10 and B10.

You can use the intersection operator to refer to 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 the cell containing the temperature in February.

The intersection operator (!) has 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 247.

1) Type the numbers 4 and 11 into cells C3 and C4 respectively of that spreadsheet.
2) Copy the formula in cell B5 (`=B3+B4`) 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.

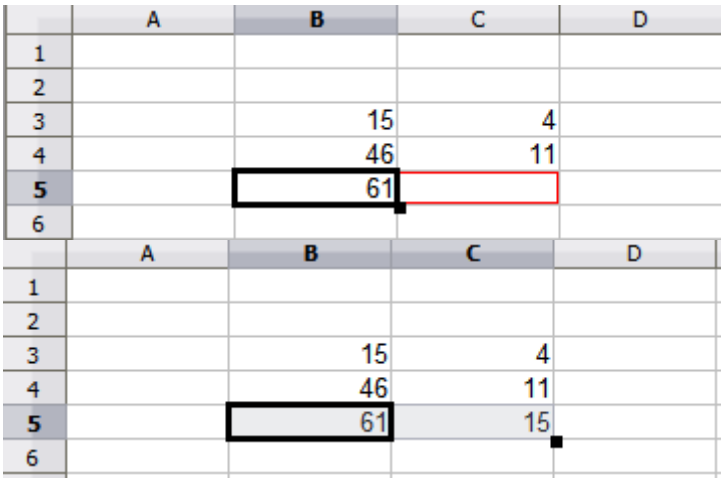


Figure 247: Relative references

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[-4]C[-1]. 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.

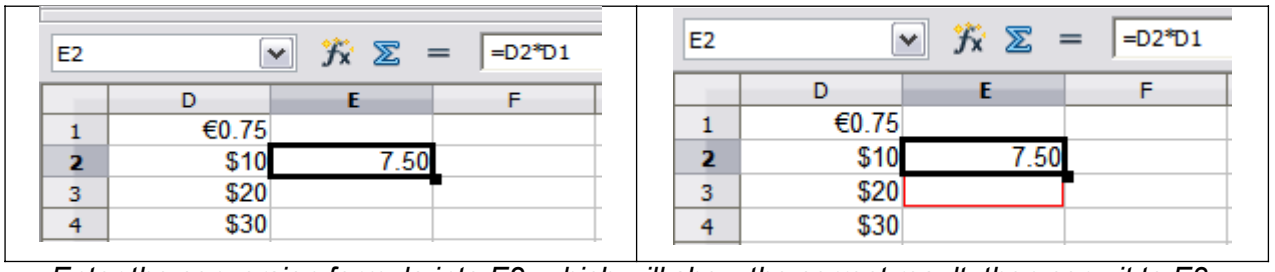
Relative addressing is the default method of referring to addresses in Calc.

Absolute referencing

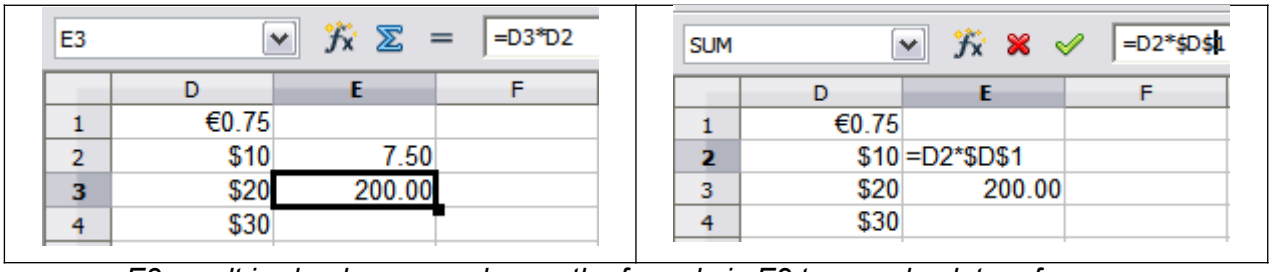
You may want to multiply a column of numbers by a fixed amount. A column of figures might show amounts in US Dollars. To convert these amounts to Euros it is necessary to multiply each dollar amount by the exchange rate. $US10.00 would be multiplied by 0.75 to convert to Euros, in this case Eur7.50. 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.

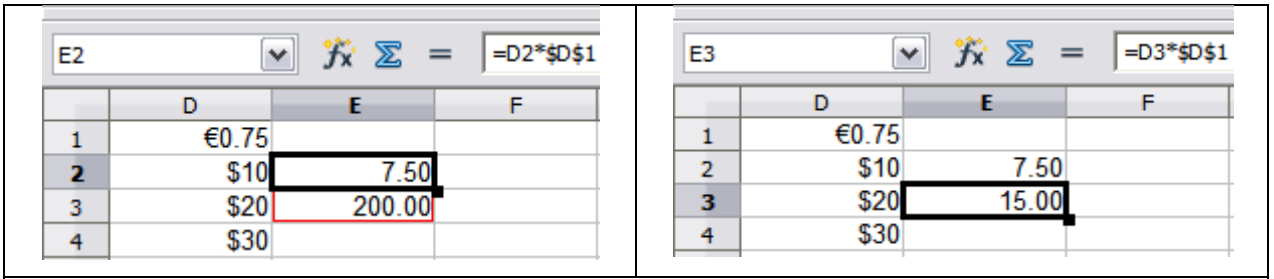
The $ signs before the D and the 1 convert the reference to cell D1 from relative to absolute or fixed. If the formula is copied to another cell the second part will always show $D$1. The interpretation of this formula is “take the value in the cell one column to the left in the same row and multiply it by the value in cell D1”.



Enter the conversion formula into E2, which will show the correct result, then copy it to E3.



E3 result is clearly wrong; change the formula in E2 to use absolute reference.



Copy the correct formula from E2 to E3 to get the correct answer.

Figure 248: Absolute references

Cell references can be shown in four ways, listed in Table 13.

Table 13: Cell reference types

Reference	*Explanation*
D1	Relative, from cell E3 it is the cell one column to the left and two rows above
$D$1	Absolute, 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 *F4* to cycle through the four types of references. To cycle only part of the formula select the cells in the formula bar and cycle with *F4*. Selecting the menu option **Sheet > Cycle Cell Reference Types** is equivalent to pressing the *F4* shortcut.

Knowledge of the use of relative and absolute references is essential if you want to copy and paste formulas and to link spreadsheets.

Named ranges

Cells and cell ranges can have a name assigned to them. Naming cells and ranges enhances formula readability and document maintenance. A simple example would be naming a range of cells B1:B10 as “Weight” and sum all weights. The formula is `=SUM(B1:B10)`. When the range B1:B10 is named as *Weight*, you can transform the formula to `=SUM(Weight)`. The advantage is clear in terms of readability of the formulas.

Another advantage is that all formulas that have the named range as argument are updated when the named range changes location or size. For example, if the range Weight is now in cells P10:P30, you do not need to review all the formulas that have Weight as an argument; you only need to update the named range *Weight* with the new size and location.

To define a named cell or range select the cell or range and use menu **Sheet > Named Ranges and Expressions > Define**. The dialog in Figure 249 appears with the selected range and you define the name and scope of the named range.

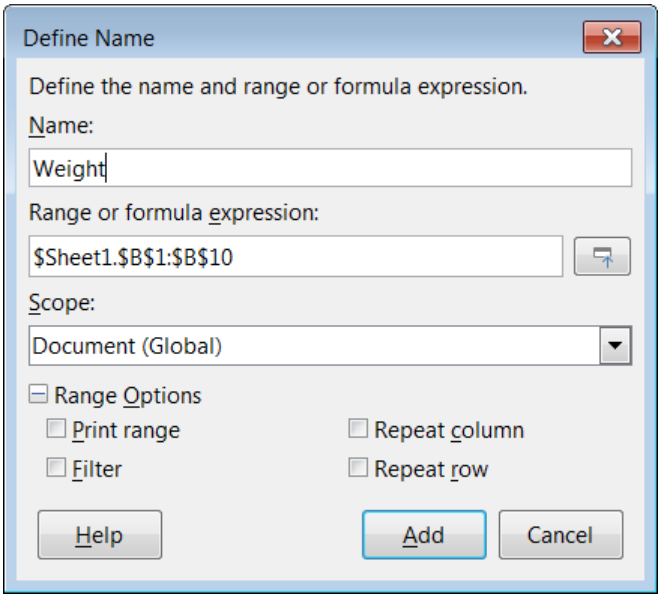


Figure 249: Define Name dialog

You can also define a named range directly in the sheet by selecting the range and typing its name in the Name Box at the left of the Formula Bar (Figure 250).

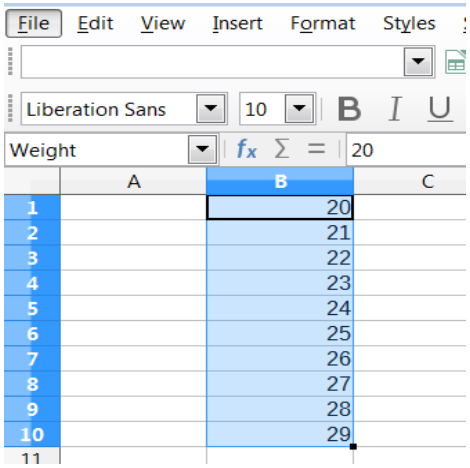


Figure 250: Inserting name in the range box to define a named range

To quickly access a named range, select the named range in the Name Box drop-down above. The named range is shown on the screen and selected.

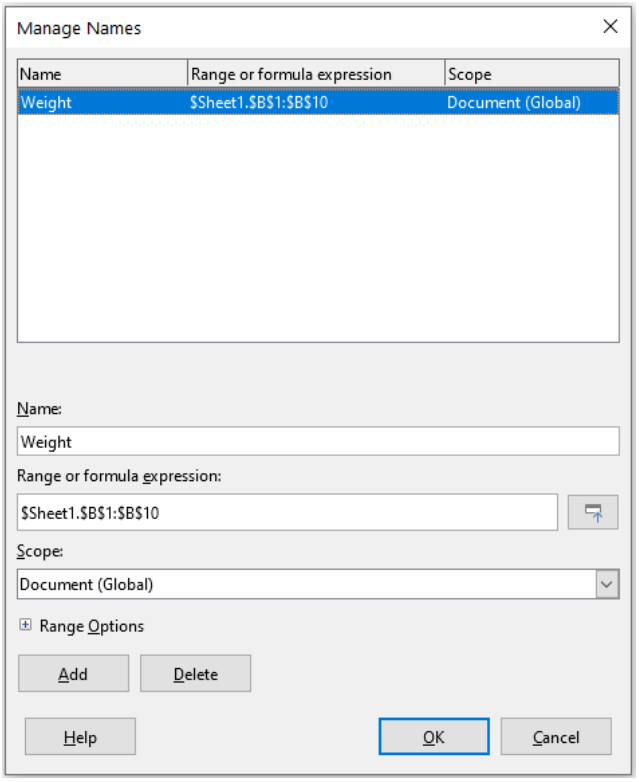


Figure 251: Manage Names dialog

To modify a named range, use the Manage Names dialog (Figure 251). This dialog is accessed by selecting **Sheet > Named Ranges and Expressions > Manage** on the Menu bar or pressing *Ctrl+F3*.

Named expressions

You also can give a long or complex formula a name. To name a formula, open the Define Name dialog (Figure 249) and enter the formula expression in the *Range or formula expression* box. Name the expression and click **Add**.

As an example, suppose you need to compute in cells C1 to C10 the circumference of a set of circles and you are given their radius in B1 to B10. Define a named expression CIRCUMFERENCE, with expression `=2*PI()*B1` and click **Add** to close the dialog. In cell C1, type `=CIRCUMFERENCE` and press *Enter*. The formula is applied to cell C1. Copy cell C1 and paste in the remaining cells from C2 to C10 and you have the circumferences of all the circles. All cells in the range C1:C10 have the expression `=CIRCUMFERENCE`.

Note that the named expression uses the same rules for cell addressing, that is, absolute and relative references.

Order of calculation

Order of calculation refers to the sequence in which numerical operations are performed and the Wikipedia article at https://en.wikipedia.org/wiki/Order_of_operations provides useful general background information. 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 expected and correct result is being obtained. Following is an example of the order of calculation in operation.

Table 14: Order of calculation

Left To Right Calculation	***Ordered Calculation***
1+3*2+3 = 11 1+3 = 4, then 4x2 = 8, then 8+3 = 11	=1+3*2+3 result 10 3*2 = 6, then 1+6+3 = 10
Another possible intention could be: 1+3*2+3 = 20 1+3 = 4, then 2+3 = 5, then 4x5=20	The program resolves the multiplication of 3 x 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, order the formula as:

((1+3) * 2)+3 = 11 (1+3) * (2+3) = 20

Note

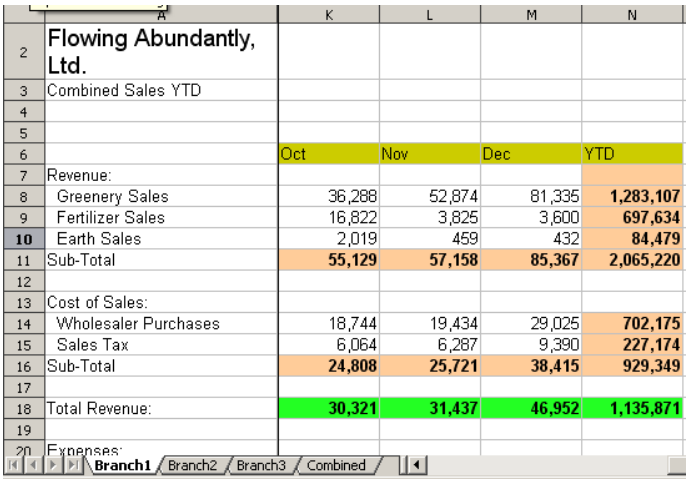
Use parentheses to group operations in the order you intend; for example, `=B4+G12*C4/M12` might become `=((B4+G12)*C4)/M12`.

Calculations linking sheets

Another powerful feature of Calc is the ability to link data through several sheets. The naming of sheets 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 (position) in the collection of sheets. There may be several sheets in each document and they may be numbered from the left: Sheet1, Sheet2, and so forth. If you drag the sheets around to different locations among the tabs, the function returns the number referring to the current position of this sheet. In a new instance of Calc, the default is a single sheet.

For example, if the formula `=SHEET()` is put into A1 on Sheet 1 it returns the value 1. If you drag Sheet 1 to be positioned between sheets 2 and 3 then the value changes to 2; it is now the second sheet in the order.

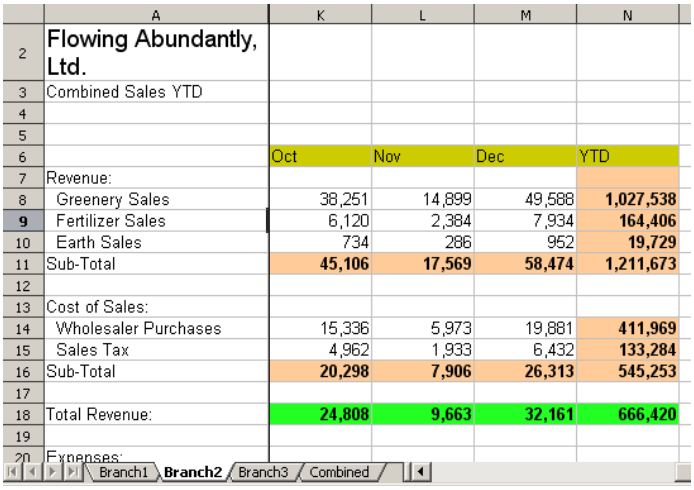
An example of calculations obtaining data from other work can be seen in a business setting where a business combines revenues and costs of each of its branch operations into a single combined sheet. See the four parts of Figure 252 below.



	A	K	L	M	N
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

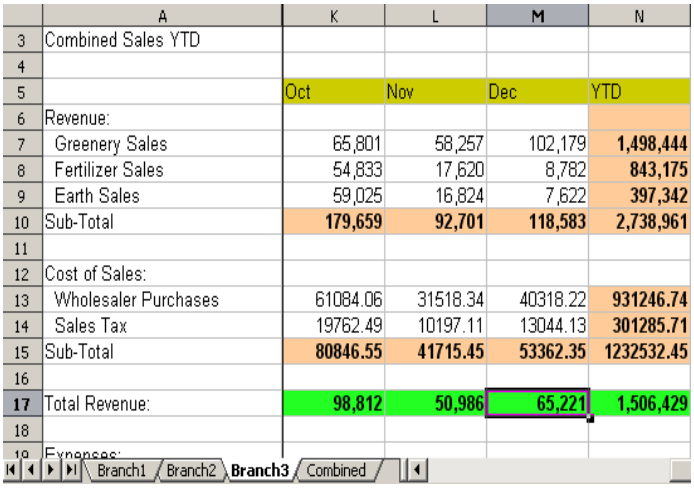
Sheet containing data for Branch 1.



	A	K	L	M	N
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

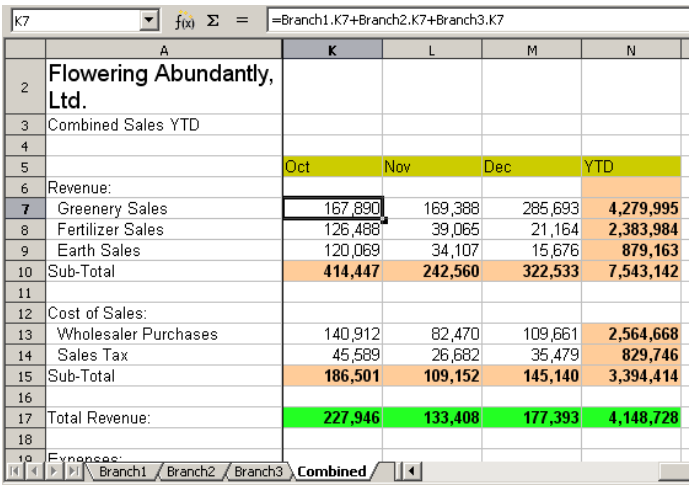
Sheet containing data for Branch 2.



	A	K	L	M	N
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:				

Branch1 | Branch2 | Branch3 | Combined

Sheet containing data for Branch 3.



Sheet containing combined data for all branches.

Figure 252: Combining data from several sheets into a single sheet

The sheets have been set up with identical structures. The easiest way to do this is to open a new spreadsheet, set up the first branch sheet, input data, format cells, and prepare the formulas for the various sums of rows and columns. After that, create copies from the first sheet as follows:

1) On the sheet tab, right-click and select **Rename Sheet**. Type `Branch1`. Right-click on the tab again and select **Move or Copy Sheet**.
2) In the Move/Copy Sheet dialog (Figure 253), select the **Copy** option (automatically selected if there is only one sheet in the spreadsheet) and select **-move to end position-** in the *Insert before* area. Change the entry in *New name* to `Branch2`. Click Copy. Repeat to produce the Branch3 and Combined sheets.

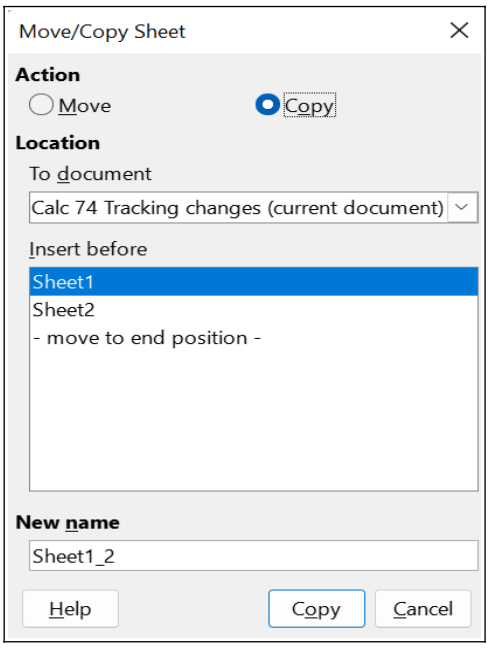
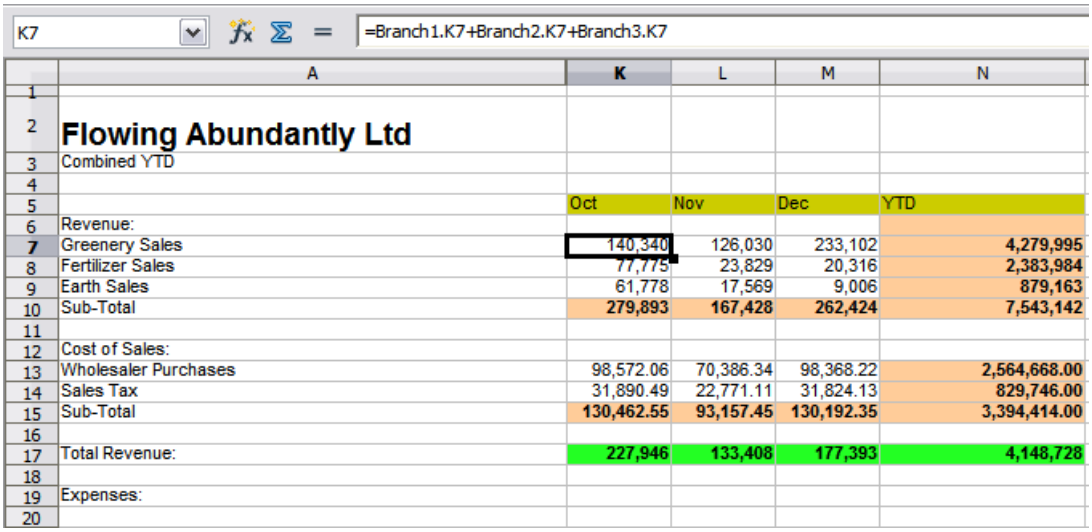


Figure 253: Copying a sheet

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 sheet, 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 K7 which adds the revenue from greenery sales for the three 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 254: Combined sheet showing linking between branch sheets

5) Copy the formula, highlight the range K7:N17, click **Edit > Paste Special > Paste Special** on the Menu bar, or right-click and select **Paste Special > Paste Special** in the context menu, or press `Ctrl+Shift+V`. Uncheck the **All** and **Formats** options in the *Paste* area of the dialog, check all other options in that area, and click **OK**. You will see the following message:

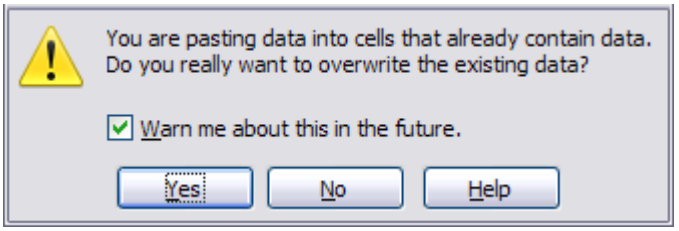
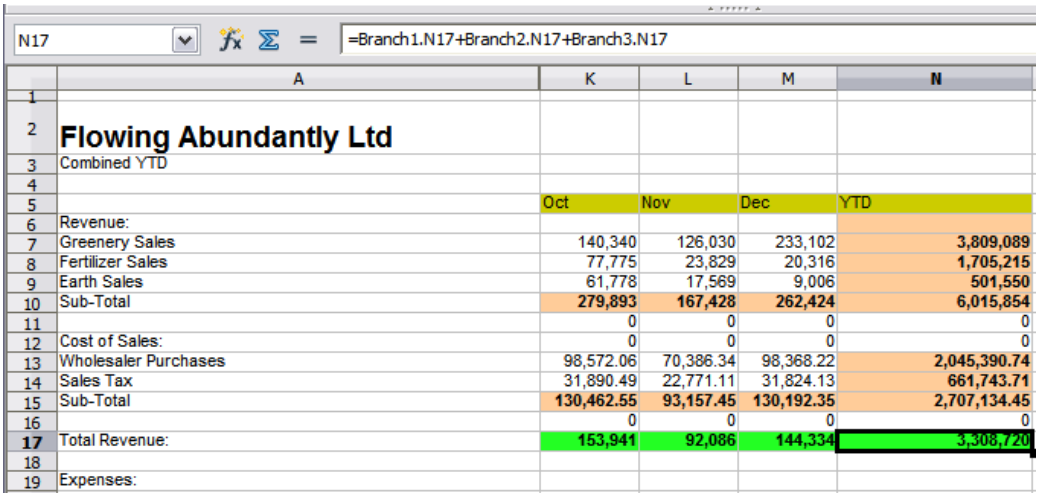


Figure 255: Linking sheets: pasting a formula to a cell range

6) Click **Yes**. You have now copied the formulas into each cell while maintaining the format set up in the original sheet. Of course, in this example you would have to tidy up the sheet 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	Greenery 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:	0	0	0	0
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 256: Linking sheets: Copy / Paste Special from K7:N17

The Function Wizard can also be used to accomplish the linking. Use of this wizard is described in detail in “Using the Function Wizard” below.

Understanding functions

Calc includes over 500 functions to help you analyze and reference data. Many of these functions are for use with numbers, but 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, or 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. In Calc, functions can be entered either in upper, lower or mixed cases.

A few basic functions are somewhat similar to operators. Examples:

+ (plus) This operator adds two numbers together for a result. SUM() on the other hand adds groups of contiguous ranges of numbers together.

*** (star)** 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 text on the Function Wizard and the Functions deck, or the Help, 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 in 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.

Tip

You can find more details about each of the available functions in the Calc Functions area of The Document Foundation Wiki at https://wiki.documentfoundation.org/Documentation/Calc_Functions. These wiki pages are a recent addition to the available documentation and are continuously undergoing improvement.

Compatibility with other spreadsheet applications

For many functions, Calc follows the *OpenFormula* standard defined in Part 2 (Recalculated Formula (OpenFormula) Format) of the Open Document Format for Office Applications (OpenDocument) Version 1.2. This standard can be accessed at the OASIS website (https://www.oasis-open.org/) or the ISO website (https://www.iso.org/standard/66375.html). Calc's general support for *OpenFormula* leads to a level of inherent compatibility with the function set of any other spreadsheet application that follows the same standard. (There are some functions within Calc that are not in accordance with *OpenFormula* but many of these are included specifically to improve the exchange of files between Calc and Microsoft Excel.)

In order to improve interoperability, Calc is able to open spreadsheets created by many different applications and to save them in many different formats. In the case of Microsoft Office, it is extremely straightforward to exchange spreadsheet files between the two applications. When Calc opens a Microsoft Excel spreadsheet, it automatically takes steps to avoid incompatibilities that might otherwise be encountered with certain functions.

For example, when Calc opens an Excel file that contains calls to Excel's CEILING function, these are automatically converted to reference Calc's CEILING.XCL function. Similarly when Calc saves a spreadsheet to Microsoft Excel format, it automatically takes steps to avoid potential incompatibilities. An example of this occurs when Calc saves a spreadsheet containing calls to its FLOOR function, as these are automatically converted to reference Excel's FLOOR.MATH function.

The Document Foundation's wiki provides a comparison of the features of LibreOffice and Microsoft Office, see https://wiki.documentfoundation.org/Feature_Comparison:_LibreOffice_-_Microsoft_Office. This comparison shows that Calc currently provides 508 discrete functions, with only 30 of those being unique to Calc, and the remainder having counterparts in Microsoft Excel. It is clear that there is a high level of commonality between the function sets of Calc and Excel, and many functions can be used in both applications with no change, thus increasing interoperability.

There are cases where a Calc function produces a result in accordance with international standards but the result differs from that produced by the equivalent Excel function. In such cases Calc often has a similarly named function but with a suitable modifier added to its name (such as "_ADD" or "_EXCEL2003") which provides the same result as the Excel function.

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.

As a typical example, the structure of a function to find cells that match entered search criteria is:

```
=DCOUNT(Database, Database field, Search criteria)
```

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 commas. A Calc function can take up to 255 arguments. An argument 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.

Depending on the nature of the function, arguments may be entered as in Table 15.

Table 15: Entering function arguments

Argument	***Description***
"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.
B2:D9	The range of cells 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 have 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.

Using the Functions deck

A more reliable method is to use the Functions deck on the Sidebar (Figure 257), accessed by selecting **View > Function List** or, if the Sidebar is already displayed, clicking the **Functions** icon on the tab panel at the right of the Sidebar.

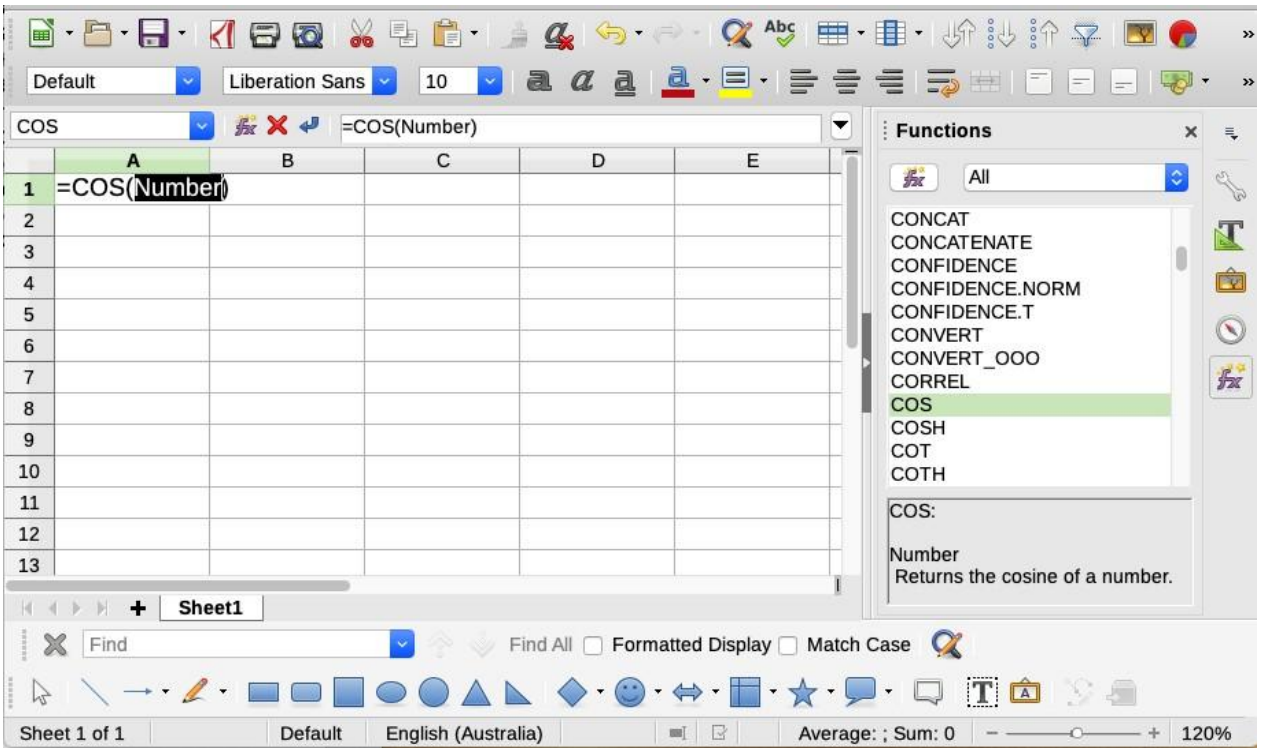


Figure 257: Functions deck in Sidebar

The Functions deck 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 mouse pointer over the division between the list and the description; when the pointer 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.

Using the Functions deck 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.

Using the Function Wizard

The most commonly used input method is the Function Wizard (Figure 258). To open it, choose **Insert > Function**, or click the **Function Wizard** icon on the Formula Bar, or press *Ctrl+F2*. The Function Wizard provides the same help features as the Functions deck, 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.

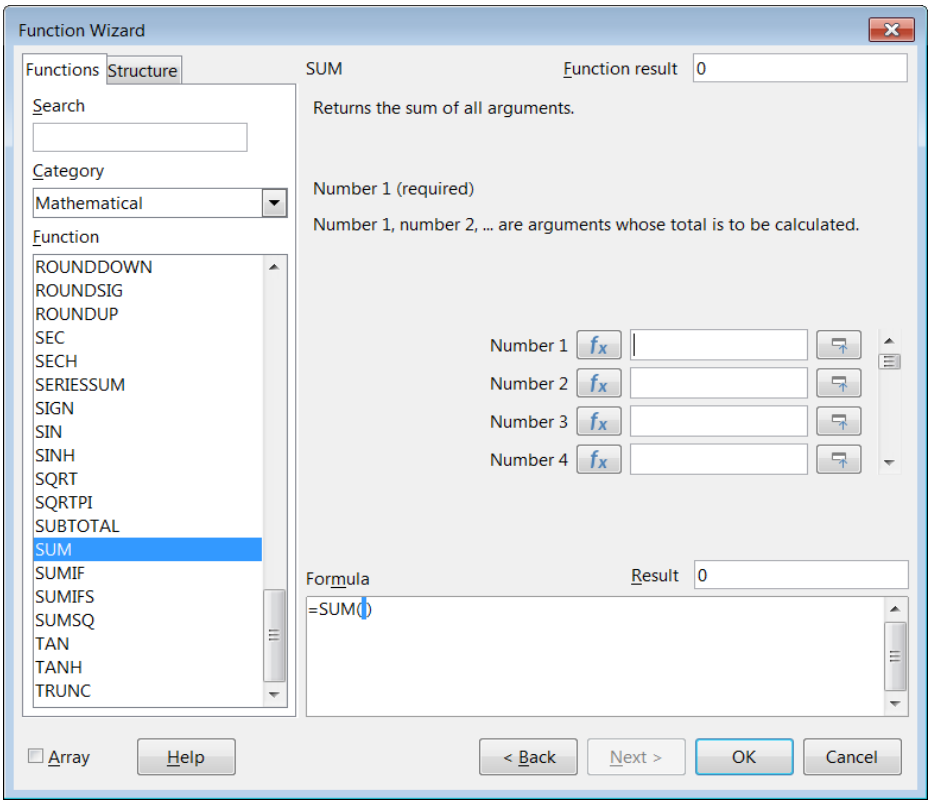


Figure 258: Functions tab of Function Wizard

Select a category of functions to shorten the list, then scroll down through the named functions and select the required one by double-clicking on it. The available categories within the Function Wizard, and the number of functions available in each category, are given in Table 16. When you select a function its description appears on the right-hand side of the dialog. Optionally you can type the function name in the Search box and the search narrows on each character inserted (Figure 258).

Table 16: Function categories in the Function Wizard

Category	Number of functions in category
Add-in	48
Array	15
Database	12
Date&Time	36
Financial	63
Information	21
Logical	11
Mathematical	82
Spreadsheet	22
Statistical	151
Text	47

The Function 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 Function Wizard so you can select cells from the sheet.



Figure 259: Function Wizard after shrinking

To select cells, either click directly on the cell or hold down the left mouse button and drag to select the required area.

When the area has been selected, click the **Expand** button to return to the wizard again.

If multiple arguments are needed click in the next text box 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 255 ranges or arguments in the SUM function.

Click **OK** to accept the function, add it to the cell, and get the result.

Note

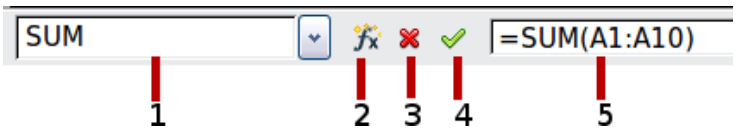
If you select a function by double-clicking it in the list, and then change your mind and select a different one by double-clicking again, then the second choice formula is added into the first choice formula in the *Formula* text box. You must clear the *Formula* text box and then double-click the function to add it to the box.

This additive facility allows you to create complex formulas by building them up in the *Formula* box.

You can also select the *Structure* tab to see a tree view of the parts of the formula. The main advantage over the Functions deck is that each argument is entered in its own field, making it easier to manage. The price of this reliability is slower input, but precision is generally more important than speed when creating a spreadsheet.

The structure view of the Function Wizard is important for debugging and fixing very long, nested, and complex formulas. In this view, the formula is parsed, and each formula component is calculated by a simpler function call or arithmetic operation and then combined following the rules of calculation. It is possible to visualize each parsed element of the formula and check if the intermediate results are correct, until the mistake is found.

Functions can be entered into the Input line. After you enter a function on the Input line, press the *Enter* key or click the **Accept** button on the Formula Bar to add the function to the cell and get its result.



1	Name Box showing list of common functions		
2	Function Wizard	4	Accept
3	Cancel	5	Input line

Figure 260: The Formula Bar

If you see the formula in the cell instead of the result, then **Formulas** is selected in the *Display* section of the **Tools > Options > LibreOffice Calc > View** dialog. Deselect **Formulas**, and the result will display. However, you can still see the formula in the Input line.

Tip

The menu option **View > Show Formula** and the Windows / Linux shortcut *Ctrl*+` (grave accent) also toggle formulas on / off.

Array formulas

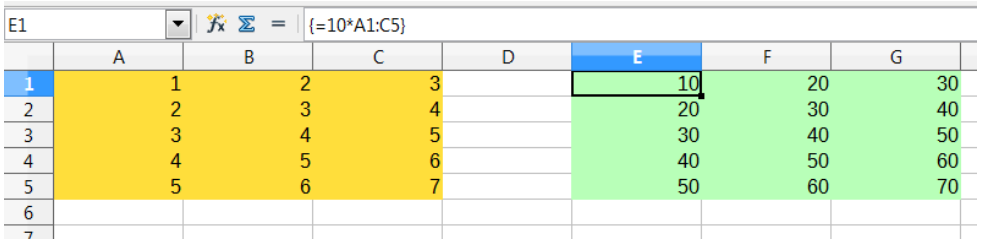
What is an array formula?

A formula in which the individual values in a cell range are evaluated is referred to as an array formula. The difference between an array formula and other formulas is that the array formula deals with several values simultaneously instead of just one.

Not only can an array formula process several values, but it can also return several values. The results of an array formula is also an array.

When Calc updates the formulas, each affected cell is read and its formula is recalculated. If you have a thousand cells in a column with the same formula (the formula expression only changes the data to compute), you end with one thousand identical formulas to interpret and execute.

Array formulas will evaluate the formula once and execute calculations as many time as the size of the array, thus saving the time used to interpret each cell formula. And because Calc stores only one formula for the entire array of data cells, it also save space in the spreadsheet file.



	A	B	C	D	E	F	G
1	1	2	3		10	20	30
2	2	3	4		20	30	40
3	3	4	5		30	40	50
4	4	5	6		40	50	60
5	5	6	7		50	60	70
6							

Figure 261: Source array in yellow and resulting array in green. The array formula is shown in the Formula Bar

To multiply the values in the individual cells by 10 in the above array (Figure 261), you do not need to apply a formula to each individual cell or value. Instead you just need to use a single array formula. Select a range of 3 x 5 cells on another part of the spreadsheet, enter the formula `=10*A1:C5` and confirm this entry using the key combination *Ctrl*+*Shift*+*Enter*. The result is a 3 x 5 array in which the individual values in the cell range (A1:C5) are multiplied by a factor of 10.

In addition to multiplication, you can also use other operators on the reference range (an array). With Calc, you can add (+), subtract (-), multiply (*), divide (/), use exponents (^), concatenation (&) and comparisons (=, <>, <, >, <=, >=). The operators can be used on each individual value in the cell range and return the result as an array if the array formula was entered.

Comparison operators in an array formula treat empty cells in the same way as in a normal formula, that is, either as zero or as an empty string. For example, if cells A1 and A2 are empty the array formulas `{=A1:A2=""}` and `{=A1:A2=0}` will both return a 1 column 2 row array of cells containing TRUE.

When do you use array formulas?

Use array formulas if you have to repeat calculations using different values. If you decide to change the calculation method later, you only have to update the array formula. To add an array formula, select the entire array range and then make the required change to the array formula.

Arrays are an essential tool for carrying out complex calculations, because you can have several cell ranges included in your calculations. Calc has different math functions for arrays, such as the MMULT function for multiplying two arrays.

Creating array formulas

If you create an array formula using the Function Wizard, you must mark the **Array** check box each time so that the results are returned in an array (Figure 258). Otherwise, only the value in the upper-left cell of the array being calculated is returned.

An array formula can also be entered directly into a cell. The result will automatically create an array of cells.

Note

Array formulas appear in braces (curly brackets) in Calc. You cannot create array formulas by manually entering the braces.

Note

The cells in a results array are automatically protected against changes. However, you can edit or copy the array formula by selecting the entire array cell range.

Implicit intersection of array formulas

You can also create a "normal" formula in which the reference range, such as parameters, indicate an array formula. This formula is also known as "implicit intersection" of array formula. The result is obtained from the intersection of the reference range and the rows or columns in which the formula is found. If there is no intersection or if the range at the intersection covers several rows or columns, a #VALUE! error message appears. The following example illustrates this concept:

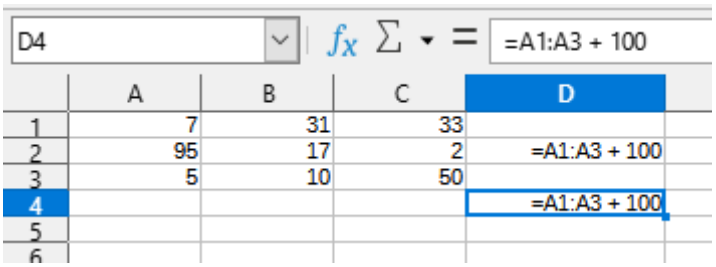


Figure 262: Implicit array formula

In the table above, place the array formula in D1:

```
{=A1:A3 + 100}
```

Cells D1, D2, D3 have values 107, 195, 105 respectively.

Insert the formula below in D2, do not enter as array formula.

```
=A1:A3 + 100
```

Cells D1 and D3 are empty, Cell D2 has value 195. This is the implicit intersection of array formulas.

Insert formula below in D4, as in D2.

```
=A1:A3 + 100
```

Cell D4 display #VALUE!. Row 4 is out of the range A1:A3 of the formula.

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, consider the following equation:

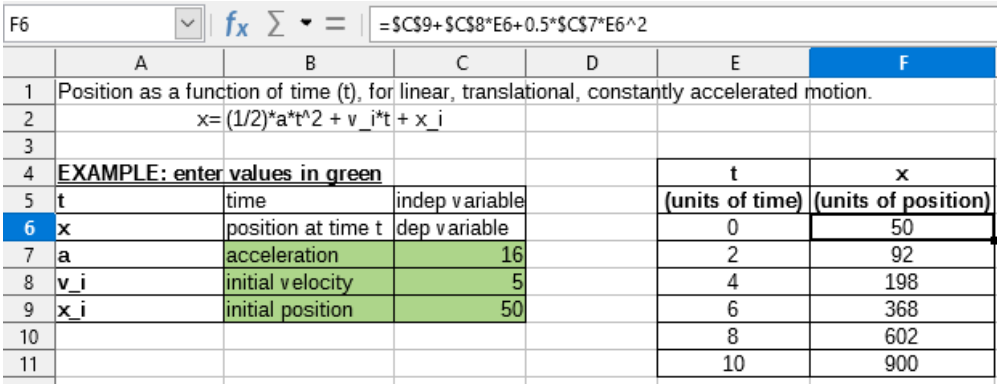
$$x = x_i + v_i t + \frac{1}{2} a t^2$$

This equation models the position of an object undergoing linear, translational motion, with constant acceleration. The position (x) depends on time (t), and the equation also contains constant values for initial position (xi), initial velocity (vi), and acceleration (a).

For ease of presentation, it is good practice to set up a spreadsheet in a manner similar to that shown in Figure 263. In this example, the individual variables are input into cells on the sheet and no editing of the formula is required.

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 sheets, the life of the sheets, 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 generated are often placed on the first sheet.



F6 | =$C$9+$C$8*E6+0.5*$C$7*E6^2

	A	B	C	D	E	F
1	Position as a function of time (t), for linear, translational, constantly accelerated motion.					
2	x= (1/2)*a*t^2 + v_i*t + x_i					
3						
4	**EXAMPLE: enter values in green**				**t**	**x**
5	**t**	time	indep variable		**(units of time)**	**(units of position)**
6	**x**	position at time t	dep variable		0	50
7	**a**	acceleration	16		2	92
8	**v_i**	initial velocity	5		4	198
9	**x_i**	initial position	50		6	368
10					8	602
11					10	900

Figure 263: Setting up a formula with arguments

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. 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) error 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 sheet. 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.

Speeding up calculations

Spreadsheets are often used to process raw data and produce meaningful summaries, consolidation and display of information for the decision maker, or to be used as the source for reports. The raw data can be produced by physical measurements, business transactions, or various other means. Sheets with thousands or even hundreds of thousands of rows and several columns are frequently found in finance departments or laboratories. Computations carried out on these raw data sets can be time consuming and last for minutes, hours and perhaps, days.

A common mistake is to insert formulas for each cell and perform thousands of formula interpretations and calculations. Here are some recommendation for speeding up calculations.

Use array formulas on massive data

Array formulas have one formula applied to the mass of data. Computation saving can be significant for large data sets.

Use consolidation functions

Consolidation functions perform calculations on data sets. SUM, SUMIF, SUMIFS, SUMPRODUCT are examples of consolidation functions. For example if you have a very long bill of materials (BOM), where quantity must be multiplied by unit price and then totaled to produce a cost figure, then instead of applying a formula on each entry of the BOM and then summing, you can use the formula SUMPRODUCT(quantity, unitprice), where quantity and unitprice are named ranges representing the BOM. SUMPRODUCT multiplies each cell of the quantity data set by its corresponding cell of unitprice and sums all the products.

Similar situations happen when you must sum a subset of the original data set, where you must apply a test on each entry to allow it to be part of the sum. For example, when the value is strictly positive. Use `SUMIF(data_to_test;">0";data_to_sum)`, where data_to_test is the data set where you test the positive values, data_to_sum is the column where the values are to sum depending on the test, and ">0" is the test itself.

Other consolidation functions are AVERAGEIF, COUNTIF, MINIFS, MAXIFS, and more.

Use macros to create functions

Another strategy is to 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 13, Macros, 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!).

Multi-threading

Many modern computers have multi-core processors and provide for multiple threads. A core is a physical hardware component within a CPU. Threads are virtual components that help to efficiently manage the workload and tasks of the CPU. A CPU can interact with more than one thread at a time and multi-threading makes CPUs more efficient, to give better overall performance.

Calc supports multi-threading to help your spreadsheets take advantage of whatever parallel processing is available within your computer. This facility is controlled by the **Enable multi-threaded calculation** option in the *CPU Threading Settings* section of the **Tools > Options > LibreOffice Calc > Calculate** dialog. The initial default is for this option to be enabled, and disabling it is not recommended. This is the only control in the Calc user interface that relates to multi-threading; once initiated, the processing operates automatically.

If multi-threading is enabled, Calc automatically identifies where your spreadsheet could benefit from multi-threading and processes it accordingly. Threads are generally used for formula groups, where enough adjacent cells in a column use the same formula but get different results because of relative cell addressing. One implication of this approach is that the optimization is column-based and so a row-based layout could be less efficient.

There are other ways to control Calc's multi-threading capability, such as adjusting the MAX_CONCURRENCY LibreOffice specific environment variable. However, these methods are beyond the scope of this document.

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 for input, and the Detective.

Error messages

The most basic tool is error messages. Error messages display in a formula's cell, on the Status Bar, or in the Function Wizard instead of the result.

An error message for a formula is usually a three-digit number from 501 to 540, or sometimes an unhelpful piece of text such as #NAME?, #REF!, or #VALUE!. The error message appears in the cell, and a brief explanation of the error is shown 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 Appendix B, Error Codes, and in the Help, by searching for "error codes" in Calc. A few of the most common are shown in Table 17.

Table 17: Common error messages

Code	***Meaning***
#NAME?	Instead of displaying Err:525. No valid reference exists for the argument.
#REF!	Instead of displaying Err:524. The column, row, or sheet for the referenced cell is missing.
#VALUE!	Instead of displaying Err: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.
#DIV/0!	Instead of displaying Err:532. Division by zero.
#NUM!	Instead of displaying Err:503. A calculation results in an overflow of the defined value range.
509	An operator such as an equals sign is missing from the formula.
510	A variable is missing from the formula.

Examples of common errors

#DIV/0! division by zero

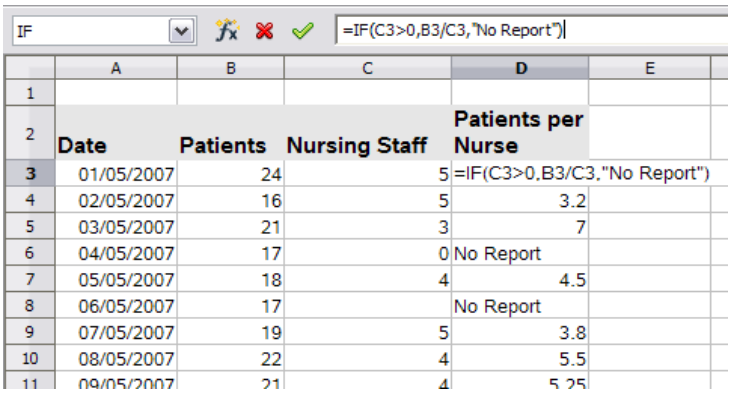
This error is the result of dividing a number by either the number zero (0) or a blank cell. There is an easy way to avoid this type of problem. When you have a zero or blank cell displayed, use a conditional function. Figure 264 depicts division of column B by column C yielding 2 errors arising from a zero and a blank cell showing in column C.

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'". An example is shown in Figure 265.

It is also possible for the last parameter to use double quotes for a blank (no value) to be entered, or a different formula with a standardized number being substituted for the lower number.

	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	#DIV/0!
7	05/05/2007	18	4	4.5
8	06/05/2007	17		#DIV/0!
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 264: Examples of #DIV/0!, division by zero error



	A	B	C	D	E
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	No Report	
7	05/05/2007	18	4	4.5	
8	06/05/2007	17		No Report	
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 265: Division by zero solution

#VALUE! no result and #REF! incorrect references

The #VALUE! error is also very common.

A common occurrence of this error arises when a cell contains an incorrect value type. In the example of Figure 266, text "None" has been entered in C8, where our formula in column D is expecting a number.

	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	No Report
7	05/05/2007	18	4	4.5
8	06/05/2007	17	None	#VALUE!
9	07/05/2007	19	5	3.8

Figure 266: Incorrect entry causing #VALUE! error

The #REF! error is caused by a missing reference. In the example shown in Figure 267, the formula references a sheet that has been deleted.

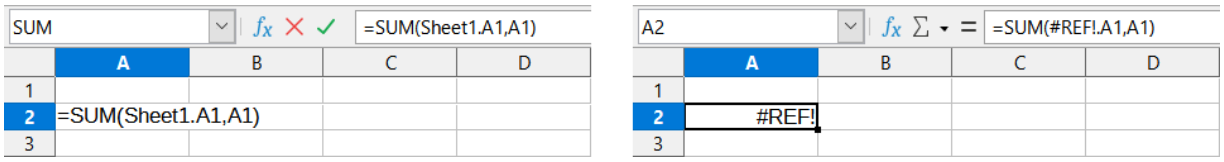


Figure 267: Deleted sheet causing #REF! error

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.

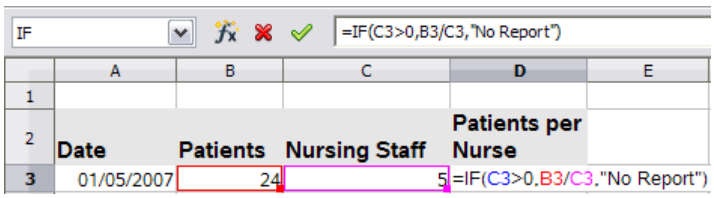


Figure 268: Color coding for input

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.

Value highlighting

There are situations where the display of cell contents is the same when the data type is different. For example text contents and numeric contents can look the same but can produce a mistake if both are used in some calculations. To illustrate, the string “10.35” right-aligned in a cell can be confused with the value 10.35. When the cell is used in a formula the string may take the value of zero and an error may be produced.

If you enable value highlighting (**View > Value Highlighting** or *Ctrl+F8*), Calc distinguishes the text and numeric data types by assigning different colors to the content’s characters. By default, the text contents are in black characters and the numeric contents are in blue. See Chapter 2, Entering and Editing Data, for more information on value highlighting.

The Detective

In a long or complicated spreadsheet, color coding becomes less useful. In these cases, consider using 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 select the required option in the **Tools > Detective** menu. On the spreadsheet, you will see lines ending in dots 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** on the Menu bar or press *Shift+F9*. Figure 269 shows a simple example of tracing precedents for cell B4.

This allows us to check the source cells (which may be a range) for any errors which have caused us to query the calculation result. If a source is a range, then that range is highlighted in blue.

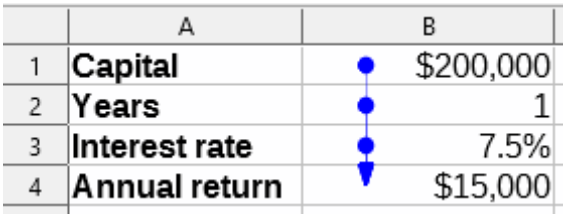


Figure 269: Tracing precedents using the Detective

In other instances we may have to trace an error. For this we use the Trace Error function, found under **Tools > Detective > Trace Error**, to find the cells that caused the error.

For more information search for "Detective" in the Help system's index.

Examples of functions

For novices, functions are one of the most intimidating features of LibreOffice Calc. New users quickly learn that functions are an important feature of spreadsheets, but there are hundreds, and many require input that assumes specialized knowledge. Fortunately, Calc includes many functions that anyone can use.

Basic arithmetic and statistics

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

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 are 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 also 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 students were absent when a test was written, and you wanted to check whether 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 of functions to choose from. You can find the arithmetical mean—that is, the result when you add all entries in a list then divide by the number of entries, by entering a range of numbers when using AVERAGE, or AVERAGEA to include text entries and to give them a value of zero.

In addition, you can get other information about the data set:

- MEDIAN: Logically ranks the numbers (lowest to highest) to evaluate the median value. In a set containing an uneven number of values, the median will be the number in the middle of the ranked list. In a set containing an even number of values, the median will be the mean of the two values in the middle of the ranked 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 any other value 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 are a programmer, you may also be familiar with some of these methods. However, you do not 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 do not 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 do not 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 labeling each function.

For details on rounding methods, see the Help.

Volatile / non-volatile functions

The Open Document Format for Office Applications (OpenDocument) Version 1.2 includes the following definition: “Functions that are *always* recalculated whenever a recalculation occurs are termed *volatile* functions.”

To understand some of the behaviors of a volatile function within Calc, consider a simple example in which you have created an empty spreadsheet and entered the formula `=RAND()` into cell A1 (RAND is one of Calc’s volatile functions). Calc displays a random number between 0 and 1 in cell A1. If you then enter any value into a different cell (say cell B2 for the purpose of this discussion) and press *Enter*, you will notice that the value displayed in A1 is updated to show a different random number. Calc recalculates the random number in A1, despite the user not changing the formula in A1 and despite the updated B2 having no link to A1. In summary, the RAND function will generate a new value when any cell is updated by selecting **Data > Calculate > Recalculate** or pressing *F9*, or on any input event.

An understanding of volatile functions is important especially if you create a large spreadsheet, where frequent recalculations may adversely affect performance. Make sure that you design your spreadsheet to use volatile functions appropriately.

The following Calc functions are volatile:

- FORMULA
- INDIRECT
- INFO
- NOW
- OFFSET
- RAND
- RANDBETWEEN
- TODAY

For the RAND and RANDBETWEEN functions, Calc provides non-volatile equivalents – RAND.NV and RANDBETWEEN.NV. These may be useful when you do not require the function values to update so frequently. A non-volatile function is not recalculated at new input events and does not recalculate when selecting **Data > Calculate > Recalculate** or pressing *F9*, except when the cell containing the function is selected. Non-volatile functions are recalculated when opening the file.

Using wildcards and regular expressions in functions

Calc supports the use of regular expressions or wildcards in the arguments of many of its functions.

Regular expressions offer the most powerful method of searching for text strings. For more information about regular expressions, including examples, see the section entitled “Regular expressions” in Chapter 1, Introduction.

If interoperability with Microsoft Excel is important for your spreadsheet, then you may not be able to fully utilize Calc's regular expression facilities because Excel does not provide equivalent facilities. Hence, when you export a Calc spreadsheet to Excel format, information relating to regular expressions will not be usable within Excel. In this case you can use the less powerful wildcards facility provided by Calc because spreadsheets that utilize wildcards can be exported to Excel format without loss of data. A wildcard is a special character that represents one or more unspecified characters. Wildcards make text searches more powerful, but often less specific. The wildcards available are ? (question mark), * (asterisk), and ~ (tilde). The usage of these wildcards is the same as that for the Find and Replace dialog, described in Section 2, Entering, Editing, and Formatting Data.

The following Calc functions allow the use of wildcards or regular expressions:

- Database functions (DAVERAGE, DCOUNT, DCOUNTA, DGET, DMAX, DMIN, DPRODUCT, DSTDEV, DSTDEVP, DSUM, DVAR, DVARP)
- AVERAGEIF, AVERAGEIFS, COUNTIF, COUNTIFS, MAXIFS, MINIFS, SUMIF, SUMIFS
- HLOOKUP, LOOKUP, VLOOKUP
- MATCH
- REGEX (not applicable for wildcards)
- SEARCH

Configuration options are available in the *Formulas wildcards* section on the **Tools > Options > LibreOffice Calc > Calculate** dialog (Figure 270) to control the use of wildcards and regular expressions with Calc's functions. The three mutually exclusive, self-explanatory options are:

- **Enable wildcards in formulas**. This is the initial default when Calc is installed.
- **Enable regular expressions in formulas**.
- **No wildcards or regular expressions in formulas**.

A further related option in the *General Calculations* area of the same dialog, **Search criteria = and <> must apply to whole cells**, controls whether search criteria must match the whole cell exactly.

Tip

When both the **Search criteria = and <> must apply to whole cells** and **Enable wildcards in formulas** options are selected, Calc behaves exactly as Microsoft Excel when searching cells in the database functions.

By default, regular expression searches within Calc functions are case insensitive, irrespective of the setting of the **Case sensitive** checkbox. However, for some functions regular expressions can include a flag option "(?-i)" to switch to a case sensitive match. Functions that support this facility are: AVERAGEIF, AVERAGEIFS, COUNTIF, COUNTIFS, HLOOKUP, LOOKUP, MATCH, SEARCH, SUMIF, SUMIFS, and VLOOKUP.

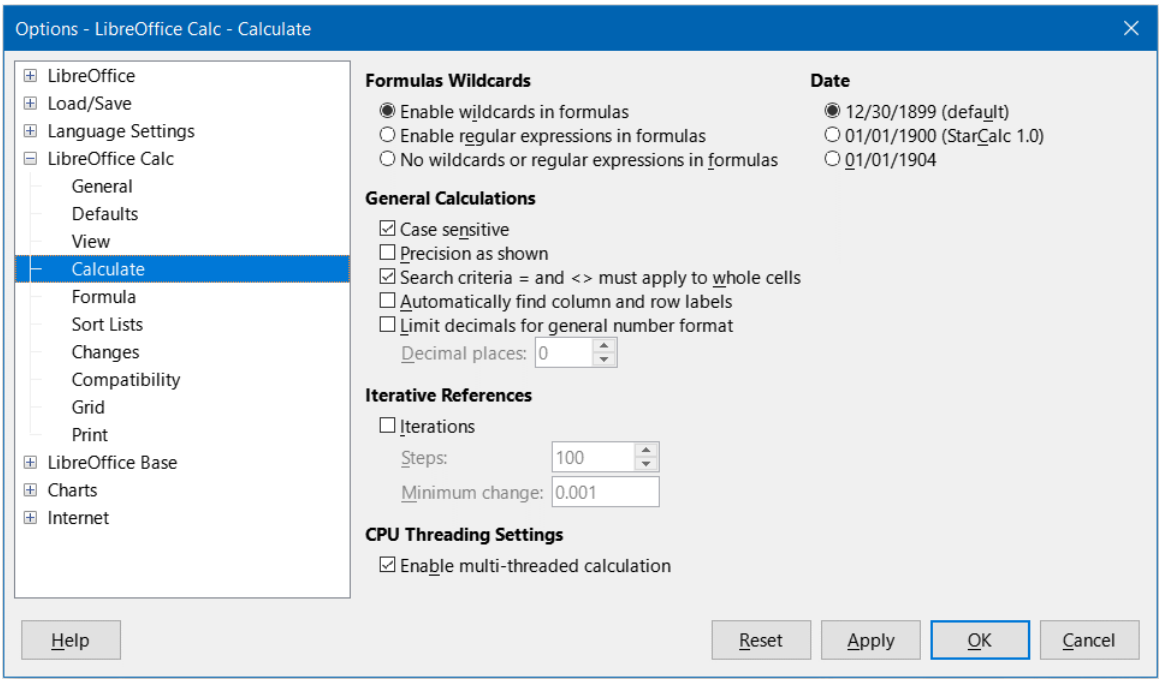


Figure 270: Tools > Options > LibreOffice Calc > Calculate dialog

To illustrate some of the features of regular expressions, consider the simple spreadsheet shown in Figure 271 and assume that **Enable regular expressions in formulas** is selected.

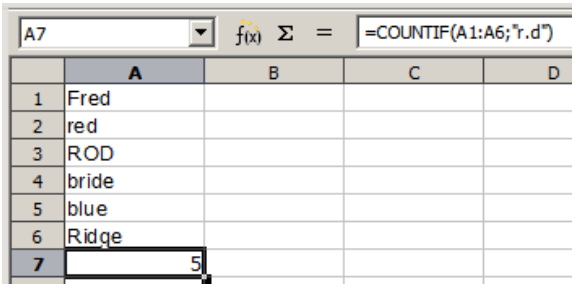


Figure 271: Using the COUNTIF function

1) With the formula `=COUNTIF(A1:A6,"r.d")` entered in cell A7 and **Search criteria = and <> must apply to whole cells** deselected, the value 5 is displayed in cell A7, as shown in Figure 271. The formula counts cells in the range A1:A6 which contain "Fred", "red", "ROD", "bride", and "Ridge".

2) With the formula `=COUNTIF(A1:A6,"(?-i)r.d")` entered in cell A7 and **Search criteria = and <> must apply to whole cells** deselected, the value 3 is displayed in cell A7. The formula counts cells in the range A1:A6 which contain "Fred", "red", and "bride". This regular expression utilizes the "(?-i)" flag option to perform a case sensitive search.

3) With the formula `=COUNTIF(A1:A6,"r.d")` entered in cell A7 and **Search criteria = and <> must apply to whole cells** selected, the value 2 is shown in cell A7. The formula counts cells in the range A1:A6 which contain "red" and "ROD".

4) With the formula `=COUNTIF(A1:A6,"(?-i)r.d")` entered in cell A7 and **Search criteria = and <> must apply to whole cells** selected, the value 1 is shown in cell A7. The formula counts cells in the range A1:A6 which contain "red". This regular expression utilizes the "(?-i)" flag option to perform a case sensitive search.

5) With the formula `=COUNTIF(A1:A6,".*r.d.*")` entered in cell A7 and S**earch criteria = and <> must apply to whole cells** selected, the value 5 is again shown in cell A7. Contrast this with example 3)) above – the regular expression in the current example allows for 0 or more characters both before the “r” and after the “d”.

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, Calc can be enhanced by user-defined functions or add-ins. Setting up user-defined functions can be done either by using macros or by writing separate add-ins or extensions.

The basics of writing and running macros is covered in Chapter 13, 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 macros can be written in Basic, BeanShell, JavaScript, or Python.



Calc Guide 7.5

Chapter 9
Using Pivot Tables

Introduction

Many requests for spreadsheet support are the result of using complicated formulas and solutions to solve simple day-to-day problems. For more efficient and effective solutions, use the pivot table, a tool for combining, comparing, analyzing, and summarizing large amounts of data easily. Using pivot tables, 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 an advanced user. Besides, you can create a pivot chart to view a graphical representation of the data in a pivot table.

Database preconditions

To work with a pivot table, you need 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 pivot table.

For processing data in lists, Calc needs to know where in the spreadsheet the list is. The list can be anywhere in the sheet, in any position. A spreadsheet can contain several unrelated lists.

Calc recognizes your lists automatically. It uses the following logic: Starting from the cell you have selected (which must be within the list), Calc checks the surrounding cells in all four 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 the list. Avoid empty lines (for example for formatting). You can format the list by using cell formats.

Tip

To make sure that Calc automatically recognizes a list correctly, check that there are no empty rows or empty columns within the list.

If you select more than one cell before creating a pivot table, then Calc's automatic list recognition logic is not applied. Instead, Calc assumes that the pivot table is to be created using exactly the cells that you selected.

Tip

Always select only one cell before initiating creation of a pivot table. This allows Calc to automatically determine the full scope of your data list.

A relatively common source of errors is to inadvertently declare a list by mistake and then to sort that 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 the list is also very important.

Note

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. Here are some mistakes commonly made by inexperienced spreadsheet users:

- You made several unnecessary sheets; for example, a sheet for each group of articles. In this case, analyses are only possible within each group.

- In a sales list, instead of only one column for the amount, you made a column for the amounts for each employee. In this case, the system will have difficulty grouping data from the various columns together. Thus, an analysis with the pivot table would no longer be possible. All data must be entered into the same column for the pivot table to be able to analyze it.
- 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 pivot table will treat the sum totals the same as any other value. Getting monthly results is one of the very fast and easy features of the pivot table.

Data sources

The possible data sources for the pivot table are a Calc spreadsheet or an external data source that is registered in LibreOffice.

Calc spreadsheet

Analyzing a list in a Calc spreadsheet is the simplest and most often used case. Lists might be updated regularly or the data might be imported from a different application.

The list data might be entered directly into the spreadsheet or copied from another file or application. You can also use a Web Page Query input filter to insert data from an HTML file, a CSV file, a Calc spreadsheet, or a Microsoft Excel spreadsheet. See Chapter 11, Linking Data, for more information.

The behavior of Calc while inserting data from a different application 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 format, the Text Import dialog appears after you select the file containing the data; see Chapter 1, Introduction, for more information about this dialog.

Registered data source

A registered data source is a connection to data held in a database outside of LibreOffice. When using a registered data source, the data to be analyzed will not be saved in the spreadsheet; Calc will always use the data from the original source. Calc can use many different data sources in addition to databases that are created and maintained with LibreOffice Base. For more information, see Chapter 11, Linking Data.

Using shortcuts

If you use pivot tables often in Calc, you might find the frequent use of the built-in menu paths inconvenient.

In some cases built-in keyboard shortcuts are already defined; see Appendix A, Keyboard Shortcuts. An example is the *F12* function key, which groups a selected data range. In some other cases, the built-in toolbars already provide relevant icons. An example is the **Insert or Edit Pivot Table** icon on the Standard toolbar.

In addition to using the built-in keyboard shortcuts and toolbar icons, you can also define your own. See Chapter 15, Setting up and Customizing, for instructions.

Creating a pivot table

If you want Calc to automatically determine the full extent of the raw data list, then select a single cell within this list. If you want to explicitly define the extent of the raw data list, then select all relevant cells.

With the cell (or cells) selected, create the pivot table by selecting **Insert > Pivot Table** on the Menu bar, selecting **Data > Pivot Table > Insert or Edit** on the Menu bar, or click the **Insert or Edit Pivot Table** icon on the Standard toolbar.

Calc displays the Select Source dialog (Figure 272), where you can choose between using the selected data cells, a range of cells that has already been named, or a data source that has already been registered with LibreOffice.

Note

See Chapter 14, Calc as a Database, for more information about named ranges. See Chapter 11, Linking Data, for more information about linking to registered data sources.

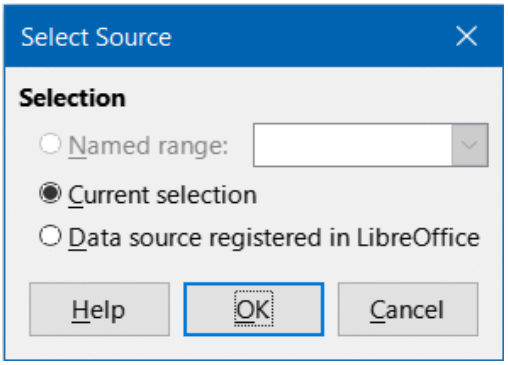


Figure 272: Select Source dialog

Click **OK** on the Select Source dialog to display the Pivot Table Layout dialog, which is described in the next section.

The Pivot Table Layout dialog

The function of the pivot table is managed in two places: first, in the Pivot Table Layout dialog; and second, through manipulations of the result in the spreadsheet. This section describes the Pivot Table Layout dialog in detail.

Tip

To access the Pivot Table Layout dialog again after initial creation of a pivot table, left-click in any cell of the pivot table. Then select **Insert > Pivot Table** on the Menu bar, or select **Data > Pivot Table > Insert or Edit** on the Menu bar, or click the **Insert or Edit Pivot Table** icon on the Standard toolbar, or right-click in any cell of the pivot table and select the **Properties** option in the context menu.

Basic layout

In the Pivot Table Layout dialog (Figure 273) there are four areas that show the layout of the resulting pivot table:

- *Filters*
- *Column Fields*
- *Row Fields*
- *Data Fields*

Besides these four areas is another area labeled *Available Fields* containing the names of the fields in the source data list. To choose a layout, drag and drop the fields from the *Available Fields* area to the other four areas.

The *Data Fields* area must contain at least one field. Advanced users can use more than one field here. For the fields in the *Data Fields* area, an aggregate function is used. For example, if you move the **Sales Value** field into the *Data Fields* area, it initially appears there as **Sum – Sales Value**.

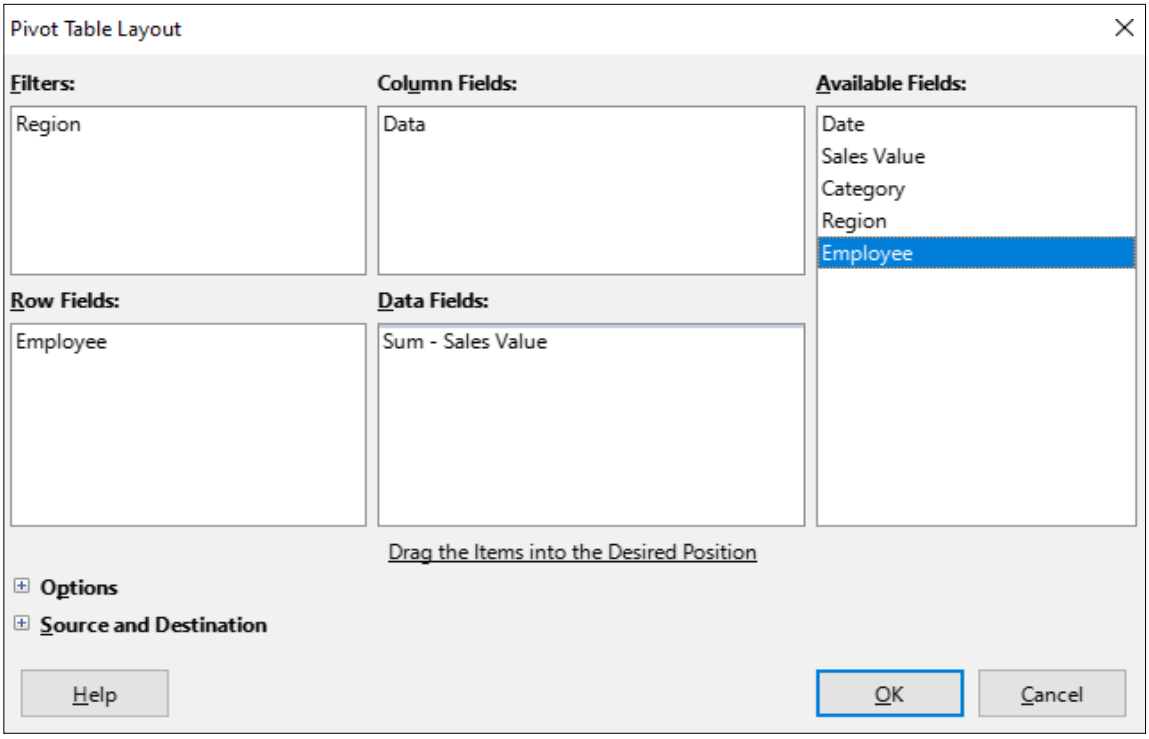


Figure 273: Pivot Table Layout dialog

Row and column fields indicate from which groups the result will be sorted. Often more than one field is used at a 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 regions. Within the regions will be the listing for the different employees (Figure 274).

Fields that are placed into the *Filters* area appear at the top of the resulting pivot table as a drop-down list. The summary in the result takes into account only that part of the base data that you have selected. For example, if you include **Employee** in the *Filters* area, you can filter the result shown for each employee.

To move a field from an area, just drag it to a new area. To remove a field from the *Filters*, *Column Fields*, *Row Fields*, or *Data Fields* areas, drag it to the *Available Fields* area.

Tip

To rapidly move a selected field from one area of the Pivot Table Layout dialog to another, press the `Alt+letter` on the keyboard that corresponds to the underlined letter in the target area's label.

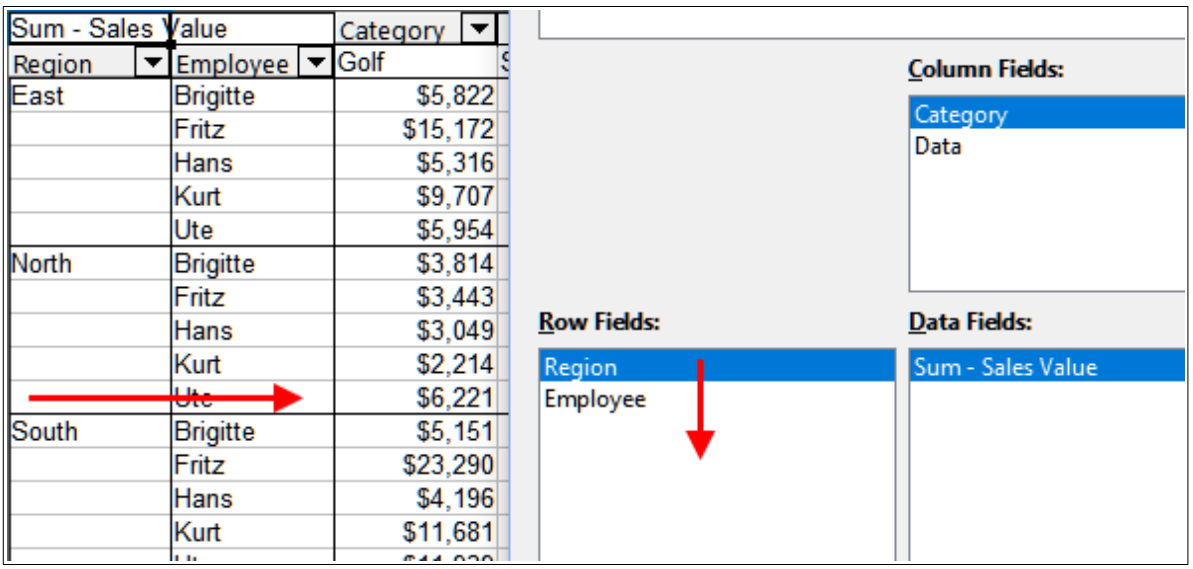


Figure 274: Field order for analysis and resulting layout of pivot table

Note

By default, Calc inserts a *Data* field into the *Column Fields* area. The *Data* field can be moved between the *Column Fields* and *Row Fields* areas as required. Depending on its position within the list of fields in its area, the *Data* field may lead to a button labeled **Data** appearing in the results of the pivot table, affecting the layout of the results. If you do not wish to use this facility, simply place the *Data* field at the bottom of the list of fields in its area.

More options

To expand the Pivot Table Layout dialog and show more options, click the expansion symbol (plus or triangle sign) adjacent to the *Options* and *Source and Destination* labels (Figure 275).

Ignore empty rows

If the source data is not in the recommended form, this option tells the pivot table to ignore empty rows.

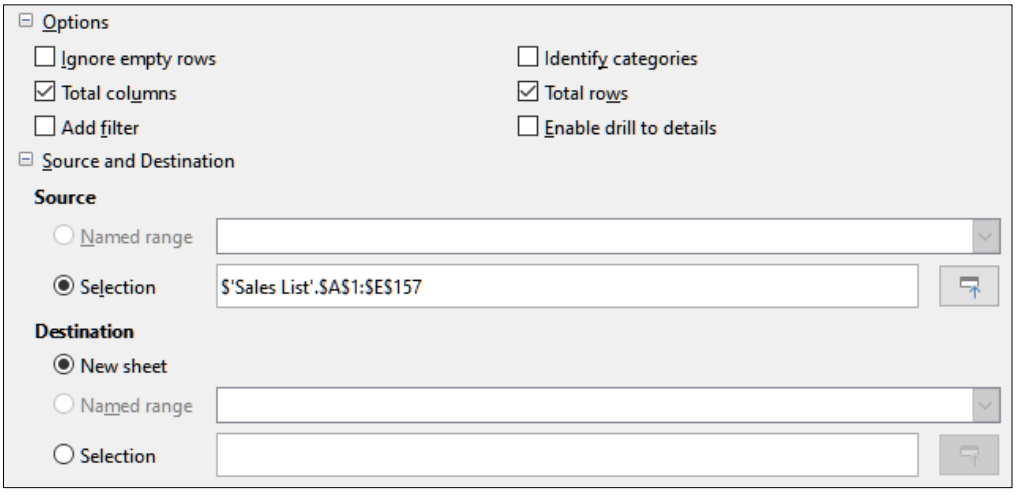


Figure 275: Expanded area of the Pivot Table Layout dialog

Identify categories

With this option selected, if the source data has missing entries in a list and does not meet the recommended data structure (as in Figure 276 for example), the pivot table adds it to the listed category above it. If this option is not chosen, then the pivot table inserts *(empty)*.

	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 276: Example of data with missing entries (blank/empty values) in Column A

The option **Identify categories** ensures that in this example rows 3 and 4 are included for Apples and that row 6 is included for Pears (Figure 277).

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 277: Pivot table result with **Identify categories** selected*

Without category recognition, the pivot table shows an *(empty)* category (Figure 278).

Sum - Quantity	Region			
Produce	California	Italy	Lake Constance	**Total Result**
Apples		6.2 t		**6.2 t**
Pears		7.0 t		**7.0 t**
(empty)	3.6 t		41.2 t	**44.8 t**
Total Result	**3.6 t**	**13.2 t**	**41.2 t**	**58.0 t**

*Figure 278: Pivot table result without **Identify categories** selected*

Logically, the behavior with category recognition is better. A list showing missing entries is also less useful because you cannot use functions such as sorting or filtering.

Total columns, Total rows

With these options, you can decide if the pivot table shows 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 the entries are accumulated or the result of comparisons.

Add filter

Use this option to add or hide the cell labeled **Filter** above the pivot table results. This conveniently provides additional filtering options within the pivot table. For more information, see “Filtering” below.

Note

The filtering provided through the **Add filter** option is independent of the filtering provided by including fields in the *Filters* area of the Pivot Table Layout dialog.

Enable drill to details

With this option enabled, if you double-click on a single data cell in the pivot table result, including a cell produced from **Total columns** or **Total rows**, a new sheet opens giving a detailed listing of the individual entry. If you double-click on a cell in either a row or column field area, the Show Detail dialog opens (Figure 310). If this function is disabled, the double-click will keep its usual edit function within a spreadsheet. For more information, see "Drilling (showing details)" below.

Source

The **Selection** field in this area shows the sheet name and the range of cells containing the raw data for the pivot table. If the source spreadsheet contains any named ranges, these can be selected through the **Named range** option.

Destination

The controls in this area define where the result will be shown.

Selecting **New sheet** adds a new sheet to the spreadsheet file and places the results there. The new sheet is named using the format **Pivot Table_sheetname_X**; where X is the number of the table created, 1 for first, 2 for the second, and so on. For a sheet named Sales List, the new sheet for the first pivot table produced would be named **Pivot Table_Sales List_1**. Each new sheet is inserted next to the source sheet.

If the target spreadsheet contains any named ranges, these can be selected with the **Named range** option.

The **Selection** field in this area shows the sheet name and the range of cells for the pivot table's results.

Tip

To display the pivot table on the same sheet as the raw data, check the **Selection** option in the *Destination* area, click the **Shrink** button to the right of the *Selection* field, click at an appropriate cell in an empty area of the sheet, click the **Expand** button, and click **OK** on the Pivot Table Layout dialog.

More settings for the fields: Field options

The options discussed in the previous section are valid for the pivot table in general. You can also change settings for any field that is currently included in the pivot table layout. Change a field's settings by double-clicking that field within the *Filters*, *Column Fields*, *Row Fields,* or *Data Fields* areas of the Pivot Table Layout dialog. Double-clicking a field within the *Available Fields* area has no effect. The options available for fields in the *Data Fields* area differ from those for fields in the other three areas.

Options for data fields

Double-click a field in the *Data Fields* area of the Pivot Table Layout dialog to access the Data Field dialog shown in Figure 279.

In the Data Field dialog, you can select the function to be used to accumulate the values from the data source. While you often use the Sum function, other functions (like standard deviation or a counting function) are also available. For example, the counting function can be useful for non-numerical data fields.

Select the **Show items without data** option to include empty columns and rows in the results table.

Click the expansion symbol (plus sign or triangle) to expand the *Displayed value* section of the dialog.

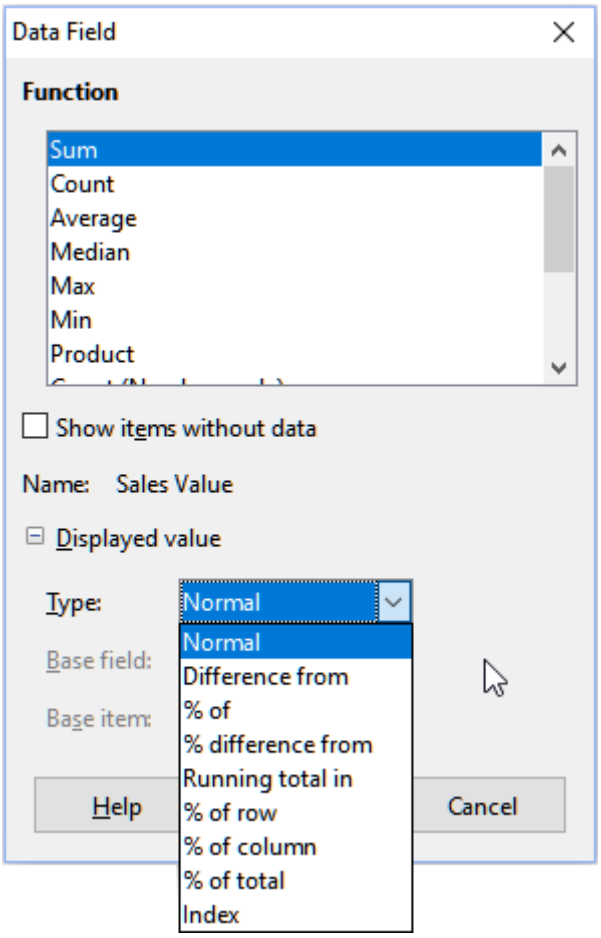


Figure 279: Expanded dialog for a data field

In the *Displayed value* section, you can choose other possibilities for analysis using the aggregate function. Depending on the setting for *Type*, you may have to choose definitions for the *Base field* and *Base item*.

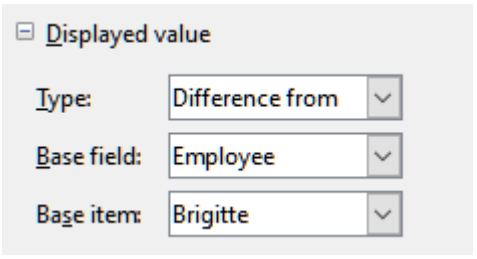


Figure 280: Example choices for Base field and Base item

Table 18 lists the possible types of displayed value and associated base field and base item, together with notes on usage.

Table 18: Description of Displayed value options on the Data Field dialog

Type	*Base field*	*Base item*	*Analysis*
Normal	—	—	Simple use of the chosen aggregate function (for example, Sum).

Type	*Base field*	*Base item*	*Analysis*
Difference from	Selection of a field from the data source of the pivot table (for example, Employee).	Selection of an element from the selected base field (for example, Brigitte)	The result is the difference between the result of the base field and the base item (for example, sales volume of the other employees against the sales volume of Brigitte; see Figure 281). If **previous item** or **next item** is specified as the *Base item*, the reference value is the result for the next visible member of the base field, in the base field's sort order.
% of	Selection of a field from the data source of the pivot table (for example, Employee)	Selection of an element from the selected base field (for example, Brigitte)	The result is a percentage ratio of the value of the base field to the base item (for example, sales result of the other employees relative to the sales result of Brigitte; see Figure 282). If **previous item** or **next item** is specified as the *Base item*, the reference value is the result for the next visible member of the base field, in the base field's sort order.
% difference from	Selection of a field from the data source of the pivot table (for example, Employee)	Selection of an element from the selected base field (for example, Brigitte)	From each result, its reference value is subtracted, and the difference is divided by the reference value (for example, sales of the other employees as a relative difference from the sales of Brigitte; see Figure 283). If **previous item** or **next item** is specified as the *Base item*, the reference value is the result for the next visible member of the base field, in the base field's sort order.
Running total in	Selection of a field from the data source of the pivot table (for example, Date)	—	Each result is added to the sum of the results for preceding items in the base field, in the base field's sort order, and the total sum is shown. Results are always summed, even if a different summary function was used to get each result.
% of row	—	—	The result is a percentage of the value of the whole row (for example, the row sum).
% of column	—	—	The result is a percentage of the total column value (for example, the column sum).
% of total	—	—	The result is a percentage of the overall result (for example, the total sum).
Index	—	—	(Default result x total result) / (row total x column total)

Sum - Sales Value	Data				
Category	Brigitte	Fritz	Hans	Kurt	Ute
Golf	$26,961	$46,839	$17,941	$28,346	$36,127
Sailing	$24,422	$19,976	$14,060	$20,814	$30,580
Tennis	$17,721	$38,638	$30,467	$27,675	$28,198
Total Result	**$69,104**	**$105,453**	**$62,468**	**$76,835**	**$94,905**

Sum - Sales Value	Data				
Category	Brigitte	Fritz	Hans	Kurt	Ute
Golf		$19,878	-$9,020	$1,385	$9,166
Sailing		-$4,446	-$10,362	-$3,608	$6,158
Tennis		$20,917	$12,746	$9,954	$10,477
Total Result		**$36,349**	**-$6,636**	**$7,731**	**$25,801**

*Figure 281: Original pivot table (top) and a **Difference from** example (bottom)*

Sum - Sales Value	Data				
Category	Brigitte	Fritz	Hans	Kurt	Ute
Golf	100.00%	173.73%	66.54%	105.14%	134.00%
Sailing	100.00%	81.80%	57.57%	85.23%	125.21%
Tennis	100.00%	218.04%	171.93%	156.17%	159.12%
Total Result	**100.00%**	**152.60%**	**90.40%**	**111.19%**	**137.34%**

*Figure 282: Example of a **% of** analysis*

Sum - Sales Value	Data				
Category	Brigitte	Fritz	Hans	Kurt	Ute
Golf		73.73%	-33.46%	5.14%	34.00%
Sailing		-18.20%	-42.43%	-14.77%	25.21%
Tennis		118.04%	71.93%	56.17%	59.12%
Total Result		**52.60%**	**-9.60%**	**11.19%**	**37.34%**

*Figure 283: Example of **% difference from** analysis*

Options for row and column fields

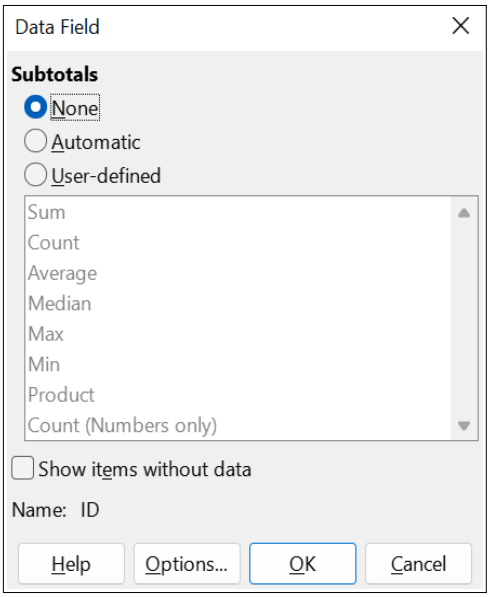


Figure 284: Data Field dialog for a row or column field

Double-click a field in the *Row* or *Column Fields* areas of the Pivot Table Layout dialog to access the Data Field dialog shown in Figure 284.

In the Data Field dialog for a row or column field, you can choose to show subtotals for each category. Subtotals are deactivated by default. Subtotals are useful only if the values in one row or column field can be divided into subtotals for another (sub)field.

Some examples are shown in Figures 285, 286, and 287.

Sum - Sales Value	Category			
Region	Golf	Sailing	Tennis	**Total Result**
East	$41,971	$22,484	$35,966	**$100,421**
North	$18,741	$22,468	$34,533	**$75,742**
South	$56,257	$44,801	$34,258	**$135,316**
West	$39,245	$20,099	$37,942	**$97,286**
Total Result	**$156,214**	**$109,852**	**$142,699**	**$408,765**

Figure 285: No subdivision with only one row or column field

Sum - Sales Value		Category			
Region	Employee	Golf	Sailing	Tennis	**Total Result**
East	Brigitte	$5,822	$2,135	$4,872	**$12,829**
	Fritz	$15,172	$5,730	$12,455	**$33,357**
	Hans	$5,316	$909	$12,220	**$18,445**
	Kurt	$9,707	$6,475	$2,417	**$18,599**
	Ute	$5,954	$7,235	$4,002	**$17,191**
North	Brigitte	$3,814	$10,151	$3,985	**$17,950**
	Fritz	$3,443	$2,698	$9,115	**$15,256**
	Hans	$3,049	$3,008	$5,361	**$11,418**
	Kurt	$2,214	$3,485	$10,499	**$16,198**
	Ute	$6,221	$3,126	$5,573	**$14,920**
South	Brigitte	$5,151	$4,432		**$9,583**
	Fritz	$23,290	$4,806	$15,641	**$43,737**
	Hans	$4,196	$9,263	$3,858	**$17,317**
	Kurt	$11,681	$7,270	$14,759	**$33,710**
	Ute	$11,939	$19,030		**$30,969**
West	Brigitte	$12,174	$7,704	$8,864	**$28,742**
	Fritz	$4,934	$6,742	$1,427	**$13,103**
	Hans	$5,380	$880	$9,028	**$15,288**
	Kurt	$4,744	$3,584		**$8,328**
	Ute	$12,013	$1,189	$18,623	**$31,825**
Total Result		**$156,214**	**$109,852**	**$142,699**	**$408,765**

Figure 286: Division of the regions for employees (two row fields) without subtotals

Sum - Sales Value		Category			
Region	Employee	Golf	Sailing	Tennis	Total Result
East	Brigitte	$5,822	$2,135	$4,872	**$12,829**
	Fritz	$15,172	$5,730	$12,455	**$33,357**
	Hans	$5,316	$909	$12,220	**$18,445**
	Kurt	$9,707	$6,475	$2,417	**$18,599**
	Ute	$5,954	$7,235	$4,002	**$17,191**
East Sum – Sales Value		**$41,971**	**$22,484**	**$35,966**	**$100,421**
North	Brigitte	$3,814	$10,151	$3,985	**$17,950**
	Fritz	$3,443	$2,698	$9,115	**$15,256**
	Hans	$3,049	$3,008	$5,361	**$11,418**
	Kurt	$2,214	$3,485	$10,499	**$16,198**
	Ute	$6,221	$3,126	$5,573	**$14,920**
North Sum – Sales Value		**$18,741**	**$22,468**	**$34,533**	**$75,742**
South	Brigitte	$5,151	$4,432		**$9,583**
	Fritz	$23,290	$4,806	$15,641	**$43,737**
	Hans	$4,196	$9,263	$3,858	**$17,317**
	Kurt	$11,681	$7,270	$14,759	**$33,710**
	Ute	$11,939	$19,030		**$30,969**
South Sum – Sales Value		**$56,257**	**$44,801**	**$34,258**	**$135,316**
West	Brigitte	$12,174	$7,704	$8,864	**$28,742**
	Fritz	$4,934	$6,742	$1,427	**$13,103**
	Hans	$5,380	$880	$9,028	**$15,288**
	Kurt	$4,744	$3,584		**$8,328**
	Ute	$12,013	$1,189	$18,623	**$31,825**
West Sum – Sales Value		**$39,245**	**$20,099**	**$37,942**	**$97,286**
Total Result		**$156,214**	**$109,852**	**$142,699**	**$408,765**

Figure 287: Division of the regions for employees with subtotals (by region)

To calculate subtotals that can also be used for the data fields (see above), select the **Automatic** option in the *Subtotals* section of the Data Field dialog.

You can choose the type of subtotal to use by selecting **User-defined** and then clicking the type of subtotal you want to calculate from the list. Functions in this list are only available when **User-defined** is selected.

Normally, the pivot table does not show a row or column for categories that have no entries in the underlying database. By choosing the **Show items without data** option, you can force these to be displayed.

For illustration purposes, the data was manipulated in such a way that the employee Brigitte has no sales values for the Golf category.

Employee	Brigitte		
Sum - Sales Value	Category		
Region	Sailing	Tennis	Total Result
East	$2,135	$4,872	**$7,007**
North	$10,151	$3,985	**$14,136**
South	$4,432		**$4,432**
West	$7,704	$8,864	**$16,568**
Total Result	**$24,422**	**$17,721**	**$42,143**

Figure 288: Default setting

Employee	Brigitte			
Sum - Sales Value	Category			
Region	Golf	Sailing	Tennis	Total Result
East		$2,135	$4,872	$7,007
North		$10,151	$3,985	$14,136
South		$4,432		$4,432
West		$7,704	$8,864	$16,568
Total Result		$24,422	$17,721	$42,143

*Figure 289: Setting **Show items without data***

Click the **Options** button on the Data Field dialog to access the Data Field Options dialog (Figure 290). Use this dialog to specify additional options for fields in the *Column* and *Row Fields* areas of the Pivot Table Layout dialog.

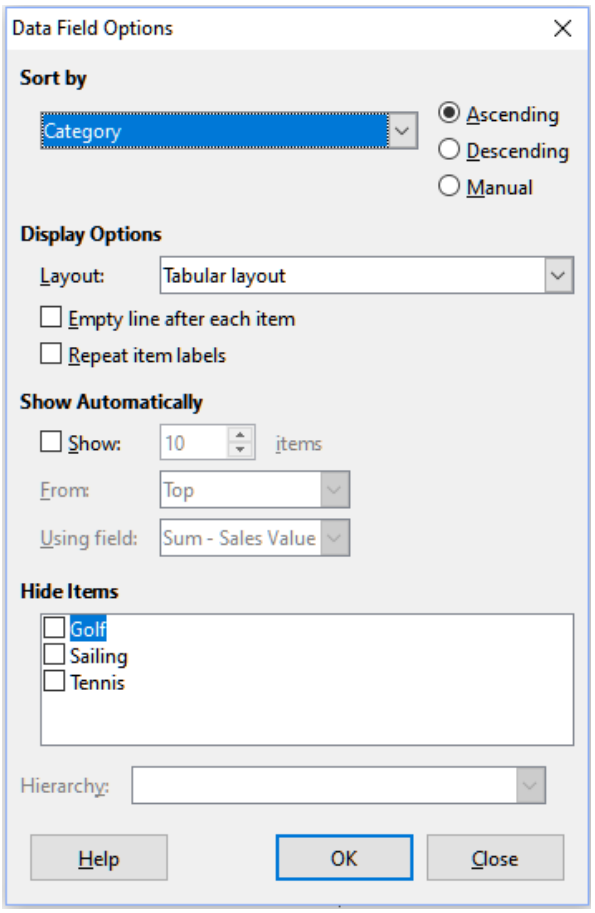


Figure 290: Data Field Options dialog

The following options are provided:

- **Sort by.** Select the data field that you want to sort columns or rows by. **Ascending** sorts the values from the lowest value to the highest value. If the selected field is the field for which the dialog was opened, the items are sorted by name. If a data field was selected, the items are sorted by the resultant value of the selected data field. Similarly **Descending** sorts the values descending from the highest value to the lowest value. **Manual** sorts values alphabetically.

- **Display Options.** You can specify the display options for all row fields except for the last, innermost row field. Select from the *Layout* drop-down list to select the layout mode for the field in the list box. Select the **Empty line after each item** option to add an empty row after the data for each item in the pivot table. Select or deselect the **Repeat item labels** option as required.
- **Show Automatically.** This feature displays the top or bottom *nn* items when you sort by a specified field. Click the **Show** option to turn on the automatic show feature and enter the maximum number of items that you want to show automatically. The *From* drop-down list selects the top or bottom items in the specified sort order. The *Using field* drop-down list selects the data field by which to sort the data.
- **Hide Items.** Use these options to select the items to hide from the calculations.
- **Hierarchy.** Select the hierarchy to use, when the field has multiple hierarchies. The pivot table must be based on external source data that contains data hierarchies. For the majority of users, Calc does not provide multiple hierarchies for a single field and so this option is normally grayed. If you use a pivot table data source extension, that extension could define multiple hierarchies for some fields and then the option could become available. See the documentation supplied with that extension for more details.

Options for filter fields

The Data Field dialog for fields in the *Filters* area is the same as for fields in the *Row* and *Column Fields* areas, 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 pivot table, you can switch the different fields between filters, columns, or rows. The fields keep the settings that you gave them. The filter field has the same properties as a row or column field. These settings only take effect when you use the field not as a filter field but as a row or column field.

Working with the results of the pivot table

The Pivot Table Layout dialog is very flexible and a pivot table can be totally restructured with only a few mouse clicks.

Changing the layout

The layout of the pivot table can be changed quickly and easily by using drag-and-drop. With the Pivot Table Layout dialog open, fields can be dragged around from *Row Fields*, *Column Fields*, *Filters,* and *Data Fields* areas to any position you want to put them, and then dropped. Unused fields can also be added, and fields removed in error can be replaced by dragging and dropping them into the positions required.

Some manipulation can also be carried out in the results view of the pivot table. Within the results of the pivot table, drag one of the filters, column, or row fields to a different position. The mouse pointer will change shape from its starting shape (horizontal or vertical block on the arrow head) to the opposite if moving to a different field, such as from row to column, where it can be dropped.

Sum - Sales Value	Employee	
Category	Brigitte	Fritz
Golf	$26,961	$46,839
Sailing	$24,422	$19,976
Tennis	$17,721	$38,638
Total Result	**$69,104**	**$105,453**

Figure 291: Drag a column field - note the pointer shape

Employee	Category	Sum - Sales Value
Brigitte	Golf	$26,961
	Sailing	$24,422
	Tennis	$17,721
Fritz	Golf	$46,839
	Sailing	$19,976
	Tennis	$38,638
Hans	Golf	$17,941
	Sailing	$14,060
	Tennis	$30,467
Kurt	Golf	$28,346
	Sailing	$20,814
	Tennis	$27,675
Ute	Golf	$36,127
	Sailing	$30,580
	Tennis	$28,198
Total Result		**$408,765**

Figure 292: Result of dragging column field (see Figure 291)

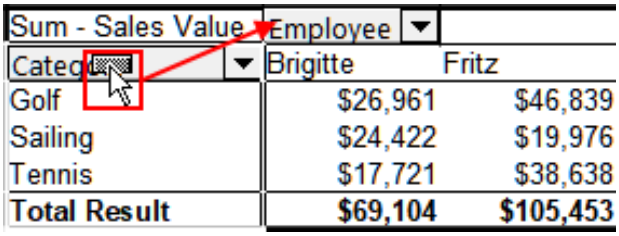


Figure 293: Drag a row field - note the pointer shape

You can remove a column, row, or filter field from the pivot table by clicking on it and dragging it out of the table. The mouse pointer changes to that shown in Figure 294. A field removed cannot be recovered, without returning to the Pivot Table Layout dialog to replace it.

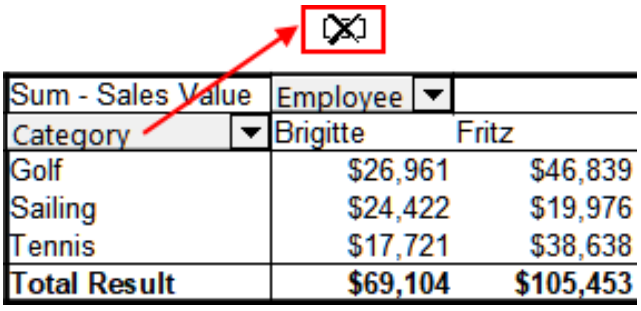


Figure 294: Field dragged out of the pivot table

Grouping rows or columns of a pivot table

For many analyses or summaries, the categories have to be grouped. You can merge the results in classes. You can only carry out grouping on an ungrouped pivot table.

After selecting the correct cell area, select **Data > Group and Outline > Group** on the Menu bar, or press `F12` on the keyboard. The type of values to be grouped is what mainly determines how the grouping function works. You need to distinguish between scalar values, or other values, such as text, that you want grouped.

Note

Before you can group, you have to produce a pivot table with ungrouped data. The time needed for creating a pivot table depends mostly on the number of columns and rows and not on the size of the basic data. Through grouping, you can produce the pivot table with a small number of rows and columns. The pivot table can contain a lot of categories, depending on your data source.

To remove grouping again, click inside the group, then choose **Data > Group and Outline > Ungroup**, or press *Ctrl+F12*.

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. Choose **Data > Group and Outline > Group** on the Menu bar or press *F12* on the keyboard; Calc displays the Grouping dialog shown in Figure 295.

You can define in which value range (*Start / End*) the grouping should take place. The default setting is the whole range, from the smallest to the largest value. In the field *Group by*, you can enter the class size, also known as the interval size.

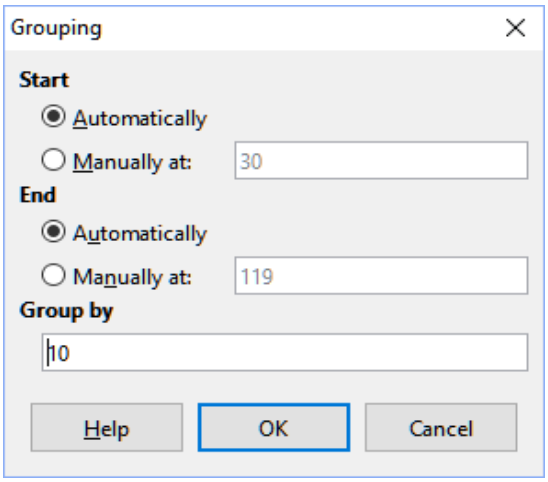


Figure 295: Grouping dialog with scalar categories

Figure 296 shows part of a pivot table created from a list containing speed measurements as a function of time. This pivot table shows the count of km/h speed measurements in the raw data.

km/h	Count - time
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 2 rouping

km/h	Count - time
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 297: Pivot table with grouping

The pivot table in Figure 297 is based on the same raw data. However in this case the speed measurements are grouped into intervals of 10 km/h.

Grouping of categories with date / time values

For grouping date / time values, select a single cell in the row or column of the category to be grouped. Choose **Data > Group and Outline > Group** on the Menu bar or press `F12` on the keyboard; Calc displays the Grouping dialog shown in Figure 298.

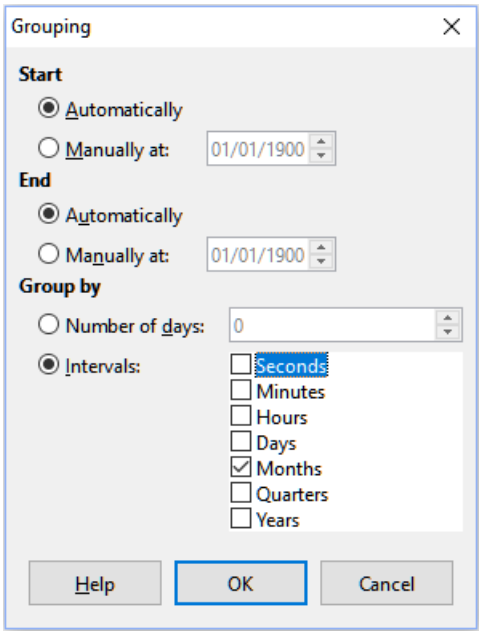


Figure 298: Grouping dialog for date/time categories

You can define in which value range (*Start* / *End*) the grouping should take place. The default setting is the whole range, from the smallest to the largest value. In the field *Group by*, you can enter the class size, also known as the interval size. In this case, you can select one of the predefined time intervals (**Seconds**, **Minutes**, **Hours**, **Days**, **Months**, **Quarters**, or **Years**) as an alternative to explicitly specifying a time interval in days.

Figure 299 shows the same data but configured to show the monthly sales in the North region.

Sum - Sales	Region	
Date	North	Total Result
Jan	$14,728	$14,728
Feb	$4,381	$4,381
Mar	$10,096	$10,096
Apr	$23,209	$23,209
May	$2,734	$2,734
Jun	$20,594	$20,594
Total Result	$75,742	$75,742

Figure 299: Pivot table with grouping

Figure 300 shows a pivot table configured to show the daily sales in the North region.

Sum - Sales Value	Region	
Date	North	Total Result
01/02/08	$410	$410
01/15/08	$1,858	$1,858
01/17/08	$4,842	$4,842
01/25/08	$4,263	$4,263
01/27/08	$2,095	$2,095
01/30/08	$1,260	$1,260
02/02/08	$734	$734
02/06/08	$3,443	$3,443
02/13/08	$204	$204
03/03/08	$3,985	$3,985
03/06/08	$1,379	$1,379
03/18/08	$3,814	$3,814
03/20/08	$918	$918
04/02/08	$1,355	$1,355
04/03/08	$576	$576
04/06/08	$3,705	$3,705
04/07/08	$3,126	$3,126
04/13/08	$498	$498
04/19/08	$4,101	$4,101
04/22/08	$4,276	$4,276
04/24/08	$3,008	$3,008
04/25/08	$2,564	$2,564
05/15/08	$520	$520
05/30/08	$2,214	$2,214
06/10/08	$4,839	$4,839
06/15/08	$3,404	$3,404
06/20/08	$3,617	$3,617
06/22/08	$2,987	$2,987
06/28/08	$3,049	$3,049
06/29/08	$2,698	$2,698
Total Result	**$75,742**	**$75,742**

Figure 300: Pivot table without grouping

Grouping without automatic creation of intervals

It is not possible to create intervals for some categories (for example, those containing text fields). However, for such fields, it is possible to define which values are put together in one group.

For grouping of these categories, select in the results of the pivot table all the individual field values that you want to put together in the group. With more than one cell selected, choose **Data > Group and Outline > Group** on the Menu bar, or press `F12` on the keyboard, to group the selected cells.

Tip

You can select several non-contiguous cells by pressing and holding the `Control` key while clicking with the mouse.

Given the input data shown in Figure 301, create a pivot table with Department in the *Row Fields* area and Sum - Sick days in the *Data Fields* area. The result should be as shown in Figure 302.

Last name	First name	Department	Sick days
Meier	Hans	Sales	7
Muller	Karin	Accounting	7
Schuster	Josef	Purchasing	3
Huber	Ema	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

Figure 301: Database with text categories

Department	Sum - Sick days
Accounting	7
Assembly	5
Production	18
Purchasing	6
Sales	7
Warehouse	5
Total Result	**48**

Figure 302: Pivot table with text categories

In the results of the pivot table select Accounting, Purchasing, and Sales in the Department column. Select **Data > Group and Outline > Group** on the Menu bar or press `F12` on the keyboard. The pivot table result updates to reflect the new group, as shown in Figure 303.

Department2	Department	Sum - Sick days
Assembly	Assembly	5
Group1	Accounting	7
	Purchasing	6
	Sales	7
Production	Production	18
Warehouse	Warehouse	5
Total Result		**48**

Figure 303: Summary of single categories in one group

In the updated pivot table result, select Assembly, Production, and Warehouse in the Department column. Select **Data > Group and Outline > Group** on the Menu bar or press `F12` on the keyboard. The pivot table updates again to reflect the new group, as shown in Figure 304.

You can change the default 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 pivot table will remember these settings, even if you change the layout later on.

Department2	Department	Sum - Sick days
Group1	Accounting	7
	Purchasing	6
	Sales	7
Group2	Assembly	5
	Production	18
	Warehouse	5
Total Result		**48**

Figure 304: Grouping finished

To add partial sums for the groups, right-click the results of the pivot table and select the **Properties** option. Double-click the **Department2** entry in the *Row Fields* area and select the **Automatic** option on the Data Field dialog (Figure 284). Click the two **OK** buttons and the pivot table is updated to include the partial sums for the groups, as shown in Figure 305.

Department2	Department	Sum - Sick days
Group1	Accounting	7
	Purchasing	6
	Sales	7
Group1 Result		**20**
Technical	Assembly	5
	Production	18
	Warehouse	5
Technical Result		**28**
Total Result		**48**

Figure 305: Renamed group and partial results

If it is not enabled already, select the **Enable drill to details** option on the Pivot Table Layout dialog. Double-click the Group 1 and Technical entries in the Department2 column to collapse/expand the group entries (for example, Figure 306 shows both groups collapsed).

Department2	Sum - Sick days
Group1	20
Technical	28
Total Result	**48**

Figure 306: Reduced to the new

Note

A well-structured database makes manual sorting within the pivot table 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.

Sorting the result

The results of a pivot table are by default sorted so that categories in columns and rows are presented in ascending order. There are three ways to change the sorting order:

- Select a sort order in the drop-down menu on a column's heading.
- Sort manually by using drag and drop.
- Select a sort order through the Data Field Options dialog for the appropriate row or column field (Figure 290).

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 column heading for a row or column field, and select one of the three sorting options (Figure 307):

- Sort Ascending
- Sort Descending
- Custom Sort

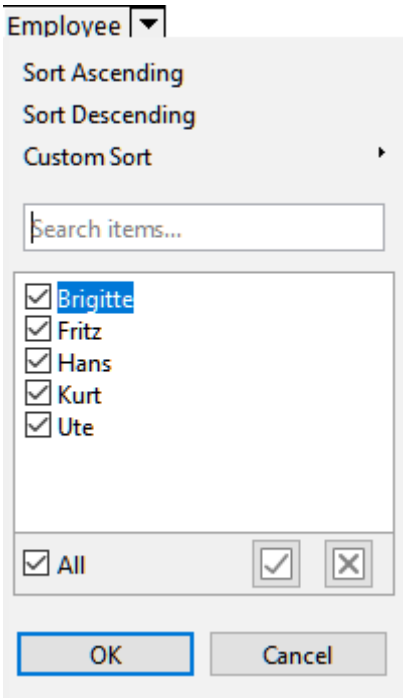


Figure 307: Column sorting and filtering dialog

Selecting the **Custom Sort** option sorts according to one of the predefined custom sorts defined in **Tools > Options > LibreOffice Calc > Sort Lists**. See Chapter 2, Entering and Editing Data for more information about creating and using sort lists.

This dialog also provides facilities for simple filtering of the data in the pivot table. Check the required individual boxes to select the data displayed in the results of the pivot table. Options are provided to show all, show only the current item, or hide only the current item. Click **OK** to activate the selected filtering. Once filtering has been carried out, the color of the arrow changes to white on a blue background, and a small white square is added to the bottom right of the arrow button (Figure 308).

Sum - Sales Value		Category			
Region	Employee	Golf	Sailing	Tennis	**Total Result**
East	Brigitte	$5,822	$2,135	$4,872	**$12,829**
North	Brigitte	$3,814	$10,151	$3,985	**$17,950**
South	Brigitte	$5,151	$4,432		**$9,583**
West	Brigitte	$12,174	$7,704	$8,864	**$28,742**
Total Result		**$26,961**	**$24,422**	**$17,721**	**$69,104**

Figure 308: Arrow color change and indicator square on column heading

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 results of the pivot table. The dragged cell is inserted before the cell on which you drop it.

Be aware that in Calc, a cell must be selected, it is not enough that the cursor is in the cell. The background of a selected cell is marked with a different color. To mark a single cell do one of the following:

- Click, then *Shift*+click the cell.
- Press the mouse button, drag a range across two cells, do not release the mouse button, and then drag back to the first cell. Release the mouse button. You can now move the individual cell by drag and drop.

To select several cells, mark one cell with no extra key pressed, then press the *Shift* or *Ctrl* key while clicking in other cells.

Sort automatically

To sort automatically, right-click within the pivot table and choose **Properties**. This will open the Pivot Table Layout dialog (Figure 273). Double-click the row or column field you want to sort. In the Data Field dialog which opens (Figure 284), click **Options** to display the Data Field Options dialog (Figure 290).

For *Sort by*, choose either **Ascending**, **Descending**, or **Manual**. If the selected field is the field for which the dialog was opened, the items are sorted by name. If a data field was selected, the items are sorted by the resultant value of the selected data field. **Ascending** sorts the values from the lowest value to the highest value. Similarly **Descending** sorts the values descending from the highest value to the lowest value. **Manual** sorts values alphabetically.

Drilling (showing details)

Use drilling to show the related detailed data for a single, compressed value in the pivot table result. This facility is available only if you selected the **Enable drill to details** option on the Pivot Table Layout dialog.

To activate a drill, double-click on the cell or choose **Data > Group and Outline > Show Details**. There are two possibilities:

- The active cell is 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 Golf. In this instance, the values that are aggregated within Golf can be subdivided using another field.

Sum - Sales Value	Region				
Category	East	North	South	West	**Total Result**
Golf	$41,971	$18,741	$56,257	$39,245	**$156,214**
Sailing	$22,484	$22,468	$44,801	$20,099	**$109,852**
Tennis	$35,966	$34,533	$34,258	$37,942	**$142,699**
Total Result	**$100,421**	**$75,742**	**$135,316**	**$97,286**	**$408,765**

Figure 309: Before the drill down for Golf

The Show Detail dialog appears allowing you to select the field to use for further subdivision. In this example, **Employee**.

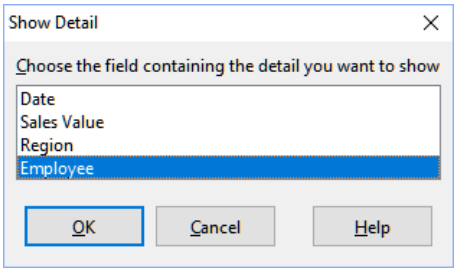


Figure 310: Selecting the field for the subdivision

Sum - Sales Value		Region				
Category	Employ	East	North	South	West	Total Result
Golf	Brigitte	$5,822	$3,814	$5,151	$12,174	**$26,961**
	Fritz	$15,172	$3,443	$23,290	$4,934	**$46,839**
	Hans	$5,316	$3,049	$4,196	$5,380	**$17,941**
	Kurt	$9,707	$2,214	$11,681	$4,744	**$28,346**
	Ute	$5,954	$6,221	$11,939	$12,013	**$36,127**
Sailing		$22,484	$22,468	$44,801	$20,099	**$109,852**
Tennis		$35,966	$34,533	$34,258	$37,942	**$142,699**
Total Result		**$100,421**	**$75,742**	**$135,316**	**$97,286**	**$408,765**

Figure 311: After the drill down

To hide the details again, double-click on the cell Golf or choose **Data > Group and Outline > Hide Details**.

The pivot table remembers your selection (in our example the field **Employee**) by adding and hiding the selected field so that for the next drill-down for a field in the **Category** column the dialog does not appear. To remove the selection **Employee**, open the Pivot Table Layout dialog and delete the unwanted selection in the *Row* or *Column Fields* area.

- The active cell is a data field. In this case, drill-down results in a listing of all data entries of the data source that aggregate to this value.
- In our example, if we double-click on the cell with the value `$18,741` from Figure 309, we would have a new list of all data sets that are included in this value. This list is displayed in a new sheet.

Filtering

F12 f_x Σ =

	A	B	C	D	E
1	Date	Sales Value	Category	Region	Employee
2	02/06/08	$3,443	Golf	North	Fritz
3	03/18/08	$3,814	Golf	North	Brigitte
4	01/17/08	$4,842	Golf	North	Ute
5	06/28/08	$3,049	Golf	North	Hans
6	03/06/08	$1,379	Golf	North	Ute
7	05/30/08	$2,214	Golf	North	Kurt

Figure 312: New sheet after the drill down for a value in a data field

To limit the pivot table analysis to a subset of the information that is contained in the data basis, you can filter the pivot table results.

Note

An AutoFilter or Standard Filter used on the sheet containing the raw data has no effect on the pivot table analysis process. The pivot table always uses the complete list that was selected when it was started.

To do this, click the **Filter** button at the top left above the results, or right-click in the results and select **Filter** in the context menu.

Note

The **Filter** button is available only if the **Add filter** option on the Pivot Table Layout dialog is selected.

	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	$33,357	$18,445	$18,599	$17,191	**$100,421**
6	North	$17,950	$15,256	$11,418	$16,198	$14,920	**$75,742**
7	South	$9,583	$43,737	$17,317	$33,710	$30,969	**$135,316**
8	West	$28,742	$13,103	$15,288	$8,328	$31,825	**$97,286**
9	**Total Result**	**$69,104**	**$105,453**	**$62,468**	**$76,835**	**$94,905**	**$408,765**

Figure 313: Filter button in the upper left area of the pivot table

In the Filter dialog (Figure 314), you can define up to three filter options that are used in the same way as Calc's Standard Filter. The controls in the *Options* section of this dialog are similar to the equivalent controls on Calc's Standard Filter dialog – see Chapter 2, Entering and Editing Data for more information.

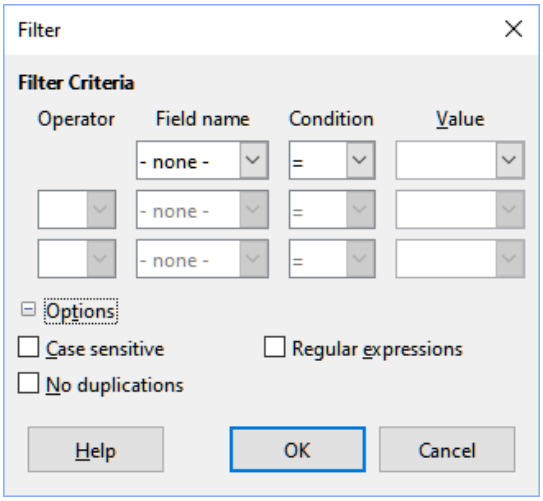


Figure 314: Dialog for defining the filter

The data presented in a pivot table can also be filtered using the drop-downs on the right hand side of column headings or by using filter fields. Filtering through column headings is described in "Select sort order from drop-down menus on each column heading" above.

Filter fields (that is, fields that you placed in the *Filters* area of the Pivot Table Layout dialog) are another practical way to filter the results of the pivot table. The advantage is that the filtering criteria used are clearly visible. Click the arrow on the right side of the filter field button to access the associated filtering dialog (Figure 315).

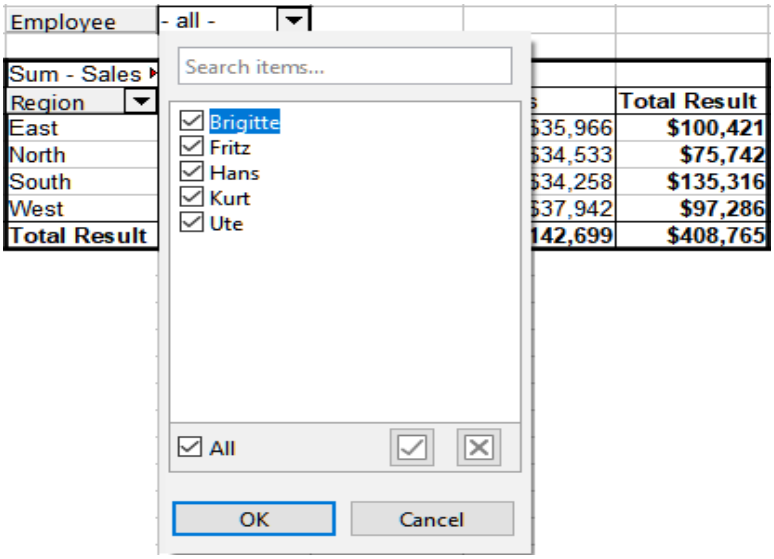


Figure 315: Filter field filtering dialog

The text adjacent to a filter field button indicates the filtering status, that is "- all -" when nothing is filtered, "- multiple -" when multiple but not all items are filtered, or the value when only that value is not filtered.

Updating (refreshing) changed values

After you have created the pivot table, changes in the source data do not cause an automatic update in the resulting table. You must update (refresh) the pivot table manually after changing any of the underlying data values.

Changes in the source data could appear in two ways:

- The content of existing data sets has been changed.
  For example, you might have changed a sales value. To update the pivot table, left-click in the results area and choose **Data > Pivot Table > Refresh** on the Menu bar, or right-click in the results area and choose **Refresh** in the context menu.
- You have added or deleted data sets in the original list.
  In this case, the change means that the pivot table has to use a different area of the spreadsheet for its analysis. If a simple addition to the list was made (for example, a new sale from a different employee was inserted), it is possible to update the pivot table by changing the range in the *Selection* field in the *Source* area of the Pivot Table Layout dialog. In the case of more complex changes to the data set collection, you must redo the pivot table from the beginning.

Cell formatting

The cells in the results area of the pivot table are automatically formatted by Calc. You can change this formatting using all the tools in Calc. However, if you make any change in the design of the pivot table using direct formatting, the formatting will return to that applied automatically by Calc when the table is next refreshed.

On creating a pivot table, six standard cell styles are added to the list of styles in the document if they are not included already. Each of these styles is applied to part of the pivot table. You can customize these pivot table styles. The pivot table styles are:

- Pivot Table Category
- Pivot Table Corner

- Pivot Table Field
- Pivot Table Result
- Pivot Table Title
- Pivot Table Value

Tip

Use the pivot table styles to make sure that the format of your pivot table is not unexpectedly changed during updates and that all pivot tables in your document have the same appearance.

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 percentage, the pivot table 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.

Deleting a pivot table

To delete a pivot table, left-click in any cell of the pivot table and select **Data > Pivot Table > Delete** on the Menu bar, or right-click in any cell of the pivot table and select **Delete** in the context menu.

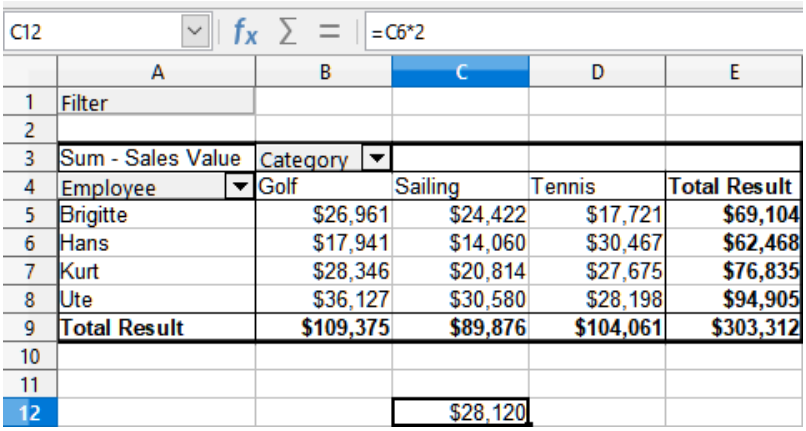
Caution

If you delete a pivot table with an associated pivot chart, the pivot chart is also deleted. Calc opens a dialog box to confirm the pivot chart deletion.

Using pivot table results elsewhere

The problem

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 pivot table, it contains the result that was calculated by referencing specific categories of the row and column fields. In Figure 316, cell C6 contains the sum of the sales values of the employee Hans in the category Sailing. The formula in cell C12 uses this value.

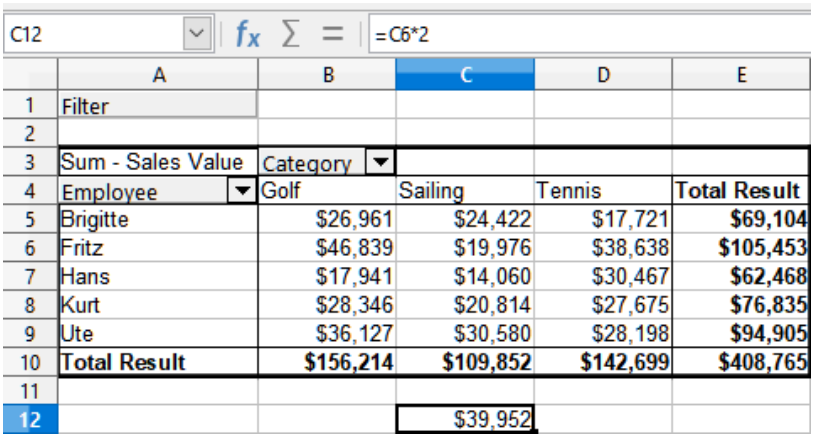


C12 | =C6*2

	A	B	C	D	E
1	Filter				
2					
3	Sum - Sales Value	Category			
4	Employee	Golf	Sailing	Tennis	Total Result
5	Brigitte	$26,961	$24,422	$17,721	**$69,104**
6	Hans	$17,941	$14,060	$30,467	**$62,468**
7	Kurt	$28,346	$20,814	$27,675	**$76,835**
8	Ute	$36,127	$30,580	$28,198	**$94,905**
9	**Total Result**	**$109,375**	**$89,876**	**$104,061**	**$303,312**
10					
11					
12			$28,120		

Figure 316: Formula reference to a cell of the pivot table

If the underlying data or the layout of the pivot table changes, then you must take into account that the sales value for Hans in the Sailing category 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 317, the location is now C7.



C12 | =C6*2

	A	B	C	D	E
1	Filter				
2					
3	Sum - Sales Value	Category			
4	Employee	Golf	Sailing	Tennis	Total Result
5	Brigitte	$26,961	$24,422	$17,721	**$69,104**
6	Fritz	$46,839	$19,976	$38,638	**$105,453**
7	Hans	$17,941	$14,060	$30,467	**$62,468**
8	Kurt	$28,346	$20,814	$27,675	**$76,835**
9	Ute	$36,127	$30,580	$28,198	**$94,905**
10	**Total Result**	**$156,214**	**$109,852**	**$142,699**	**$408,765**
11					
12			$39,952		

Figure 317: The value that you really want to use can be found now in a different location

The solution: Function GETPIVOTDATA()

Use the function GETPIVOTDATA() to have a reference to a value inside the pivot table by using the specific identifying categories for this value. This function can be used with formulas in Calc if you want to reuse the results from the pivot table elsewhere in your spreadsheet.

Syntax

The syntax has two variations:

```
=GETPIVOTDATA(Target Field; Pivot Table[; Field 1; Item 1][; ... [Field 126; Item 126]])
```

or

```
=GETPIVOTDATA(Pivot Table; Constraints)
```

The square brackets in the first variation surround optional arguments.

First syntax variation

The **Target Field** specifies which data field of the pivot table is used within the function. If your pivot table has only one data field, this entry is ignored, but you *must* enter it anyway.

If your pivot table 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 **Pivot Table** specifies the pivot table that you want to use. Your document may contain more than one pivot table. Enter here a cell reference that is inside the area of your pivot table. It might be a good idea to always use the upper left corner cell of your pivot table so that you can be sure that the cell will always be within your pivot table, 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 pivot table (“Sum – Sales Value” entered as the field will return a value of 408,765).

You can add more arguments as pairs with **Field names** and **Elements** to retrieve specific partial sums. In the example in Figure 318, 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")
```

C12 =GETPIVOTDATA("Sales Value",A1,"Employee", "Hans","Category", "Sailing")

	A	B	C	D	E	F	G
1	Filter						
2							
3	Sum - Sales Value	Category					
4	Employee	Golf	Sailing	Tennis	Total Result		
5	Brigitte	$26,961	$24,422	$17,721	$69,104		
6	Fritz	$46,839	$19,976	$38,638	$105,453		
7	Hans	$17,941	$14,060	$30,467	$62,468		
8	Kurt	$28,346	$20,814	$27,675	$76,835		
9	Ute	$36,127	$30,580	$28,198	$94,905		
10	Total Result	$156,214	$109,852	$142,699	$408,765		
11							
12			14060				

Figure 318: First syntax variation

Second syntax variation

The argument **Pivot Table** has to be given in the same way as for the first syntax variation.

For the **Constraints**, enter a list separated by spaces to specify the value you want from the pivot table. 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 319, 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 Value Employee[Hans] Category[Sailing]")

	A	B	C	D	E	F	G
1	Filter						
2							
3	Sum - Sales Value	Category					
4	Employee	Golf	Sailing	Tennis	**Total Result**		
5	Brigitte	$26,961	$24,422	$17,721	**$69,104**		
6	Fritz	$46,839	$19,976	$38,638	**$105,453**		
7	Hans	$17,941	$14,060	$30,467	**$62,468**		
8	Kurt	$28,346	$20,814	$27,675	**$76,835**		
9	Ute	$36,127	$30,580	$28,198	**$94,905**		
10	**Total Result**	**$156,214**	**$109,852**	**$142,699**	**$408,765**		
11							
12			14060				

Figure 319: Second syntax variation

When working with data sets containing date information, you must take care if you use the date information in the GETPIVOTDATA() function. The function will only recognize the date entry if it is entered into the formula in exactly the same way that it appears in the data set from which the pivot table is produced. In the example of Figure 320, an error is returned when the date format does not match that of the data. Only with the correct format is the result returned.

Sum - Cost		Date		
Name	Phone numbe	26/01/2010	24/02/2010	**Total Result**
Jones	12345678921	0.84	1.0928	**1.9328**
	12345678922	7.816	1.4812	**9.2972**
Jones Sum - Cost		**8.656**	**2.574**	**11.23**
Smith	12345678911	1.0038	3.7265	**4.7303**
	12345678912	15.911	4.4125	**20.3235**
Smith Sum - Cost		**16.9148**	**8.139**	**25.0538**
Total Result		**25.5708**	**10.713**	**36.2838**

Result	Formula
#REF!	=GETPIVOTDATA($A$2,"Date[26/01/10]")
25.5708	=GETPIVOTDATA($A$2,"Date[26/01/2010]")

Figure 320: Error produced if date information is not entered correctly

Using pivot charts

Introduction

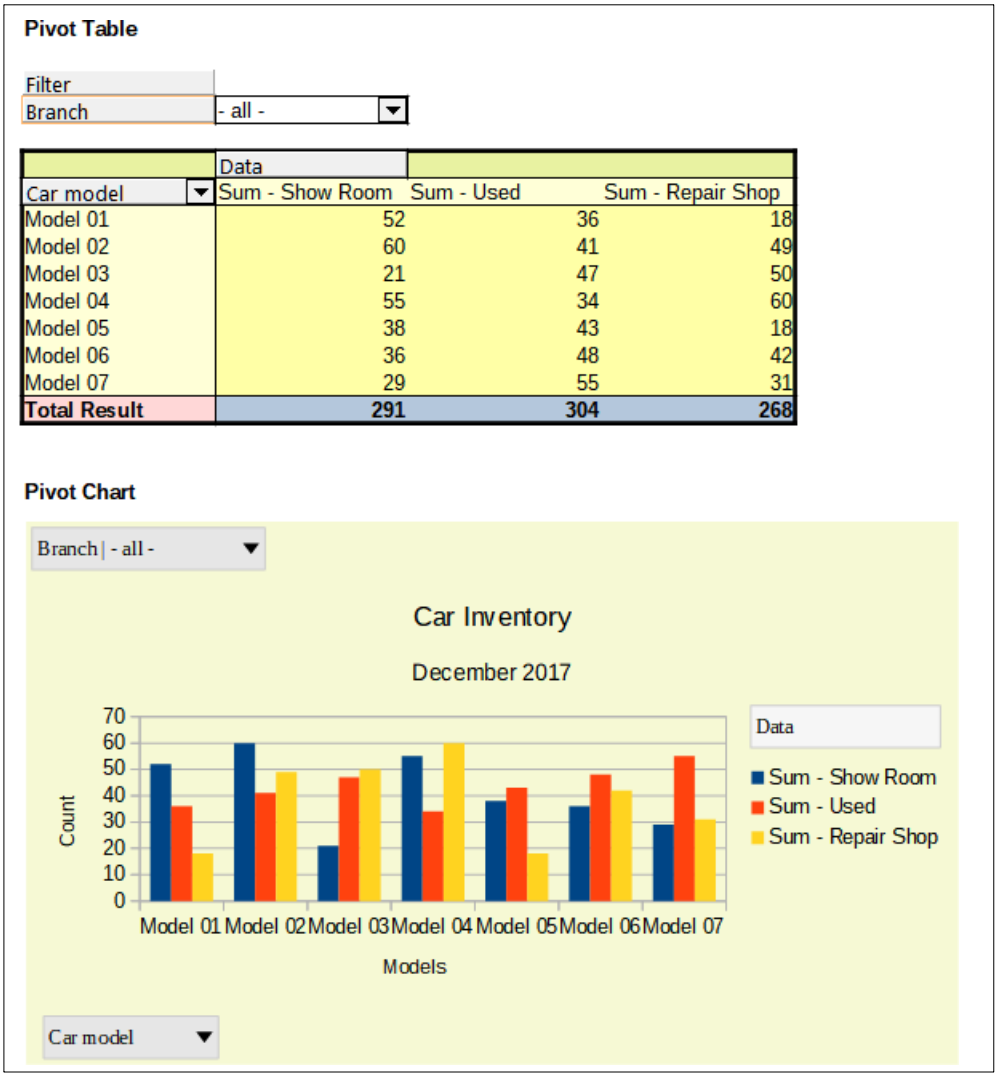


Figure 321: Sample pivot chart and associated pivot table

A pivot table is a powerful tool to reorganize, manipulate and summarize data. A pivot chart provides a visual representation of the information in a pivot table. You can create a pivot chart from the output of a pivot table and, if the pivot table gets changed, so does the pivot chart.

Pivot charts are a special case of the more general Calc charts described in Chapter 3, Creating Charts and Graphs. The main differences between pivot charts and other charts in Calc are as follows:

- A pivot chart tracks the changes in the data issued from a pivot table and Calc automatically adjusts the data series and data range of the pivot chart accordingly.
- Pivot chart buttons are provided on pivot charts. These buttons are unique to pivot charts and are not provided on Calc's normal charts. An important purpose of the buttons is to represent the layout of the underlying pivot table and they show the pivot table's fields. Buttons representing the filter fields (if present) are provided at the top of the pivot chart. Buttons representing the row fields are provided at the bottom of the pivot chart. Buttons representing the column fields are stacked in the legend at the right of the pivot chart. You can also use pivot chart buttons to filter the data displayed in the pivot chart.

Creating a pivot chart

To create a pivot chart, click inside the pivot table and select **Insert > Chart** on the Menu bar or click the **Insert Chart** icon on the Standard toolbar.

Calc automatically detects the pivot table and opens the Chart Wizard. Through the Chart Wizard, you can select the chart type and chart elements for the pivot chart. The wizard is similar to the corresponding wizard for normal charts but for pivot charts, the steps to define data range and data series are disabled.

The first step in the wizard is to select the chart type and the same options are available as for a normal chart (Figure 322).

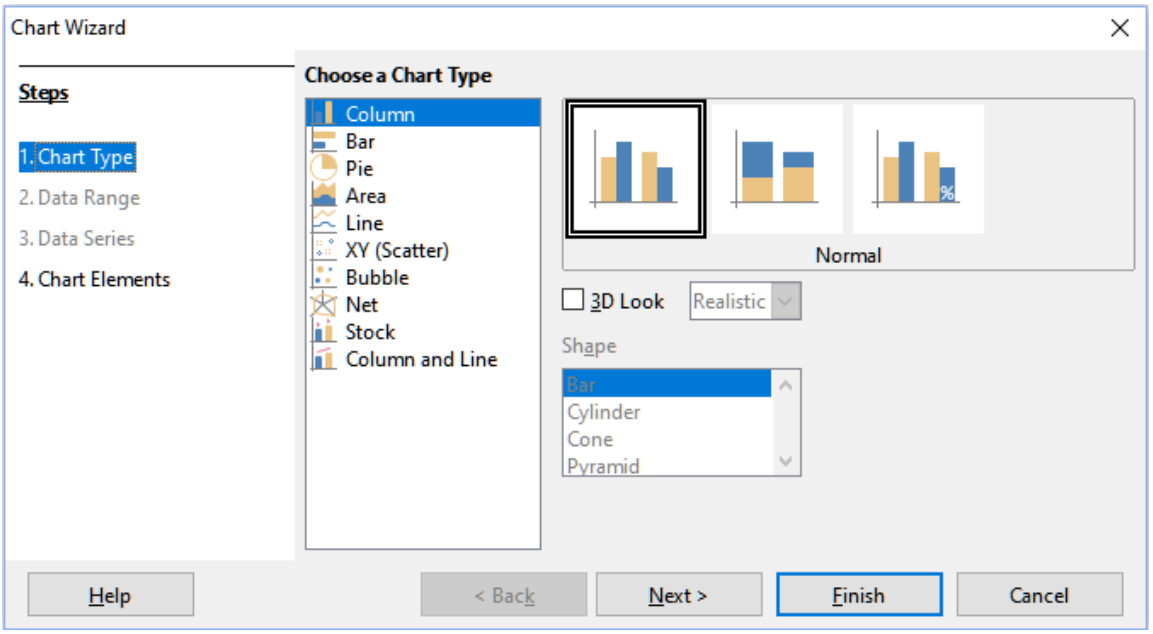


Figure 322: Select the chart type through the Chart Wizard when creating a pivot chart

The second step is to select the chart elements and these are similar to those for normal charts (Figure 323).

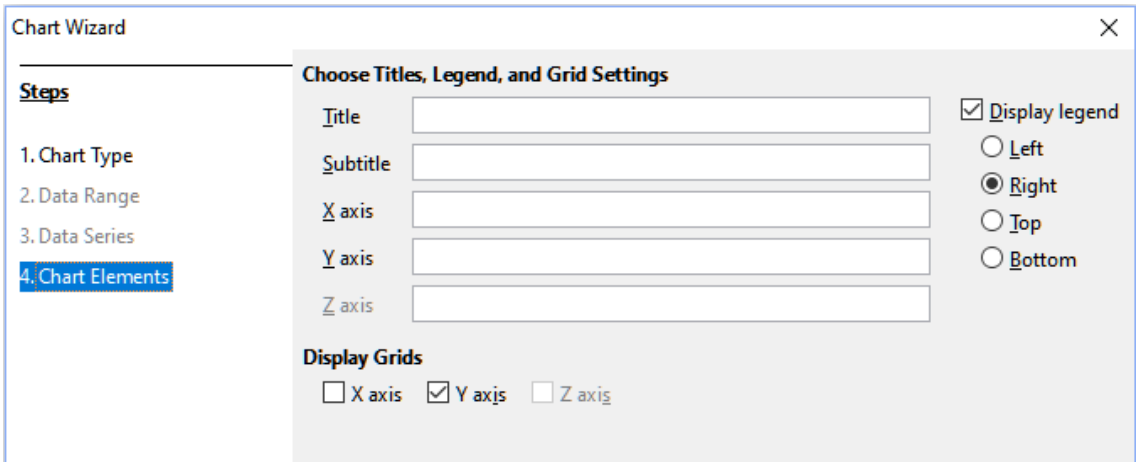


Figure 323: Enter chart elements through the Chart Wizard when creating a pivot chart

Click **Finish** to close the wizard and create the pivot chart.

Editing a pivot chart

After you have created a pivot chart, you may find that you would like to move it, change its size or improve its appearance. Calc provides tools for changing the chart type, chart elements, fonts, colors, and many other options. The facilities provided for pivot charts are the same as those available for normal charts; see Chapter 3, Creating Charts and Graphs.

Updating a pivot chart

If the source data of the pivot table changes, refresh the pivot table and the pivot chart is also updated accordingly. To refresh the pivot table (and thus the pivot chart), click in any cell within the pivot table and select **Data > Pivot Table > Refresh** on the Menu bar or select **Refresh** in the context menu.

Filtering a pivot chart

Use filters to remove unwanted data from a pivot chart.

All filters applied to a pivot table affect any linked pivot chart equally, since the table and chart show exactly the same data. The various pivot table filtering mechanisms are described in “Filtering” above.

Pivot chart buttons include a down arrow to indicate that there is an associated pop-up action. If any filtering is applied, then this arrow turns from black to blue. Pivot chart buttons become operational when you double-click on the chart and a gray frame appears around the chart. This action puts the pivot chart into edit mode.

Click a filter field button located at the top of a pivot chart to access a filtering dialog similar to that shown in Figure 315. Change the filtering applied to the pivot table and pivot chart through this dialog. The right-hand section of the button’s legend indicates the filtering status, that is “- all -” when nothing is filtered, “- multiple -” when multiple but not all items are filtered, or the value when only that value is not filtered.

Buttons located at the bottom and right of a pivot chart that include a downward pointing arrow provide access to a sorting and filtering dialog similar to the one shown in Figure 307. Change the sorting and filtering applied to the pivot table and pivot chart through this dialog.

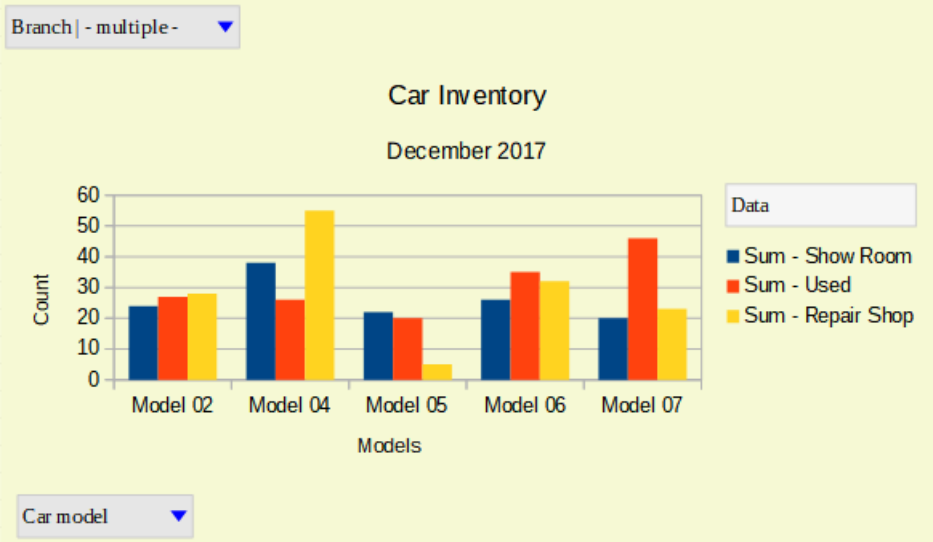


Figure 324: Filtering applied to filter and row fields

Deleting a pivot chart

To delete a pivot chart, select the chart and press `Del` on the keyboard.

Note

When you delete a pivot chart, the associated pivot table is not affected.

Caution

If you delete a pivot table with an associated pivot chart, the pivot chart is also deleted. Calc opens a dialog box to confirm the pivot table deletion.



Calc Guide 7.5

Chapter 10
Data Analysis

Using Scenarios, Goal Seek, Solver, Statistics, 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.

In addition to formulas and functions, Calc includes several tools for processing your data. These tools include features for copying and reusing data, creating subtotals, running what-if analysis, and performing statistical analysis. They can be found under the **Tools** and **Data** menus on the Menu bar. Although they are not necessary when using Calc, they can help you save time and effort with handling large data sets or preserving your work for future review.

Note

A related tool, the Pivot Table, is not mentioned here, as it is complex enough to require its own chapter. See Chapter 9, Using Pivot Tables, for more information.

Consolidating data

The Consolidate tool allows you to combine and aggregate data spread across one or more sheets. This tool is useful if you need to quickly summarize a large, scattered set of data for review. For example, you could use it to consolidate multiple department budgets from different sheets into a single company-wide budget contained in a master sheet.

To consolidate data:

1) Open the document containing the cell ranges to be consolidated.
2) Select **Data > Consolidate** on the Menu bar to open the Consolidate dialog (Figure 325).
3) Click on the *Source data ranges* field, then type a reference to a source data range, a named range, or select it with the mouse. Use the associated **Shrink / Expand** button if you need to minimize the dialog while you select the range. Alternatively, select a named range from the drop-down list to the left of the field.
4) Click **Add**. The selected range is added to the *Consolidation ranges* list.
5) Repeat steps 3) and 4) to add additional source ranges.
6) To delete an entry in the *Consolidation ranges* list, select it and click **Delete**. The deletion is carried out without further confirmation.
7) Click on the *Copy results to* field, then type a reference to the first cell of the target range or select it with your mouse. You can also select a named range in the drop-down list to the left of the field.
8) Select a function to aggregate your data in the *Function* drop-down list. The default is Sum. Other available functions are Count, Average, Max, Min, Product, Count (numbers only), StdDev (sample), StDevP (population), Var (sample), and VarP (population).
9) Click **OK** to consolidate the ranges. Calc runs the function from step 8) on your source data ranges and populates the target range with the results.

Tip

If you are consolidating the same cell ranges repeatedly, consider converting them into reusable named ranges to make the process easier. For more information about named ranges, see Chapter 14, Calc as a Database.

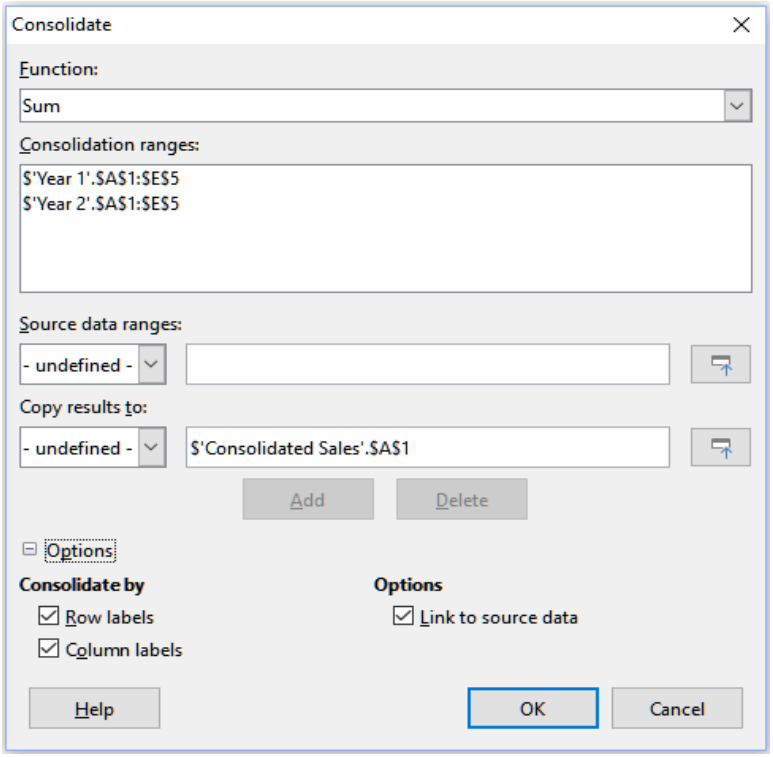


Figure 325: Consolidate dialog

Consolidation settings

In the Consolidate dialog, expand the *Options* section to access the settings shown in Figure 326.

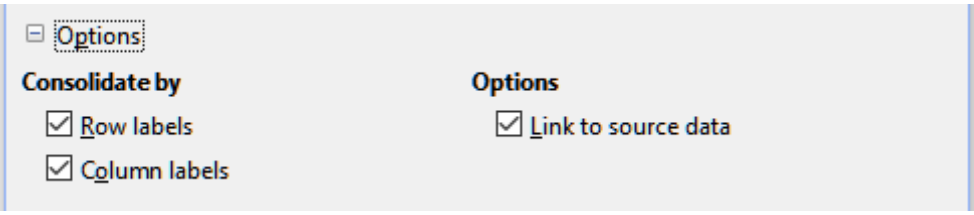


Figure 326: Consolidate dialog – Options section

Consolidate by

In this section, choose whether to consolidate your source data ranges by their range position or by matching labels. Consolidation labels must be contained within each range, and the text of corresponding row or column labels must match for the rows or columns themselves to be combined.

- **Row labels** - Consolidates rows by matching label. If this option is unchecked, the tool will consolidate rows by position instead.
- **Column labels** - Works the same as **Row labels**, but with columns instead.

Options

Select **Link to source data** to add formulas in the target range that link back to values in the source ranges. When you select this option, any changes you make in the source ranges will automatically update values in the target range.

Note

If you use the **Link to source data** option, each source link is inserted into the target range, then ordered and hidden from view. Only the final results of consolidation are displayed by default.

Consolidation example

Figures 327, 328, and 329 show a simple example of consolidation using a spreadsheet with the sheets *Year 1*, *Year 2*, and *Consolidated Sales*. Figure 327 shows the contents of the *Year 1* sheet, with sales figures by region for each of the four product colors.

	A	B	C	D	E
1		**Red**	**Orange**	**Green**	**Blue**
2	**North**	$84,213	$87,445	$5,930	$31,653
3	**East**	$92,609	$94,959	$44,466	$28,606
4	**South**	$67,987	$19,169	$92,682	$28,253
5	**West**	$29,628	$95,213	$74,880	$10,334
6					
7					
8					
9					

Year 1 | Year 2 | Consolidated Sales

Figure 327: Year 1 sales by region

Figure 328 shows the *Year 2* sheet, sales figures by region for each of four product colors. Note the different ordering of row and column labels between the two figures.

	A	B	C	D	E
1		**Red**	**Green**	**Blue**	**Orange**
2	**North**	$11,716	$94,891	$68,566	$71,120
3	**South**	$86,039	$20,239	$1,194	$83,642
4	**East**	$18,326	$69,337	$59,089	$48,803
5	**West**	$60,579	$25,280	$75,349	$47,605
6					
7					
8					
9					

Year 1 | Year 2 | Consolidated Sales

Figure 328: Year 2 sales by region

Figure 329 shows the consolidated sales data, created by using the Consolidate dialog settings shown in Figure 326. Note that because the **Link to source data** option was selected, clicking on the plus sign (+) indicators to the left of the data will reveal formula links back to the source ranges.

The source ranges and target range are saved as part of the document. If you later open a document with consolidated ranges, they will still be available in the *Consolidation ranges* list of the Consolidate dialog.

	A	B	C	D	E
1		Red	Orange	Green	Blue
4	North	$95,929	$158,565	$100,821	$100,219
7	East	$110,935	$143,762	$113,803	$87,695
10	South	$154,026	$102,811	$112,921	$29,447
13	West	$90,207	$142,818	$100,160	$85,683
14					
15					
16					
17					

Year 1 | Year 2 | Consolidated Sales

Figure 329: Consolidated sales by region

Creating subtotals

Calc offers two methods of creating subtotals: the SUBTOTAL function and the Subtotals tool.

Using the SUBTOTAL function

The SUBTOTAL function is listed under the Mathematical category of the Function Wizard, and the Functions deck of the Sidebar, which are described in Chapter 8, Using Formulas and Functions. SUBTOTAL is a relatively limited method for generating a subtotal, and works best if used with only a few categories.

A SUBTOTAL example

To illustrate how to use the SUBTOTAL function, we use the sales data sheet shown in Figure 330. The AutoFilter function is already applied to the sales data, as indicated by the down arrow buttons at the head of each column. AutoFilters are described in Chapter 2, Entering and Editing Data.

	A	B	C	D	E
1	Date	Sales Value	Category	Region	Employee
2	04/13/08	$498	Sailing	North	Kurt
3	02/07/08	$1,383	Sailing	South	Kurt
4	05/28/08	$4,655	Tennis	East	Hans
5	04/20/08	$3,993	Sailing	East	Fritz
6	02/28/08	$3,377	Golf	South	Ute
7	01/27/08	$2,095	Sailing	North	Brigitte
8	02/16/08	$4,731	Sailing	East	Ute
9	04/15/08	$4,330	Tennis	South	Kurt
10	04/20/08	$3,664	Golf	South	Kurt

Figure 330: Sales data with AutoFilter applied (only the first few rows are shown)

To create a summation subtotal for the *Sales Value* field using the Function Wizard:

1) Select the cell to contain a subtotal. Typically, this cell is at the bottom of the column being subtotaled, which, for our example, is the *Sales Value* column.
2) Use one of the following methods to open the Function Wizard dialog (Figure 331):
   - Select **Insert > Function** on the Menu bar
   - Click the **Function Wizard** icon on the Formula bar
   - Press `Ctrl+F2`

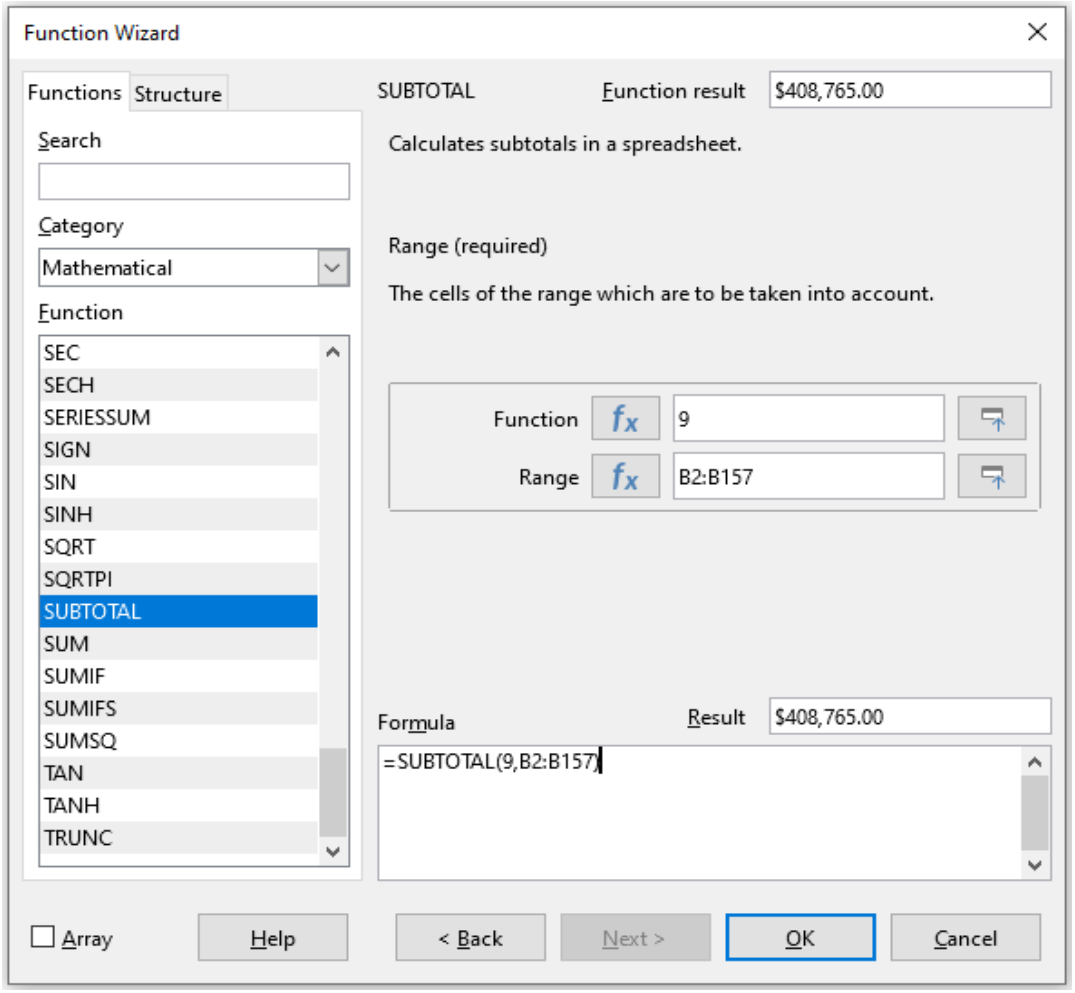


Figure 331: Function Wizard dialog

3) Select SUBTOTAL in the *Function* list of the Function Wizard dialog and click **Next**.

4) Enter the numeric code of a function into the *Function* field on the right side of the dialog. This code must be a value in the range 1 to 11, or 101 to 111, with the meaning of each value shown in Table 19.

Note

Values 1 to 11 include hidden values in the calculated subtotal, while values 101 to 111 do not. Hiding and showing data is described in Chapter 2, Entering and Editing Data. Filtered-out cells are always excluded by the SUBTOTAL function.

Table 19: SUBTOTAL function numbers

Function index (includes hidden values)	***Function index (ignores hidden values)***	***Function***
1	101	AVERAGE
2	102	COUNT
3	103	COUNTA
4	104	MAX
5	105	MIN

Function index (includes hidden values)	*Function index (ignores hidden values)*	*Function*
6	106	PRODUCT
7	107	STDEV
8	108	STDEVP
9	109	SUM
10	110	VAR
11	111	VARP

5) Click on the *Range* field, then type a reference to the *Sales Value* range or select the cells with your mouse (Figure 331). Use the **Shrink** / **Expand** button if you need to temporarily minimize the dialog while selecting the cells.

6) Click **OK** to close the Function Wizard dialog. The cell you selected in step 1) now contains the total sales value.

7) Click on the AutoFilter down arrow button at the top of the *Employee* column and remove all marks from the filter area except those next to *Brigitte* and *(empty)*. The cell that you selected in step 1) should now reflect the sum of all of Brigitte's sales (Figure 332).

Note

If the cell range used to calculate a subtotal contains other subtotals, these subtotals will not be counted in the final one. Similarly, if you use this function with AutoFilters, only the data satisfying the current filter selections will be displayed. Any filtered-out data is ignored.

114	05/15/08	$520	Sailing	North	Brigitte
115	05/06/08	$575	Golf	West	Brigitte
118	06/02/08	$2,213	Golf	East	Brigitte
119	06/03/08	$1,819	Golf	East	Brigitte
122	04/18/08	$3,060	Golf	West	Brigitte
124	02/20/08	$1,660	Golf	South	Brigitte
127	04/02/08	$1,355	Sailing	North	Brigitte
134	02/27/08	$4,433	Sailing	West	Brigitte
138	01/25/08	$3,116	Sailing	West	Brigitte
148	06/20/08	$3,617	Sailing	North	Brigitte
151	02/27/08	$1,790	Golf	East	Brigitte
158		$69,104			

Figure 332: SUBTOTAL result for Brigitte's sales

The Subtotals tool

Calc offers the Subtotals tool as a more comprehensive alternative to the SUBTOTAL function. In contrast to SUBTOTAL, which only works on a single array, the Subtotals tool can create subtotals for up to three arrays arranged in labeled columns. It also groups subtotals by category and sorts them automatically, thereby eliminating the need to apply AutoFilters and filter categories by hand.

Using the Subtotals tool

To insert subtotal values into a sheet:

1) Select the cell range for the subtotals that you want to calculate, and remember to include the column heading labels. Alternatively, click on a single cell within your data to allow Calc to automatically identify the range.
2) Select **Data > Subtotals** on the Menu bar to open the Subtotals dialog (Figure 333).
3) In the *Group by* drop-down list on the *1st Group* tab, select a column by its label. Entries in the cell range from step 1) will be grouped and sorted by matching values in this column.
4) In the *Calculate subtotals for* box on the *1st Group* tab, select a column containing values to be subtotaled. If you later change values in this column, Calc will automatically recalculate the subtotals.
5) In the *Use function* box on the *1st Group* tab, select a function to calculate the subtotals for the column selected in step 4).
6) Repeat steps 4) and 5) to create subtotals for other columns on the *1st Group* tab.
7) You can create two more subtotal categories by using the *2nd Group* and *3rd Group* tabs and repeating steps 3) to 6). If you do not want to add more groups, then leave the *Group by* list for each page set to "*- none -*".
8) Click **OK**. Calc will add subtotal and grand total rows to your cell range.

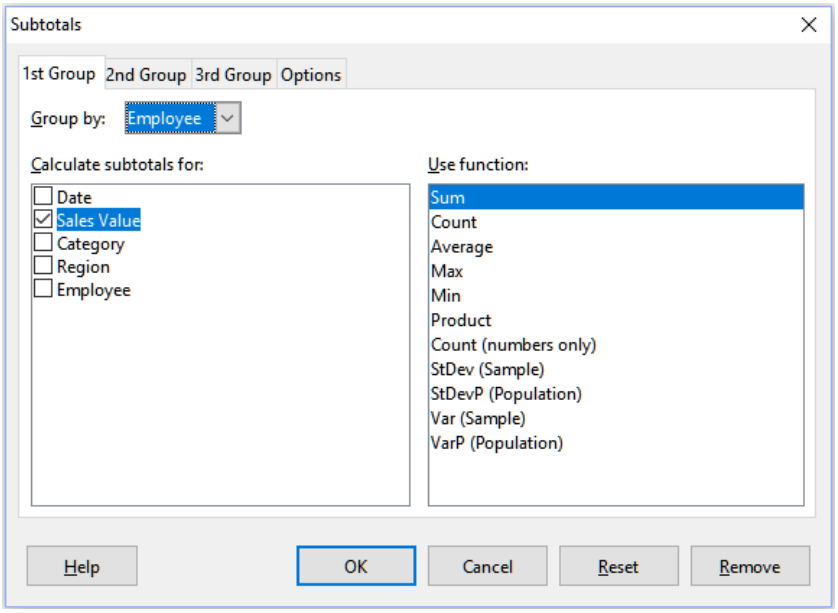


Figure 333: Subtotals dialog

For our sales data example, a partial view of the results is shown in Figure 334. The group settings are identified in Table 20.

Table 20: Group settings used on Subtotals dialog for example sales data

Tab	*Group by*	*Calculate subtotals for*	*Use function*
1st Group	Employee	Sales Value	Sum
2nd Group	Category	Sales Value	Sum
3rd Group	- none -	-	-

Subtotal outline

When you use the Subtotals tool, Calc inserts an outline to the left of the row number column. This outline represents the hierarchical structure of your subtotals, and can be used to hide or show data at different levels in the hierarchy using the numbered column indicators at the top of the outline or the group indicators, denoted by plus (+) and minus (-) signs.

This feature is useful if you have many subtotals, as you can simply hide low-level details, such as individual entries, to produce a high-level summary of your data. For more information on how to use outlines, see Chapter 2, Entering and Editing Data.

To turn off outlines, select **Data > Group and Outline > Remove Outline** on the Menu bar. To reinstate them, select **Data > Group and Outline > AutoOutline**.

Figure 334 shows the outline for our sales data example.

1 2 3 4 5		A	B	C	D	E
	1	Date	Sales Value	Category	Region	Employee
−	2	01/19/08	$2,032	Golf	West	Brigitte
−	3	01/29/08	$3,491	Golf	South	Brigitte
−	4	02/20/08	$1,660	Golf	South	Brigitte
−	5	02/27/08	$1,146	Golf	West	Brigitte
−	6	02/27/08	$1,790	Golf	East	Brigitte
−	7	03/18/08	$3,814	Golf	North	Brigitte
−	8	04/04/08	$4,045	Golf	West	Brigitte
−	9	04/18/08	$3,060	Golf	West	Brigitte
−	10	04/29/08	$1,316	Golf	West	Brigitte
−	11	05/06/08	$575	Golf	West	Brigitte
−	12	06/02/08	$2,213	Golf	East	Brigitte
−	13	06/03/08	$1,819	Golf	East	Brigitte
	14		***$26,961***	***Golf Sum***		
−	15	01/25/08	$3,116	Sailing	West	Brigitte
−	16	01/27/08	$2,095	Sailing	North	Brigitte
−	17	01/28/08	$155	Sailing	West	Brigitte
−	18	02/27/08	$4,433	Sailing	West	Brigitte
−	19	04/02/08	$1,355	Sailing	North	Brigitte
−	20	04/25/08	$2,564	Sailing	North	Brigitte
−	21	05/12/08	$3,887	Sailing	South	Brigitte
−	22	05/15/08	$520	Sailing	North	Brigitte
−	23	06/04/08	$2,135	Sailing	East	Brigitte
−	24	06/20/08	$3,617	Sailing	North	Brigitte
−	25	06/28/08	$545	Sailing	South	Brigitte
	26		***$24,422***	***Sailing Sum***		
−	27	01/03/08	$4,872	Tennis	East	Brigitte
−	28	02/02/08	$1,218	Tennis	West	Brigitte
−	29	02/11/08	$2,565	Tennis	West	Brigitte
−	30	02/28/08	$3,145	Tennis	West	Brigitte
−	31	03/03/08	$3,985	Tennis	North	Brigitte
−	32	06/07/08	$769	Tennis	West	Brigitte
−	33	06/08/08	$1,167	Tennis	West	Brigitte
	34		***$17,721***	***Tennis Sum***		
	35		***$69,104***			***Brigitte Sum***

Figure 334: Partial outlined view of sales data example with subtotals

Column 1 represents the highest group level, the grand total over all employees. Outline columns 2 to 5 show descending group levels as follows:

- Column 2 represents the grand total over all categories.
- Column 3 represents the total for each employee.
- Column 4 represents the total for each category for an individual employee.
- Column 5 shows individual entries.

Subtotals tool options

Click on the *Options* tab of the Subtotals dialog to access the following settings:

Groups

Defines how subtotal data is organized.

- **Page break between groups** - inserts page breaks between each subtotal group so that each group displays on a separate page when you print the data.
- **Case sensitive** – prevents the tool from grouping entries by data labels that differ by case. In our sales data example, entries with “Brigitte” and “brigitte” under the Employee column will not match if this option is selected.
- **Pre-sort area according to groups** – sorts entries by group before calculating subtotals. Disabling this option prevents the tool from grouping matching entries together. As a result, distinct subtotals will be created for matching entries if they do not appear on consecutive rows. For example, two entries under the “Golf” category will not count towards the same group subtotal if there is an entry for “Tennis” in between them.

Sort

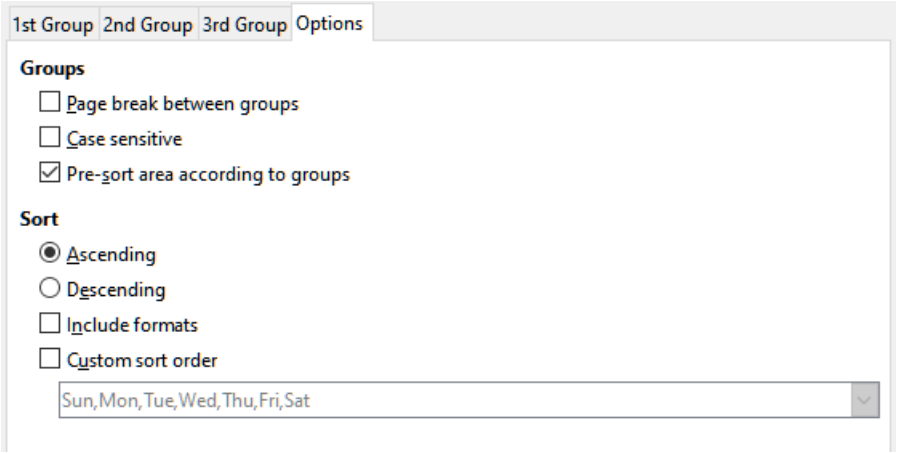


Figure 335: Options tab of the Subtotals dialog

Defines how subtotal data is sorted. This section is disabled if **Pre-sort area according to groups** is unchecked.

- **Ascending** or **Descending** – sorts entries by value from lowest to highest and highest to lowest, respectively. You can modify these sort rules by using **Data > Sort** on the Menu bar. For more detail, see Chapter 2, Entering and Editing Data.
- **Include formats** - carries over formatting, such as the currency format, from the data to the corresponding subtotals.
- **Custom sort order** – sorts your data according to one of the predefined custom sorts defined in **Tools > Options > LibreOffice Calc > Sort Lists** on the Menu bar. For more details about custom sort lists, see Chapter 2, Entering and Editing Data.

Reset and Remove

In the Subtotals dialog, use the **Reset** button to undo any changes made on the current tab. Use the **Remove** button to remove any subtotals that have already been created using the Subtotals tool. Use these features with care, as no confirmation dialogs will be displayed.

Using scenarios

Scenarios are saved, named cell ranges that you can use to answer "what-if" questions about your data. You can create multiple scenarios for the same calculation set, then quickly swap between them to view the outcomes of each. This feature is useful if you need to test the effects of different conditions on your calculations, but do not want to deal with repetitive manual data entry. For example, if you wanted to test different interest rates for an investment, you could create scenarios for each rate, then switch between them to find out which rates work the best for you.

Creating scenarios

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** on the Menu bar to open the Create Scenario dialog (Figure 336).

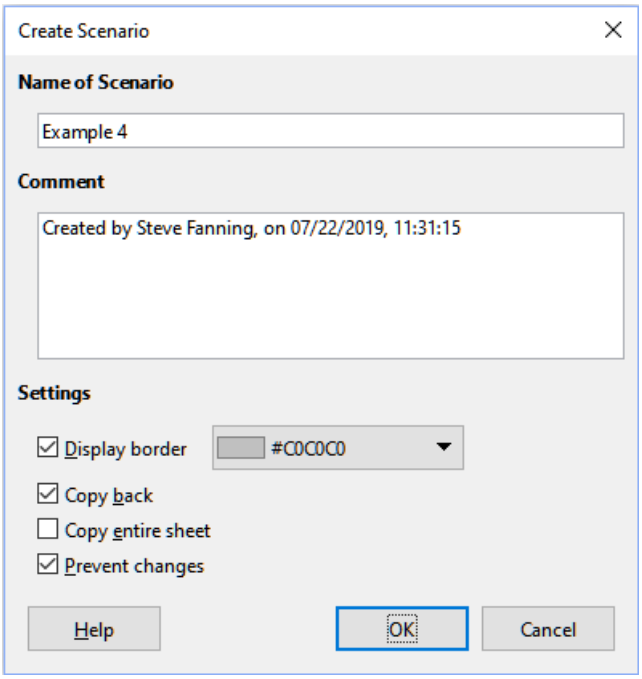


Figure 336: Create Scenario dialog

3) Enter a name for the new scenario in the *Name of Scenario* field.

Tip

For each scenario you create, use a unique name that clearly identifies and distinguishes it. This practice will save you time and headache if you have to work with a large set of scenarios. We do not recommend using the default name suggested by Calc.

4) Optionally, add information to the *Comment* field. The example in Figure 336 shows the default comment.

5) Click **OK** to close the dialog. The new scenario is automatically activated upon creation.

6) Repeat steps 1) to 5) to create additional scenarios. Select the same cell range that you used for the first scenario to have multiple scenarios for the same calculations.

Tip

To keep track of what calculations are dependent on your scenarios, use **Tools > Detective > Trace Dependents** on the Menu bar after highlighting your scenario cells. Arrows will point from your scenario cells to the dependent formula cells. For more information about the Detective tool, see Chapter 8, Using Formulas and Functions.

Scenario settings

The *Settings* section of the Create Scenario dialog contains the following options:

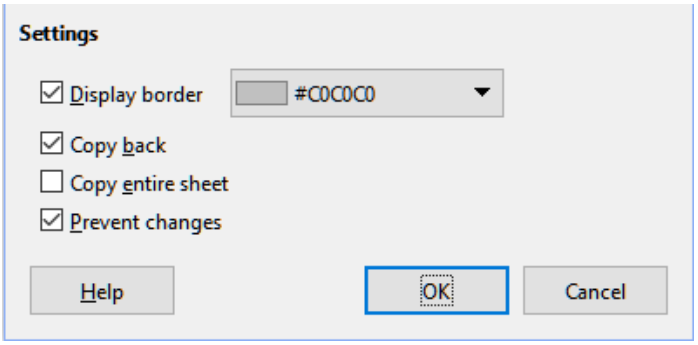


Figure 337: Create Scenario dialog – Settings section

Display border

Places a colored border around the cell range that contains your scenario (Figure 338).

	A	B
1	Fixed cost estimates	
2		
3		Estimate 2
4	**Salaries**	$6,532
5	**Sales & Marketing**	$6,117
6	**Insurance**	$3,908
7	**Rent**	$5,610
8	**Other**	$1,017
9		
10	Total	$23,184

Figure 338: Scenario cell range with border

To choose the color of the border, use the drop-down field to the right of this option. The border has a title bar displaying the name of the active scenario and a down arrow button that opens a drop-down list of all the scenarios defined for the current cell range. You can swap to another scenario by selecting it in this list.

Copy back

Copies any changes made to a scenario's cell values back into the active scenario. If you uncheck this option, then the scenario's initial values cannot be overwritten. The actual behavior of the **Copy back** setting depends on the current cell and sheet protections and the **Prevent changes** setting (see Table 22 on page 392).

Caution

When creating a new scenario from the cells of a scenario with **Copy back** enabled, be careful not to overwrite the old scenario. To avoid this situation, create the new scenario with **Copy back** enabled first, then change its values only once it is active.

Copy entire sheet

Creates a copy of the sheet with the new active scenario. The sheet is named after this scenario. Note that changing scenario values in the copy sheet will not affect the active scenario, even if it has **Copy back** enabled.

Prevent changes

Prevents changes to a scenario with **Copy back** enabled when the sheet is protected but the cells are not. Also prevents changes to the scenario's settings while the sheet is protected. This option and its effects are more fully explained in the next section.

Changing scenarios

Scenarios have two aspects that can be altered independently:

- Scenario properties (that is, its settings)
- Scenario cell values

The extent to which these aspects can be changed depends on the active scenario's properties and the current sheet and cell protections. For more detail about sheet and cell protections, see Chapter 2, Entering and Editing Data.

Changing scenario properties

Table 21 summarizes how sheet protection and the **Prevent changes** option affect your ability to change scenario properties.

Table 21: Changing scenario properties

Sheet protection	*Prevent changes*	*Property changes*
On	On	No scenario properties can be changed.
On	Off	**Display border** and **Copy back** can be changed. **Prevent changes** and **Copy entire sheet** cannot be changed.
Off	Any setting	All scenario parameters except for **Copy entire sheet** can be changed. In this case, the **Prevent changes** option has no effect.

Changing scenario cell values

Table 22 summarizes the interaction of various settings in making changes to scenario cell values.

Table 22: Changing scenario cell values

Sheet protection	*Scenario cell protection*	*Prevent changes*	*Copy back*	*Change allowed*
On	Off	On	On	Scenario cell values cannot be changed.
On	Off	Off	On	Scenario cell values can be changed, and the scenario is updated.
On	Off	Any setting	Off	Scenario cell values can be changed, but the scenario is not updated due to the **Copy back** setting.
On	On	Any setting	Any setting	Scenario cell values cannot be changed.
Off	Any setting	Any setting	Any setting	Scenario cell values can be changed and the scenario is updated or not, depending on the **Copy back** setting.

Working with scenarios using the Navigator

After you add scenarios to a spreadsheet, you can view a particular scenario by using the Navigator. Open it by selecting **View > Navigator** on the Menu bar, then click on the **Scenarios** icon in the Navigator and select a scenario in the list (Figure 339). Any defined scenarios are listed along with the comments that were entered when each scenario was created. You can also use the equivalent facilities in the Navigator deck of the Sidebar. For more information about the Navigator, see Chapter 1, Introduction.

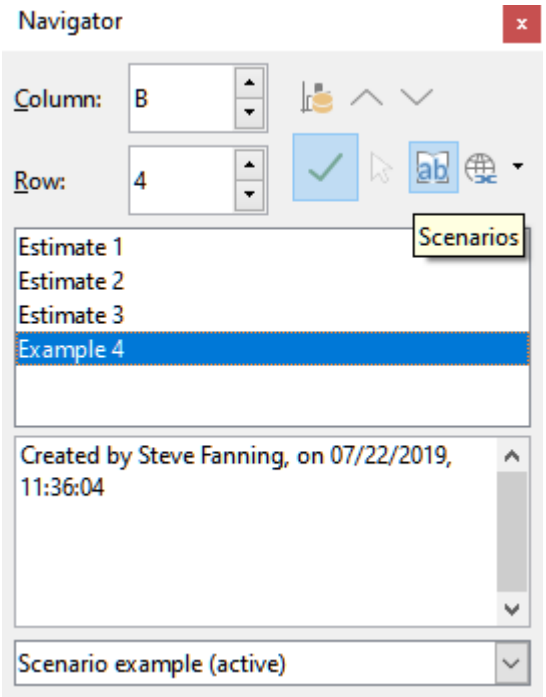


Figure 339: Scenarios in the Navigator

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**, or press `Delete` after selecting it. A confirmation dialog will be displayed.

To edit a scenario, right-click the name in the Navigator and choose **Properties**. Calc displays the Edit Scenario dialog, which is similar to the Create Scenario dialog (Figure 336).

Using the Multiple Operations tool

Like scenarios, the Multiple Operations tool performs what-if analysis on your calculations. Unlike scenarios, which represent individual sets of values for multiple formula variables, this tool uses a whole range of values for just one or two variables. It then uses one or more formulas to create a matching range of solutions. Since each solution corresponds to one or two variable values, both the variable and solution ranges can be easily arrayed in tabular format. As a result, the Multiple Operations tool is well-suited to generating data that is easy to read and share or visualize using graphs.

Tip

Exercising good organization can make using this tool relatively painless. For example, we recommend keeping your data together on one sheet and using labels to identify your formulas, variables, and table ranges.

Multiple Operations with one formula and one variable

The easiest way to learn how to use the Multiple Operations tool is with one formula and one variable. To learn how to use the tool with multiple formulas or with two variables, see "Calculating with several formulas simultaneously" below and "Multiple operations with two variables" below, respectively.

To use the Multiple Operations tool with one formula and one variable:

1) In the cells of a worksheet, enter a formula and at least one variable that it uses.
2) In the same worksheet, enter values into a cell range that occupies a single column or row. These values will be used for one of the variables of the formula that you defined in step 1).
3) With the mouse, select the range containing both the variable range that you defined in step 2) and the adjacent empty cells that follow it. Depending on how your variable range is arrayed, these empty cells will either be in the column to the right (if the range is in a column) or in the row immediately below (if it is in a row).
4) Select **Data > Multiple Operations** on the Menu bar to open the Multiple Operations dialog (Figure 340).

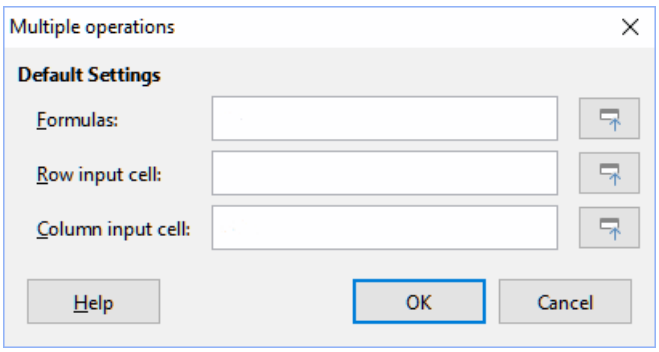


Figure 340: Multiple Operations dialog

5) Click on the *Formulas* field and type a cell reference to the formula you defined in step 1) or select the cell with the mouse. Use the associated **Shrink / Expand** button if you need to minimize the dialog while selecting the cell.

6) If the range from step 2) is arrayed in a column, then click on the *Column input cell* field and type a cell reference to the variable that you want to use or select the cell with the mouse. If the range is in a row, then use the *Row input cell* field instead.

7) Click **OK** to run the tool. The Multiple Operations tool will generate its results in the empty cells that you selected in step 3). Each result value corresponds to the variable value adjacent to it, and together they form the entries of a results table.

An example with one formula and one variable

Using the Multiple Operations tool is best explained by example. Suppose that you produce toys that you sell for $10 each (cell B1 of a worksheet). Each toy costs $2 to make (B2), and you have a fixed annual cost of $10,000 (B3). What is the minimum number of toys that you must sell to break even? Suppose that our initial estimate of quantity sold is 2,000 (B4).

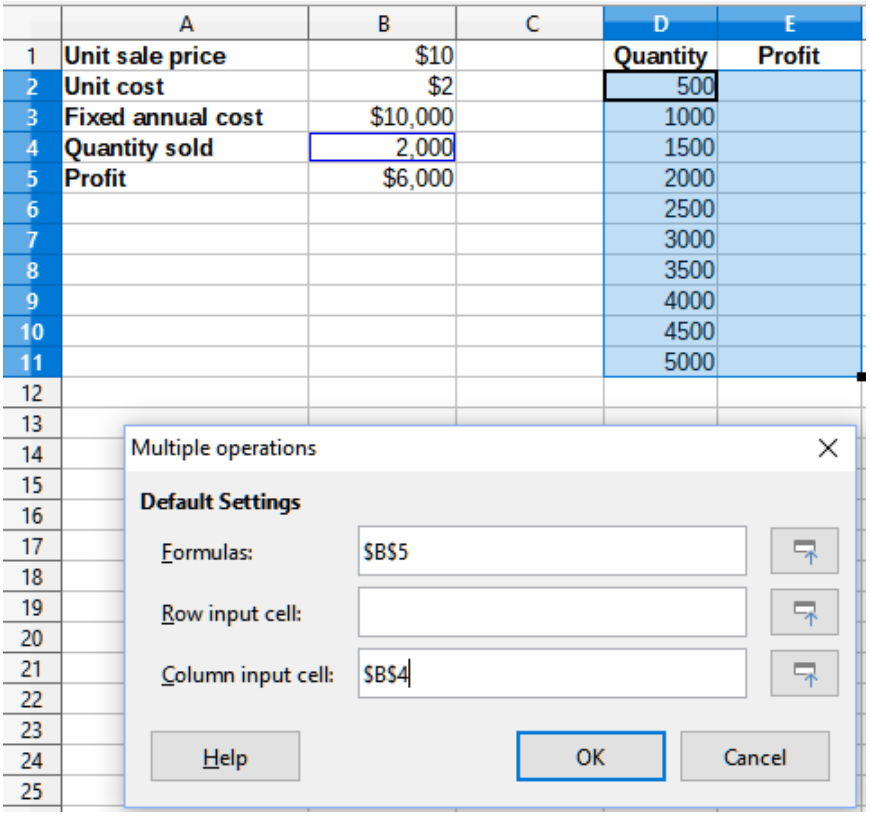


Figure 341: Inputs to Multiple Operations tool for one formula, one variable

To answer this question:

1) Enter the following formula into B5: `=B4*(B1-B2)-B3`. This formula represents the equation *Profit = Quantity * (Selling price – Direct costs) – Fixed costs*. With this equation, our initial quantity produces a $6,000 profit, which is higher than the break-even point.

2) In D2:D11, enter a range of alternate quantities from 500 to 5000 in steps of 500.

3) Select the range D2:E11 to define the results table. This range includes the alternate quantity values (column D) and the empty results cells (column E).

4) Select **Data > Multiple Operations** on the Menu bar to open the Multiple Operations dialog.

5) Using the *Formulas* field, select the cell B5.

6) Using the *Column input cell* field, select the cell B4 to set the quantity as the variable for our calculations. Figure 341 shows the worksheet and Multiple Operations dialog at this point.

7) Click **OK**. The profits for the different quantities are now shown in column E (Figure 342). We can see that the break-even point is between `1000` and `1500` toys sold – namely, `1250`. Figure 342 shows an XY (Scatter) chart showing the profit as a function of quantity.

E11 | =MULTIPLE.OPERATIONS(B$5,$B$4,$D11)

	A	B	C	D	E
1	**Unit sale price**	$10		**Quantity**	**Profit**
2	**Unit cost**	$2		500	-$6,000
3	**Fixed annual cost**	$10,000		1000	-$2,000
4	**Quantity sold**	2,000		1500	$2,000
5	**Profit**	$6,000		2000	$6,000
6				2500	$10,000
7				3000	$14,000
8				3500	$18,000
9				4000	$22,000
10				4500	$26,000
11				5000	$30,000

Figure 342: Results of Multiple Operations tool for one formula and one variable



Figure 343: XY (Scatter) plot of profit over quantity of toys sold (example of visualization)

Calculating with several formulas simultaneously

Using the Multiple Operations tool with multiple formulas follows nearly the same process as with one formula, but with two important differences:

1) For each formula that you add, you must also add a corresponding column or row to the results table to contain the output of that formula.

2) How you initially arrange your formulas determines how their results will be displayed in the results table. For example, if you arrange the formulas *A*, *B*, and *C* in a single row in that order, then Calc will generate the results of *A* in the first results table column, the results of *B* in the second column, and the results of *C* in the third.

Note

The Multiple Operations tool only accepts formulas arranged in a single row or column, depending on how your results table is oriented. If the table is column-oriented – that is, the way it is in our sales data example – then your formulas must be arranged in a row. If the table is row-oriented, then your formulas must be in a column.

Caution

Be careful not to add empty cells between formulas, as they will create gaps in the results table and may cause some results not to appear if you don't select enough rows or columns for the table.

An example with two formulas and one variable

Using our sales data example, suppose that we want to calculate the annual profit per item sold in addition to the annual overall profit. To calculate the results:

1) In the sheet from the previous example, delete the results in 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 for the results table. Column F will contain the results of the annual profit per item formula in C5.
4) Select **Data > Multiple Operations** on the Menu bar to open the Multiple Operations dialog.
5) Using the *Formulas* field, select the range B5:C5.
6) Using the *Column input cell* field, select the cell B4. Figure 344 shows the worksheet and the dialog at this point.

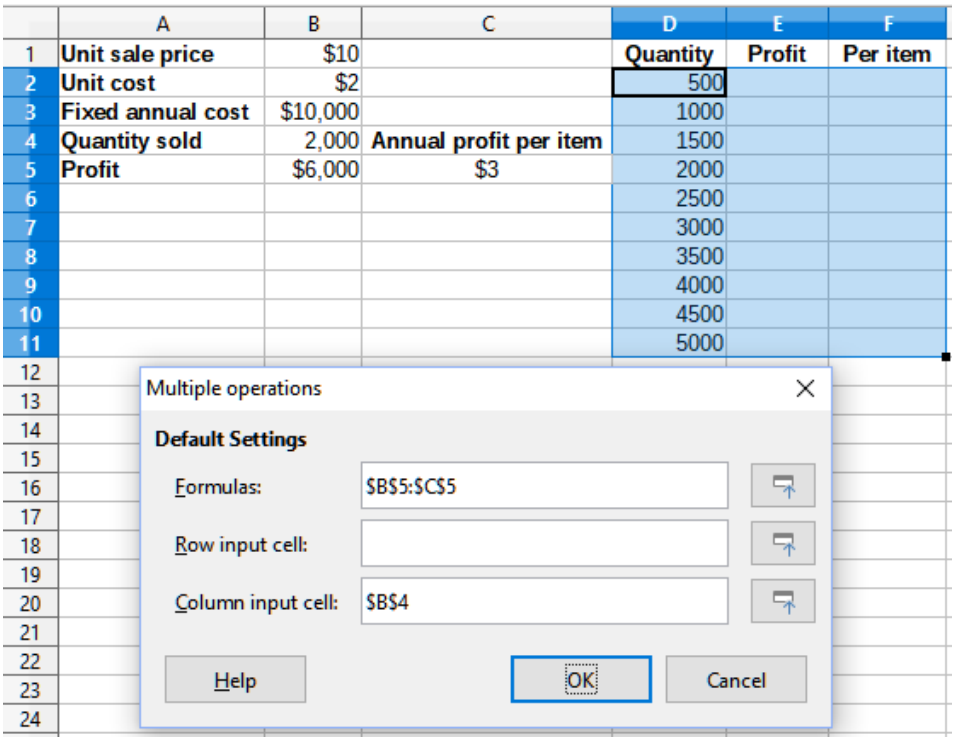


Figure 344: Inputs to Multiple Operations tool for one variable and two formulas

7) Click **OK**. Now the profits are listed in column E and the annual profit per item in column F.

F11 | =MULTIPLE.OPERATIONS(C$5,$B$4,$D11)

	A	B	C	D	E	F
1	**Unit sale price**	$10		**Quantity**	**Profit**	**Per item**
2	**Unit cost**	$2		500	-$6,000	-$12.00
3	**Fixed annual cost**	$10,000		1000	-$2,000	-$2.00
4	**Quantity sold**	2,000	**Annual profit per item**	1500	$2,000	$1.33
5	**Profit**	$6,000	$3	2000	$6,000	$3.00
6				2500	$10,000	$4.00
7				3000	$14,000	$4.67
8				3500	$18,000	$5.14
9				4000	$22,000	$5.50
10				4500	$26,000	$5.78
11				5000	$30,000	$6.00

Figure 345: Results of Multiple Operations tool for one variable and two formulas

Multiple operations with two variables

When you use the Multiple Operations tool with two variables, it creates a two-dimensional results table. Each variable defines one of the table's dimensions such that the alternate values for both variables serve as the table's row and column headings, respectively. Each cell in the table corresponds to a distinct pair of row and column heading values. In turn, the results in each cell are created from these values for both variables.

Since you are using two variables, you must use both the *Column input cell* and *Row input cell* dialog fields to define them. The order is important; the *Column input cell* field corresponds to the row heading values, while the *Row input cell* field corresponds to the column heading values.

Tip

A good guideline to remember is that since column headings are in a row at the top of the table, they correspond to the *Row input cell* field. Likewise, row headings are in a column, so they correspond to the *Column input cell* field.

Note

If you use two variables, the Multiple Operations tool will not work with multiple formulas. It will allow you to enter the extra formulas, but will not generate the expected results for any formula beyond the first.

Calculating with two variables

Using our sales example, suppose that in addition to varying the quantity of toys sold, you also want to vary the unit sale price as well. To calculate the results:

1) Expand the sales data table by entering `$8`, `$10`, `$15` and `$20` in the range E1:H1.
2) Select the range D1:H11 for the results table.
3) Select **Data > Multiple Operations** on the Menu bar to open the Multiple Operations dialog.
4) Using the *Formulas* field, select cell B5.
5) Using the *Row input cell* field, select cell B1. The column headings - `$8`, `$10`, `$15` and `$20` - are now linked to the unit sale price variable defined in cell B1.

6) Using the *Column input cell* field, select cell B4. The row headings – `500`, `1000`, ... , `5000` – are now linked to the quantity sold variable defined in cell B4. Figure 346 shows the worksheet and dialog at this point.

7) Click **OK**. The profits for the different sale prices and quantities are now shown in the range E2:H11 (Figure 399).

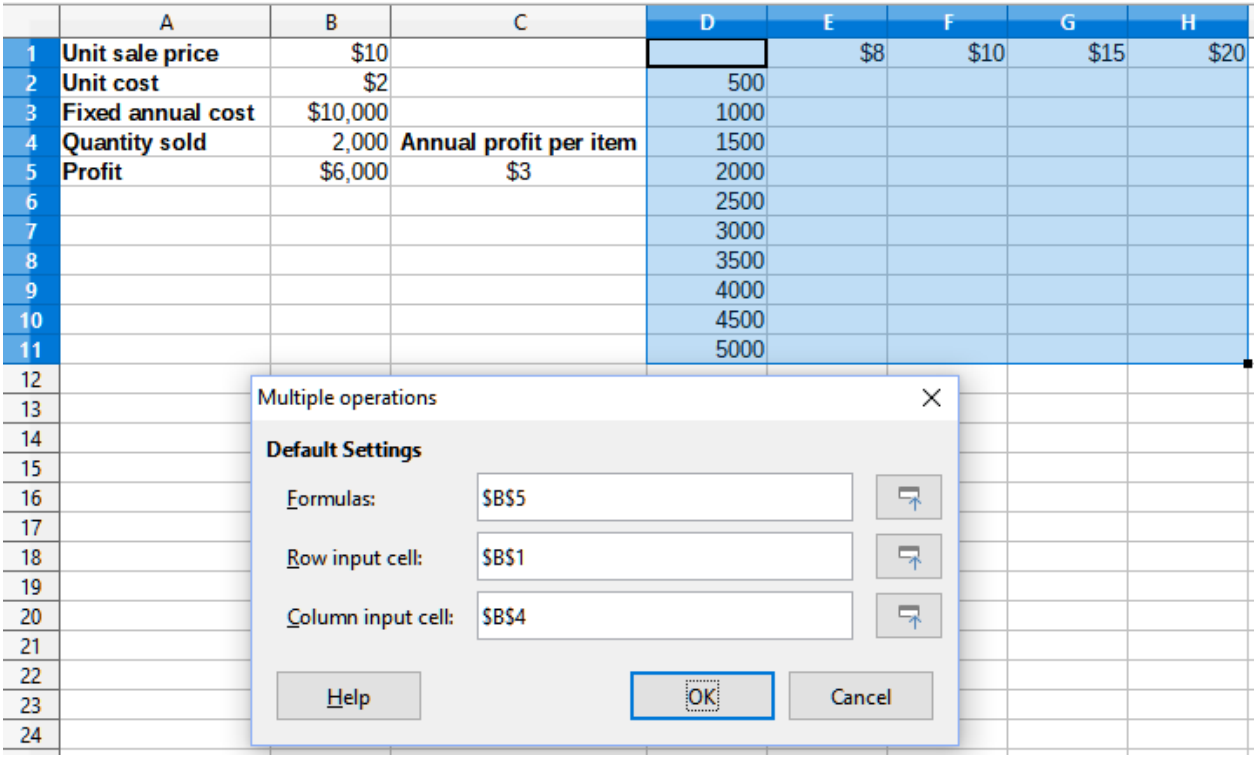
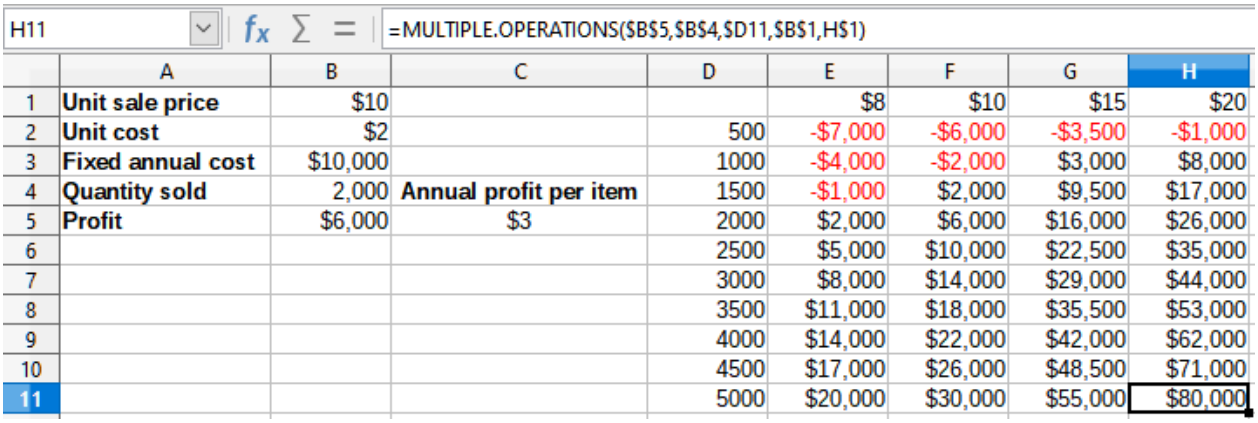


Figure 346: Inputs to Multiple Operations tool for two variables



	A	B	C	D	E	F	G	H
1	**Unit sale price**	$10			$8	$10	$15	$20
2	**Unit cost**	$2		500	-$7,000	-$6,000	-$3,500	-$1,000
3	**Fixed annual cost**	$10,000		1000	-$4,000	-$2,000	$3,000	$8,000
4	**Quantity sold**	2,000	**Annual profit per item**	1500	-$1,000	$2,000	$9,500	$17,000
5	**Profit**	$6,000	$3	2000	$2,000	$6,000	$16,000	$26,000
6				2500	$5,000	$10,000	$22,500	$35,000
7				3000	$8,000	$14,000	$29,000	$44,000
8				3500	$11,000	$18,000	$35,500	$53,000
9				4000	$14,000	$22,000	$42,000	$62,000
10				4500	$17,000	$26,000	$48,500	$71,000
11				5000	$20,000	$30,000	$55,000	$80,000

Figure 347: Results of Multiple Operations tool for two variables

Using Goal Seek

In addition to scenarios and the Multiple Operations tool, Calc has a third “what-if” analysis tool: Goal Seek. Usually, you use a formula to calculate a result from existing values. In contrast, with Goal Seek, you work backwards from a result to discover what values produce it. This feature is useful if you already know the outcome you want, but need to answer questions such as how to reach it or how it could be changed if you altered conditions.

Note

Only one argument can be altered at a time in a single goal seek. If you need to test multiple arguments, then you must run a separate goal seek on each one.

Goal Seek example

To illustrate how to use Goal Seek, suppose that we want to calculate the annual interest return for an account. To calculate annual interest (`I`), we must create a table with values for the capital (`C`), the interest period length in years (`n`), and the interest rate (`i`). The formula is `I = C*n*i`.

Suppose that the interest rate `i = 7.5%` (cell B3 of a worksheet) and the period length `n = 1` (B2) remain constant. We want to know how much investment capital `C` is needed to achieve a return of `I = $15,000`. Assume that our initial capital estimate is `C = $100,000` (B1).

To calculate the return:

1) Enter the return formula (`=B1*B2*B3`) into B4 and select the cell with the mouse.
2) Select **Tools > Goal Seek** on the Menu bar to open the Goal Seek dialog (Figure 348).

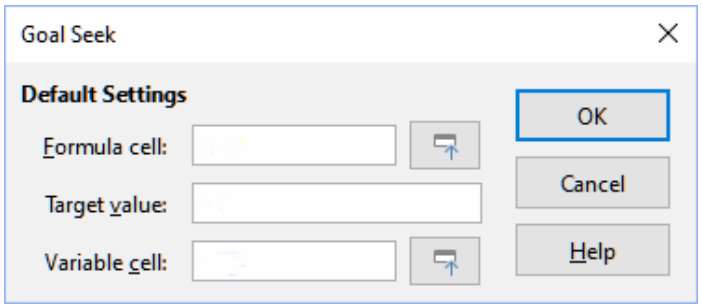


Figure 348: Goal Seek dialog

3) B4 should already be entered in the *Formula cell* field. However, if you want to select a different cell, use the associated **Shrink / Expand** button to minimize the dialog while you select the required cell.
4) Click on the *Variable cell* field, then type a reference to cell B1 or select it with the mouse to make the capital the variable in the current Goal Seek.
5) Enter the desired formula result in the *Target value* field. In this example, the value is `15000`. Figure 349 shows the cells and dialog fields at this point.

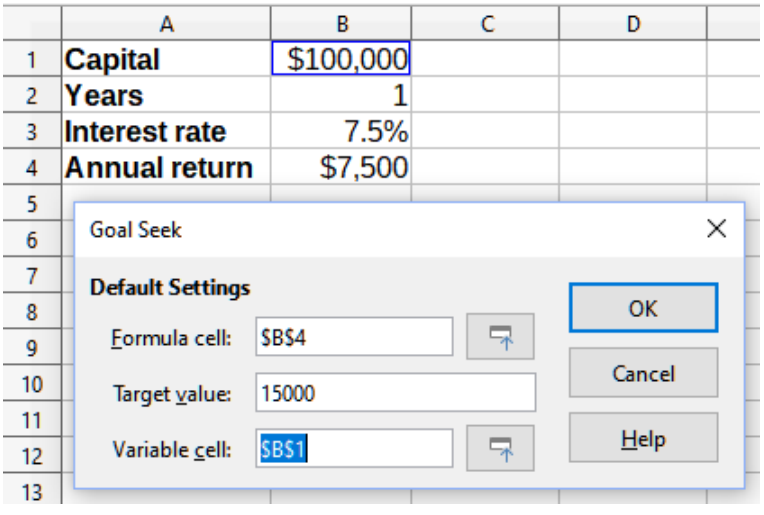


Figure 349: Example setup for goal seek

6) Click **OK**. A dialog appears informing you that the goal seek was successful (Figure 350).

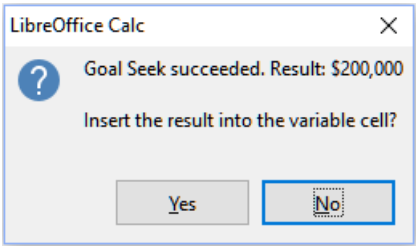


Figure 350: Goal seek result dialog

7) Click **Yes** to enter the goal value into the variable cell. The result is shown in Figure 351, indicating that a capital requirement of $200,000 is needed to achieve a $15,000 return.

	A	B
1	**Capital**	$200,000
2	**Years**	1
3	**Interest rate**	7.5%
4	**Annual return**	$15,000

Figure 351: Result of goal seek in worksheet

Note

Not every goal seek problem succeeds in returning a good result. It depends on the formula used, goal value, and initial value. The goal seek algorithm iterates internally several times converging to the goal.

If the goal seek is unsuccessful, Calc displays an information dialog reporting the failure. This dialog offers the choice of inserting the closest value into the variable cell. Press **Yes** or **No** as required.

Using the Solver

The Solver amounts to a more elaborate form of goal seek, which allows you to solve mathematical programming or optimization problems. A mathematical programming problem is concerned with minimizing or maximizing a function subject to a set of constraints. Such problems arise in many scientific, engineering, business, and other disciplines. A full discussion of mathematical programming is beyond the scope of this guide and the interested reader is referred to the relevant Wikipedia page at https://en.wikipedia.org/wiki/Mathematical_optimization, which provides high level information and references to more detailed materials.

Currently Calc offers the following selection of solver engines:

- DEPS (Differential Evolution & Particle Swarm Optimization) Evolutionary Algorithm.
- SCO (Social Cognitive Optimization) Evolutionary Algorithm.
- LibreOffice CoinMP Linear Solver.
- LibreOffice Linear Solver.
- LibreOffice Swarm Non-Linear Solver (experimental).

Caution

As the LibreOffice Swarm Non-Linear Solver is an experimental tool, it may not be supported in future versions of Calc, and we recommend that you do not use it unless you are familiar with non-linear programming concepts.

The DEPS and SCO Evolutionary Algorithms are intended for solving non-linear problems - they are only available if you have a Java runtime environment installed on your computer and have enabled the **Tools > Options > LibreOffice > Advanced > Use a Java runtime environment** configuration option. The DEPS Evolutionary Algorithm is the initial default if it is available, while LibreOffice CoinMP Linear Solver is the initial default otherwise.

The available options provide flexibility to choose the most suitable algorithm for a given problem, which may be linear or non-linear, and a given performance requirement. The Help system contains much more information about the available algorithms and their configuration options.

In order to use the Solver to solve a mathematical programming problem, you must formulate the problem as follows:

- *Decision variables* – a set of *n* non-negative variables x*1*, … , x*n*,. Decision variables may be real numbers, but generally tend to be integers in many real world problems.
- *Constraints* – a set of linear equalities or inequalities involving the decision variables.
- *Objective function* – a linear expression involving the decision variables.

The goal is usually to find values of the decision variables that satisfy the constraints and maximize or minimize the result of the objective function.

Solver dialog

After setting up the data for the problem in your Calc spreadsheet, select **Tools > Solver** on the Menu bar to open the Solver dialog (Figure 352).

Note

Depending on the configuration of your computer, a message may be displayed the first time that you select **Tools > Solver** after starting Calc. The nature of this message will change dependent on the existence of a Java runtime environment (JRE) on your system. If no JRE is detected, the message will simply be a warning to that effect. In the case where a JRE is detected but the **Tools > Options > LibreOffice > Advanced > Use a Java runtime environment** option is disabled, then the message will include a button to enable that option.

Target cell
Type a cell reference to the objective function or select it with the mouse.

Optimize result to
Select **Maximum** to find the maximum result for the objective function, **Minimum** to find the minimum result, or **Value of** to set it to a specific value. If you select **Value of**, enter the required value or a reference to the cell containing that value.

By changing cells
Enter the locations of any cells that define your decision variables.

Limiting Conditions
Enter your constraints in the fields in this area:

– *Cell reference* – enter a cell reference to a decision variable.

– *Operator* – defines a parameter for a constraint. Available options include **<=** (less than or equal to), **=** (equal to), **=>** (greater than or equal to), **Integer** (values without decimals), and **Binary** (only 0 or 1).

– *Value* – enter a value or a cell reference to a constraint formula.

– **Remove** button – deletes the currently-defined constraint.

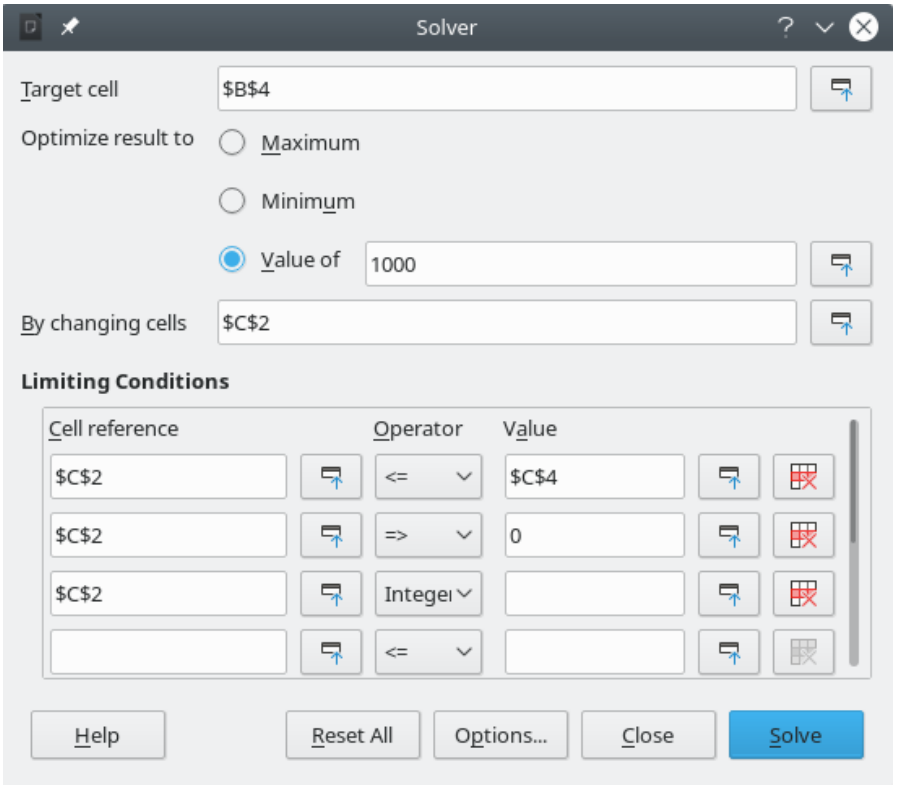


Figure 352: Solver dialog

Tip

Remember that for some of these options, you can minimize the Solver dialog using the associated **Shrink / Expand** buttons if you need to select cells with the mouse.

Once you have finished setting up the Solver, click the **Solve** button to begin the process of adjusting values and calculating results. Depending on the complexity of the task, this may take some time. If you want to start again, click the **Reset All** button and the data inserted in the Solver dialog (Figure 352) will be cleared.

If you are using either the DEPS Evolutionary Algorithm or the SCO Evolutionary Algorithm, Calc may periodically interrupt execution of the solver engine to display the Solver Status dialog (Figure 353). This dialog provides diagnostic information about the current status of the engine's calculations, which may be of interest to an expert user of the Solver. Click **OK** to dismiss this dialog and finish the calculations, or click **Continue** to allow the engine to carry on processing a step further, with the diagnostic data on the dialog refreshed at the next break point. The display of the Solver Status dialog is enabled by default but may be disabled by deselecting the **Show enhanced solver status** setting on the Solver Options dialog.

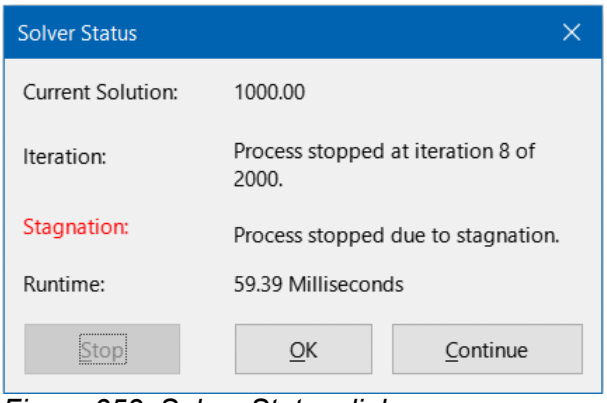


Figure 353: Solver Status dialog

On successful completion, Calc presents a Solving Result dialog (Figure 354). This dialog includes buttons to save (**Keep Result**) or discard (**Restore Previous**) your results.

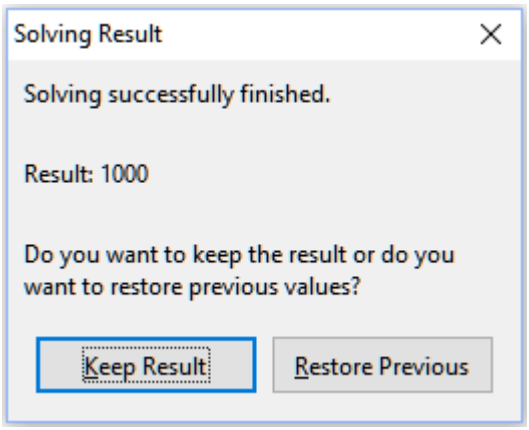


Figure 354: Solving Result dialog

The Solver dialog also has an **Options** button, which opens the Options dialog shown in Figure 355.

Solver options

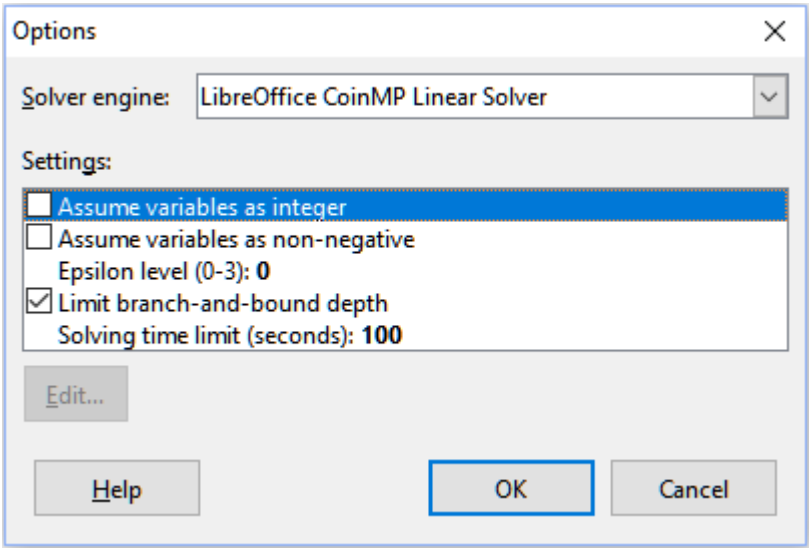


Figure 355: Solver Options dialog

Solver engine

With the standard LibreOffice download, and an enabled Java runtime environment, the *Solver engine* drop-down list provides five options:

- **DEPS Evolutionary Algorithm**
- **SCO Evolutionary Algorithm**
- **LibreOffice CoinMP Linear Solver**
- **LibreOffice Linear Solver**
- **LibreOffice Swarm Non-Linear Solver (experimental)**

Settings

This area enables the user to adjust the detailed processing parameters of the selected solver engine, and the options available vary between engines.

Solver example

Suppose that you have $10,000 that you want to invest in two mutual funds for one year. Fund X is a low risk fund with an 8% interest rate and Fund Y is a higher risk fund with a 12% interest rate. How much money should be invested in each fund to earn a total interest of $1,000?

To find the answer using the Solver:

1) Enter the following labels and data into a worksheet:
   - Row labels: *Fund X*, *Fund Y,* and *Total* in cells A2, A3, and 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.
   - Enter an arbitrary value (`$0` or leave blank) in cell C2 as the amount invested in Fund X.
2) Enter the following 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 formulas `=C2*D2*E2` (B2) and `=C3*D3*E3` (B3).
   - In cell B4, enter the formula `=B2+B3` as the total interest earned. Figure 356 shows the worksheet at this point.

	A	B	C	D	E
1		Interest earned	Amount invested	Interest rate	Time period
2	Fund X	$0	$0	8%	1
3	Fund Y	$1,200	$10,000	12%	1
4	Total	$1,200	$10,000		
5					

Figure 356: Solver example setup

3) Select **Tools > Solver** on the Menu bar to open the Solver dialog (Figure 352).
4) Using the *Target cell* field, select the cell that contains the target value. In this example, it is B4, which contains the total interest value.

5) 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 $1,000.

6) Using the *By changing cells* field, select cell C2 in the sheet. In this example, you need to find the amount invested in Fund X (cell C2).

7) Enter the following limiting conditions for the variables by using the *Cell reference*, *Operator*, and *Value* fields:

   – `C2 <= C4` - the amount invested in Fund X cannot exceed the total amount available.

   – `C2 => 0` - the amount invested in Fund X cannot be negative.

   – `C2` is an *Integer* - specified for convenience.

8) Click **Solve**. The result is shown in Figure 357.

	A	B	C	D	E
1		Interest earned	Amount invested	Interest rate	Time period
2	Fund X	$400	$5,000	8%	1
3	Fund Y	$600	$5,000	12%	1
4	Total	$1,000	$10,000		
5					

Figure 357: Solver example result

Using Statistics tools

Under **Data > Statistics** on the Menu bar, Calc features several tools for quick and easy statistical analysis of your data. These tools include:

- Sampling
- Descriptive Statistics
- Analysis of Variance (ANOVA)
- Correlation
- Covariance
- Exponential Smoothing
- Moving Average
- Regression
- Paired t-test
- F-test
- Z-test
- Chi Square Test
- Fourier Analysis

Sampling tool

The Sampling tool creates a target table with data sampled from a source table. The sampling tool can pick samples randomly or on a periodic basis. Sampling is done row-wise, with whole rows of the source table copied into rows of the target table. To use this tool, select **Data > Statistics > Sampling** on the Menu bar to access the Sampling dialog (Figure 358).

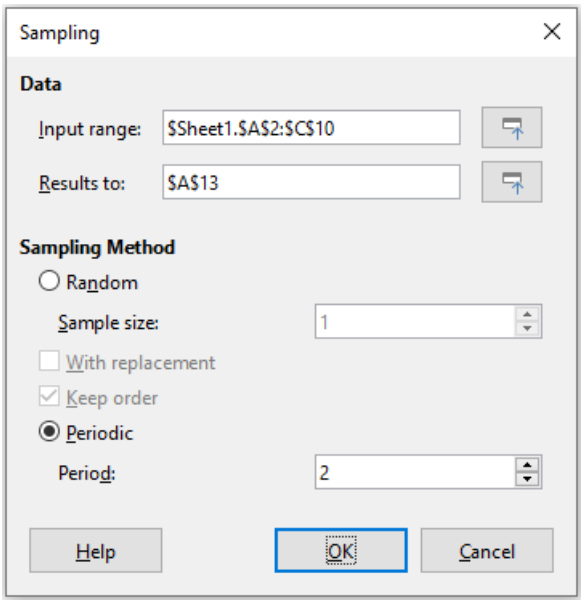


Figure 358: Sampling dialog

Input range
Specifies the cell range containing the source table.

Results to
Specifies the top left cell of the target table. When you run the tool, it will fill out the rest of the target table starting from this cell. Be careful, Calc will replace any data that is in the range of the table to be created.

Random
Enables random sampling mode when selected.

Sample size
Defines the number of lines to be sampled from the source table during random sampling. Only available if the **Random** option is selected. If **With replacement** is deselected, the maximum value that can be entered in this field is limited to the number of rows in the source table.

With replacement
If this option is selected, a sample drawn from the source table is effectively returned and so is eligible for re-sampling later. In this case, the sample size can be larger than the number of rows in the source table. If the option is deselected, a sample drawn from the source table is not eligible for re-sampling later. In this case, the sample size is limited to the number of rows in the source table. This option is automatically deselected for periodic sampling. It is not possible to have both **With replacement** and **Keep order** options selected simultaneously.

Keep order
If this option is selected, samples are drawn from the source table in order of the data in the source table. If deselected, samples are drawn in random order from the source table. This option is automatically selected for periodic sampling. It is not possible to have both **With replacement** and **Keep order** options selected simultaneously.

Periodic
Enables periodic sampling mode when selected.

Period

Defines the number of lines to skip between samples during periodic sampling. For example, a value of 2 will cause alternate lines to be sampled from the source table, starting with the second line. Only available if the **Periodic** option is selected. The maximum value that can be entered in this field is limited to the number of rows in the source table.

Tip

Use the **Shrink / Expand** buttons next to the *Input range* and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

Figure 359 shows the source table (below the *Source Data* heading) and the corresponding target table (under the *Target Data* heading), sampled using the settings shown in Figure 358.

	A	B	C
1	**Source Data**		
2	11	21	31
3	12	22	32
4	13	23	33
5	14	24	34
6	15	25	35
7	16	26	36
8	17	27	37
9	18	28	38
10	19	29	39
11			
12	**Target Data**		
13	12	22	32
14	14	24	34
15	16	26	36
16	18	28	38

Figure 359: Example data for the Sampling tool

Descriptive Statistics tool

Given a set of data, the Descriptive Statistics tool creates a tabular report of the data set's primary statistical properties, such as information about its central tendency and variability. Select **Data > Statistics > Descriptive Statistics** on the Menu bar to access the Descriptive Statistics dialog (Figure 360).

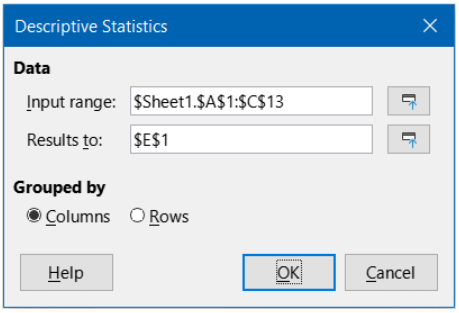


Figure 360: Descriptive Statistics dialog

Input range

Specifies the cell range containing the source data.

Results to

Specifies the top left cell of the results area. When you run the tool, it will fill out the rest of the report table starting at this cell. Be careful, Calc will replace any data that is in the range of the table to be created.

Columns / Rows

Specifies whether the data to be analyzed is organized in columns or rows.

Tip

Use the **Shrink / Expand** buttons next to the *Input range* and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

Figure 361 shows a small data set comprising student examination results in three subjects.

	A	B	C
1	**Maths**	**Physics**	**Biology**
2	47	67	33
3	36	68	42
4	40	65	44
5	39	64	60
6		38	43
7	47	84	62
8	29	80	51
9	27	49	40
10	57	49	12
11	56	33	60
12	57		
13	26		

Figure 361: Input data for descriptive statistics analysis

Figure 362 shows the statistics report generated for this input data using the settings shown in Figure 360.

E	F	G	H
	Maths	**Physics**	**Biology**
Mean	41.909091	59.7	44.7
Standard Error	3.561038	5.358379	4.768065
Mode	47	49	60
Median	40	64.5	43.5
First Quartile	32.5	49	40.5
Third Quartile	51.5	67.75	57.75
Variance	139.490909	287.122222	227.344444
Standard Deviation	11.810627	16.944681	15.077946
Kurtosis	-1.462168	-0.941599	1.418053
Skewness	0.015241	-0.222643	-0.976680
Range	31	51	50
Minimum	26	33	12
Maximum	57	84	62
Sum	461	597	447
Count	11	10	10

Figure 362: Results from Descriptive Statistics tool

Tip

For more information on descriptive statistics, refer to the corresponding Wikipedia article at https://en.wikipedia.org/wiki/Descriptive_statistics.

Analysis of Variance (ANOVA) tool

The Analysis of Variance (ANOVA) tool compares the means of two or more groups in a sample. Select **Data > Statistics > Analysis of Variance (ANOVA)** on the Menu bar to access the Analysis of Variance (ANOVA) dialog (Figure 363).

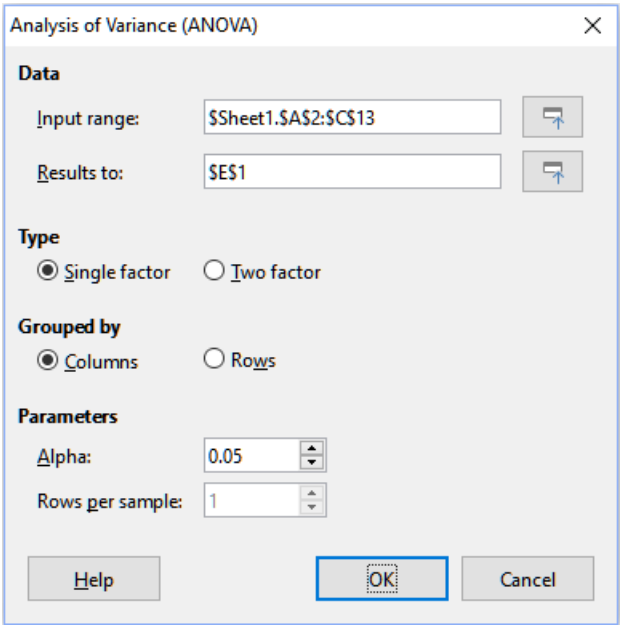


Figure 363: Analysis of Variance (ANOVA) dialog

Input range
Specifies the cell range containing the source data.

Results to
Specifies the top left cell of the results area. When you run the tool, it will fill out the analysis of variance report table starting at this cell. Be careful, Calc will replace any data that is in the range of the table to be created.

Single factor / Two factor
Determines whether the analysis is for single factor or two factor ANOVA.

Columns / Rows
Specifies whether the data to be analyzed is organized in columns or rows. Only available if **Single factor** is selected.

Alpha
In this field, enter a significance level in the range 0.01 to 0.99. The default is 0.05.

Rows per sample
Defines how many rows a sample has. This option is always set to 1 in this version of Calc.

Tip

Use the **Shrink** / **Expand** buttons next to the *Input range* and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

To illustrate how to use this tool, we use the input data set from Figure 361. Figure 364 shows the analysis of variance results generated for this data using the settings shown in Figure 363.

E	F	G	H	I	J	K
ANOVA - Single Factor						
Alpha	0.05					
Groups	Count	Sum	Mean	Variance		
Column 1	11	461	41.909091	139.490909		
Column 2	10	597	59.7	287.122222		
Column 3	10	447	44.7	227.344444		
Source of Variation	SS	df	MS	F	P-value	F critical
Between Groups	1876.568328	2	938.284164	4.360412	0.022461	3.340386
Within Groups	6025.109091	28	215.182468			
Total	7901.677419	30				

Figure 364: Results from Analysis of Variance (ANOVA) tool

Tip

For more information on analysis of variance, refer to the corresponding Wikipedia article at https://en.wikipedia.org/wiki/Analysis_of_variance.

Correlation tool

The Correlation tool calculates the correlation of two sets of numeric data and generates the resulting correlation coefficient. This coefficient is a value between -1 and +1 that indicates how strongly two variables are related to each other. A correlation coefficient of +1 indicates a perfect positive correlation (the data sets match) and a coefficient of -1 indicates a perfect negative correlation (the data sets are inverse to each other). Select **Data > Statistics > Correlation** on the Menu bar to access the Correlation dialog (Figure 365).

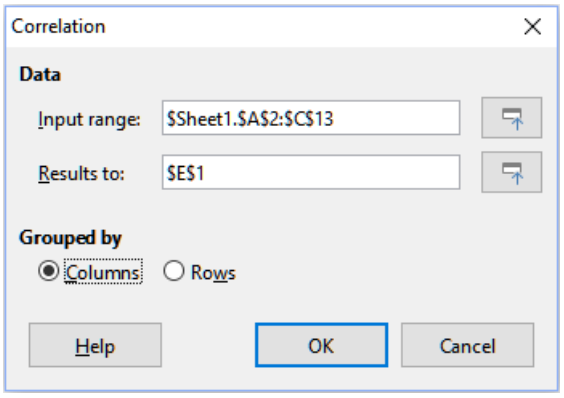


Figure 365: Correlation dialog

Input range
Specifies the cell range containing the source data.

Results to
Specifies the top left cell of the results area. When you run the tool, it will fill out the correlation coefficient table starting at this cell. Be careful, Calc will replace any data that is in the range of the table to be created.

Columns / Rows
Specifies whether the data to be analyzed is organized in columns or rows.

Tip

Use the **Shrink** / **Expand** buttons next to the *Input range* and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

To illustrate how to use this tool, we again use the data set from Figure 361. Figure 366 shows the correlation coefficients generated for this input data using the settings shown in Figure 365.

E	F	G	H
Correlations	Column 1	Column 2	Column 3
Column 1	1		
Column 2	-0.402925	1	
Column 3	-0.210764	0.230971	1

Figure 366: Correlation results

Tip

For more information on statistical correlation, refer to the corresponding Wikipedia article at https://en.wikipedia.org/wiki/Correlation_and_dependence.

Covariance tool

The Covariance tool measures how much two sets of numeric data vary together. Select **Data > Statistics > Covariance** on the Menu bar to access the Covariance dialog (Figure 367).

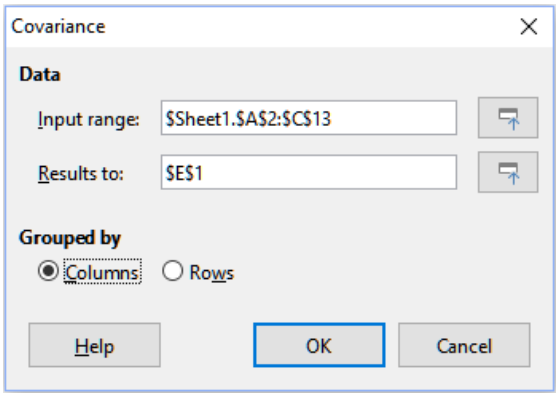


Figure 367: Covariance dialog

Input range
Specifies the cell range containing the source data.

Results to
Specifies the top left cell of the results area. When you run the tool, it will fill out the covariance table starting at this cell. Be careful, Calc will replace any data that is in the range of the table to be created.

Columns / Rows
Specifies whether the data to be analyzed is organized in columns or rows.

Tip

Use the **Shrink** / **Expand** buttons next to the *Input range* and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

To illustrate how to use this tool, we again use the data set from Figure 361. Figure 368 shows the six covariance values generated for this input data using the settings shown in Figure 367.

E	F	G	H
Covariances	Column 1	Column 2	Column 3
Column 1	126.809917		
Column 2	-61.444444	258.41	
Column 3	-32	53.11	204.61

Figure 368: Covariance results

Tip

For more information on statistical covariance, refer to the corresponding Wikipedia article at https://en.wikipedia.org/wiki/Covariance.

Exponential Smoothing tool

The Exponential Smoothing tool filters a data set to produce smoothed results. It is used in domains such as stock market analysis and in sampled measurements. Select **Data > Statistics > Exponential Smoothing** on the Menu bar to access the Exponential Smoothing dialog (Figure 369).

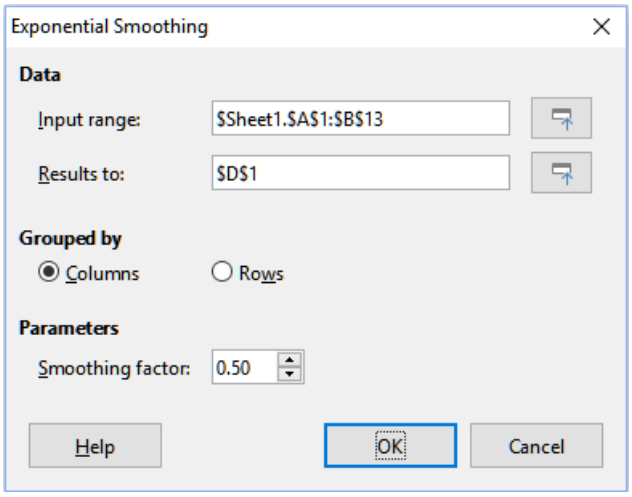


Figure 369: Exponential Smoothing dialog

Input range
Specifies the cell range containing the source data.

Results to
Specifies the top left cell of the results area. When you run the tool, it will generate smoothed results starting at this cell. Be careful, Calc will replace any data that is in the range of the table to be created.

Columns / Rows
Specifies whether the data to be analyzed is organized in columns or rows.

Smoothing factor
Enter a value here between 0 and 1 (default is 0.2) that represents the damping factor alpha in the smoothing equation.

Tip

Use the **Shrink** / **Expand** buttons next to the *Input range* and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

To illustrate how to use this tool, we use the data set shown in Figure 370. The table has two time series representing impulse functions at times t=0 and t=2.

	A	B
1	1	0
2	0	0
3	0	1
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0

Figure 370: Input data set for exponential smoothing example

Figure 371 shows the smoothed results for this input data using the settings shown in Figure 369. In the result table, it is possible to change the outcome by varying the Alpha parameter.

Tip

For more information on exponential smoothing, refer to the corresponding Wikipedia article at https://en.wikipedia.org/wiki/Exponential_smoothing.

D	E
Alpha	
0.5	
Column 1	**Column 2**
1	0
1	0
0.5	0
0.25	0.5
0.125	0.25
0.0625	0.125
0.03125	0.0625
0.015625	0.03125
0.0078125	0.015625
0.00390625	0.0078125
0.001953125	0.00390625
0.0009765625	0.001953125
0.00048828125	0.0009765625
0.000244140625	0.00048828125

Figure 371: Results from Exponential Smoothing tool

Moving Average tool

The Moving Average tool calculates the moving average of a time series data set. Select **Data > Statistics > Moving Average** on the Menu bar to access the Moving Average dialog (Figure 372).

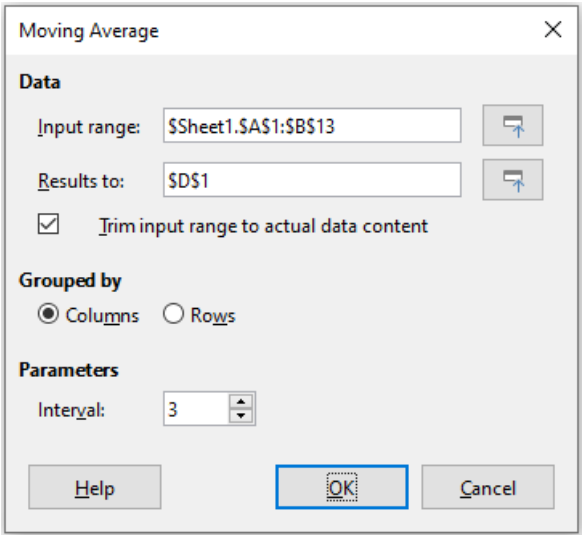


Figure 372: Moving Average dialog

Input range
Specifies the cell range containing the source data.

Results to
Specifies the top left cell of the results area. When you run the tool, it will generate the moving average results starting at this cell.

Trim input range to actual data content
Specifies whether to allow trimming of the input range to the actual data content before computing the moving average. Enabled by default to provide better performance.

Columns / Rows
Specifies whether the data to be analyzed is organized in columns or rows.

Interval
Specifies the number of samples used in the moving average calculation (the default value is 2).

Tip

Use the **Shrink** / **Expand** buttons next to the *Input range* and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

To illustrate how to use this tool, we again use the data set from Figure 370. Figure 373 shows the moving averages calculated for this input data using the settings shown in Figure 372.

D	E
Column 1	**Column 2**
#N/A	#N/A
0.333333	0.333333
0	0.333333
0	0.333333
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
#N/A	#N/A

Figure 373: Calculated moving averages

Tip

For more information on the moving average, refer to the corresponding Wikipedia article at https://en.wikipedia.org/wiki/Moving_average.

Regression tool

The Regression tool performs linear, logarithmic, or power regression analysis of a data set comprising one dependent variable and multiple independent variables. Select **Data > Statistics > Regression** on the Menu bar to access the Regression dialog (Figure 374).

Independent variable(s) (X) range
Specifies the cell range containing the independent variables in the source data.

Dependent variable (Y) range
Specifies the cell range containing the dependent variable in the source data.

Both X and Y ranges have labels
Specifies whether the ranges above include data labels.

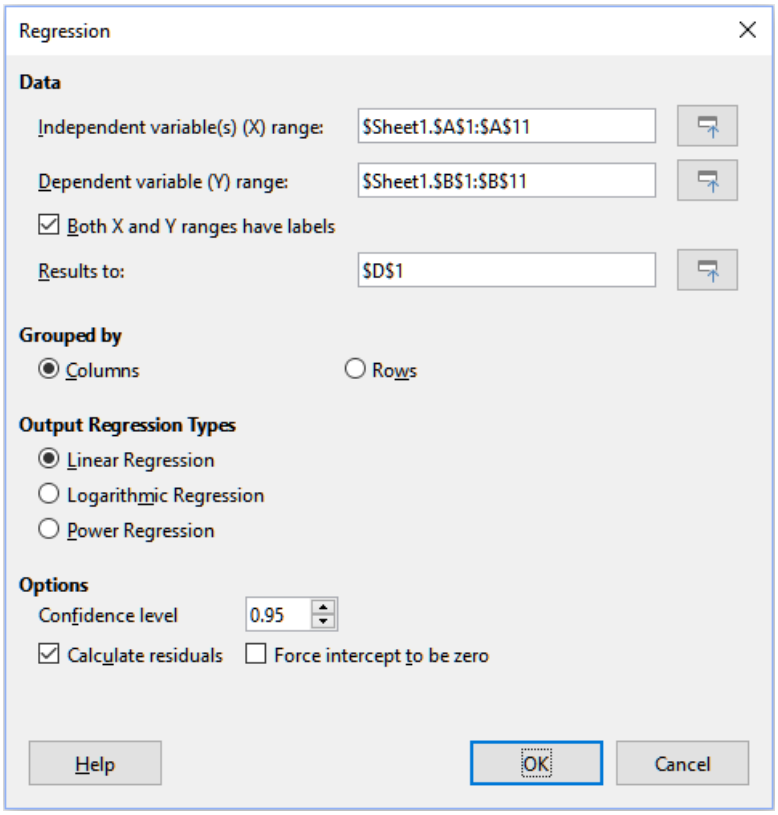


Figure 374: Regression dialog

Results to

Specifies the top left cell of the results area. When you run the tool, it will generate the regression analysis table starting at this cell. Be careful, Calc will replace any data that is in the range of the table to be created.

Columns / Rows

Specifies whether the data to be analyzed is organized in columns or rows.

Linear Regression

Select this option to use linear regression. Linear regression finds a linear function in the form of y = b + a1.[x1] + a2.[x2] + a3.[x3] ..., where ai is the i-th slope, [xi] is the i-th independent variable, and b is the intercept that best fits the data.

Logarithmic Regression

Select this option to use logarithmic regression. Logarithmic regression finds a logarithmic curve in the form of y = b + a1.ln[x1] + a2.ln[x2] + a3.ln[x3] ..., where ai is the i-th coefficient, b is the intercept and ln[xi] is the natural logarithm of the i-th independent variable, that best fits the data.

Power Regression

Select this option to use power regression. Power regression finds a power curve in the form of y = exp(b + a1.ln[x1] + a2.ln[x2] + a3.ln[x3] ...), where ai is the i-th power, [xi] is the i-th independent variable, and b is intercept that best fits the data.

Confidence level

Specifies the confidence level, which is a value between 0 and 1. The default value is 0.95. Calc uses this percentage to compute the corresponding confidence intervals for each of the estimates (namely the slopes and intercept)

Calculate residuals

Select whether to opt in or out of computing the residuals, which may be beneficial in cases where you are interested only in the slopes and intercept estimates and their statistics. The residuals give information on how far the actual data points deviate from the predicted data points, based on the regression model.

Force intercept to be zero

Specifies whether to force the regression intercept to be 0.

Tip

Use the **Shrink / Expand** buttons next to the *Independent variable(s) (X) range*, *Dependent variable (Y) range*, and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

Tip

Calc utilizes the small, otherwise blank area above the **Help**, **OK**, and **Cancel** buttons to provide feedback on erroneous selections on the dialog. For example, the text "Independent variable(s) range is not valid." appears if you have not entered a valid cell range in the *Independent variable(s) (X) range* field, and in this circumstance the **OK** button is grayed.

To illustrate how to use this tool, we use the data set shown in Figure 375. This table contains measurements taken at 1 second intervals.

	A	B
1	**Time**	**Measurement**
2	1	2.7
3	2	4.0
4	3	4.4
5	4	7.1
6	5	4.9
7	6	3.6
8	7	4.0
9	8	0.6
10	9	1.0
11	10	4.3

Figure 375: Input data set for regression analysis

Figure 376 shows the regression outputs calculated for this input data using the settings shown in Figure 374.

Tip

For more information on regression analysis, refer to the corresponding Wikipedia article at https://en.wikipedia.org/wiki/Regression_analysis.

D	E	F	G	H	I	J
Regression						
Regression Model	Linear					
LINEST raw output						
-0.219394	4.866667					
0.205798	1.276946					
0.124390	1.869257					
1.136489	8					
3.971030	27.952970					
Regression Statistics						
R^2	**0.124390**					
Standard Error	1.869257					
Count of x-variables	1					
Observations	10					
Adjusted R^2	0.014939					
Analysis of Variance (ANOVA)						
	df	SS	MS	F	Significance F	
Regression	1	3.971030	3.971030	1.136489	0.317509	
Residual	8	27.952970	3.494121			
Total	9	31.924				
Confidence level	0.95					
	Coefficients	Standard Error	t-Statistic	P-value	Lower 95%	Upper 95%
Intercept	4.866667	1.276946	3.811178	0.005154	1.922025	7.811308
Time	-0.219394	0.205798	-1.066062	0.317509	-0.693966	0.255178
Time	Predicted y	Measurement	Residual			
1	4.64727	2.7	-1.947273			
2	4.42788	4	-0.427879			
3	4.20848	4.4	0.191515			
4	3.98909	7.1	3.110909			
5	3.76970	4.9	1.130303			
6	3.55030	3.6	0.049697			
7	3.33091	4	0.669091			
8	3.11152	0.6	-2.511515			
9	2.89212	1	-1.892121			
10	2.67273	4.3	1.627273			

Figure 376: Linear regression outputs

Paired t-test tool

The Paired t-test tool compares the population means of two related sample sets and determines the difference between them. Select **Data > Statistics > Paired t-test** on the Menu bar to access the Paired t-test dialog (Figure 377).

Variable 1 range
Specifies the cell range containing the first set of input data.

Variable 2 range
Specifies the cell range containing the second set of input data.

Results to
Specifies the top left cell of the results area. When you run the tool, it will generate the paired t-test table starting at this cell. Be careful, Calc will replace any data that is in the range of the table to be created.

Columns / Rows

Specifies whether the data to be analyzed is organized in columns or rows.

Tip

Use the **Shrink** / **Expand** buttons next to the *Variable 1 range*, *Variable 2 range*, and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

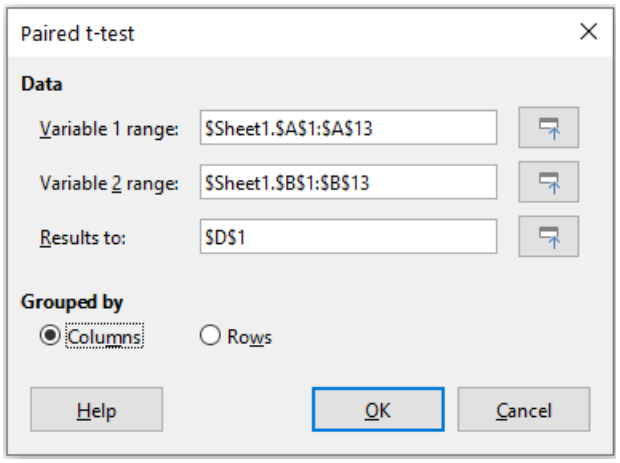


Figure 377: Paired t-test dialog

To provide an example of using this tool, we make use of the input data set shown in Figure 378. The data sets in columns A and B represent two sets of paired values referred to as *Variable 1* and *Variable 2*.

	A	B
1	28	19
2	26	13
3	31	12
4	23	5
5	20	34
6	27	31
7	28	31
8	14	12
9	4	24
10	0	23
11	2	19
12	8	10
13	9	33

Figure 378: Input data for paired t-test example

Figure 379 shows the paired t-test results calculated for this input data using the settings shown in Figure 377.

In the resulting table, it is possible to insert different values for Alpha and Hypothesized Mean Difference. The t values (Stat, Critical one-tail, and Critical two-tail) will be updated automatically.

Tip

For more information on paired t-tests, refer to the corresponding Wikipedia article at https://en.wikipedia.org/wiki/Student's_t-test.

D	E	F
Paired t-test		
Alpha	0.05	
Hypothesized Mean Difference	0	
	Variable 1	**Variable 2**
Mean	16.923077	20.461538
Variance	125.076923	94.435897
Observations	13	13
Pearson Correlation	-0.061754	
Observed Mean Difference	-3.538462	
Variance of the Differences	232.935897	
df	12	
t Stat	-0.835926	
P (T<=t) one-tail	0.209765	
t Critical one-tail	1.782288	
P (T<=t) two-tail	0.419530	
t Critical two-tail	2.178813	

Figure 379: Results from Paired t-test tool

F-test tool

The F-test tool calculates the F-test of two data samples. The tool is used to test the hypothesis that the variance of two populations are equal. Click **Data > Statistics > F-test** on the Menu bar to access the F-test dialog shown in Figure 380 and define the required inputs to the tool.

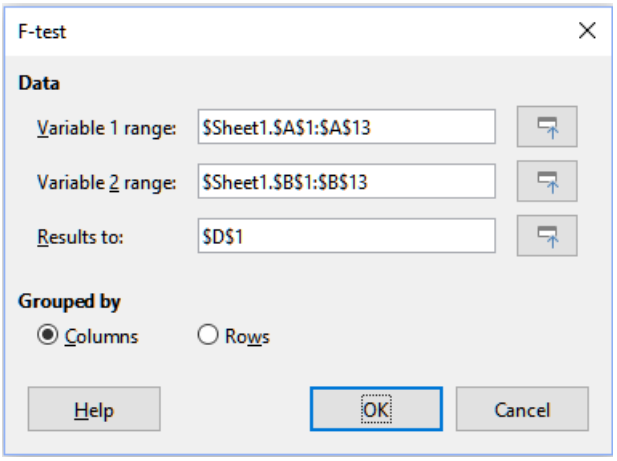


Figure 380: F-test dialog

Variable 1 range
Specifies the cell range containing the first set of input data.

Variable 2 range
Specifies the cell range containing the second set of input data.

Results to
Specifies the top left cell of the results area. When you run the tool, it will generate the F-test table starting at this cell. Be careful, Calc will replace any data that is in the range of the table to be created.

Columns / Rows
Specifies whether the data to be analyzed is organized in columns or rows.

Tip

Use the **Shrink / Expand** buttons next to the *Variable 1 range*, *Variable 2 range*, and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

To illustrate how to use this tool, we again use the data set from Figure 378. In this case, the data in columns A and B represent two independent sample sets, referred to as *Variable 1* and *Variable 2*. Figure 381 shows the F-test results calculated for this input data using the settings shown in Figure 380.

D	E	F
F-test		
Alpha	0.05	
	Variable 1	**Variable 2**
Mean	16.923077	20.461538
Variance	125.076923	94.435897
Observations	13	13
df	12	12
F	1.324464	
P (F<=f) right-tail	0.317061	
F Critical right-tail	2.686637	
P (F<=f) left-tail	0.682939	
F Critical left-tail	0.372213	
P two-tail	0.634123	
F Critical two-tail	0.305131	3.277277

Figure 381: Results from F-test tool

In the resulting table, it is possible to insert different values for Alpha. The F Critical values (right-tail, left-tail, and two-tail) will be updated automatically.

Tip

For more information on F-tests, refer to the corresponding Wikipedia article at https://en.wikipedia.org/wiki/F-test.

Z-test tool

The Z-test tool calculates the Z-test of two data samples. The tool performs a two sample Z-test to test the null hypothesis that there is no difference between the means of the two data sets. The Z-test works better for large samples (n > 30); if you are using a small sample, the Paired t-test tool may be more appropriate. Click **Data > Statistics > Z-test** on the Menu bar to access the z-test dialog shown in Figure 382 and define the required inputs to the tool.

Variable 1 range
Specifies the cell range containing the first set of input data.

Variable 2 range
Specifies the cell range containing the second set of input data.

Results to
Specifies the top left cell of the results area. When you run the tool, it will generate the Z-test table starting at this cell. Be careful, Calc will replace any data that is in the range of the table to be created.

Columns / Rows
Specifies whether the data to be analyzed is organized in columns or rows.

Tip

Use the **Shrink / Expand** buttons next to the *Variable 1 range*, *Variable 2 range*, and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

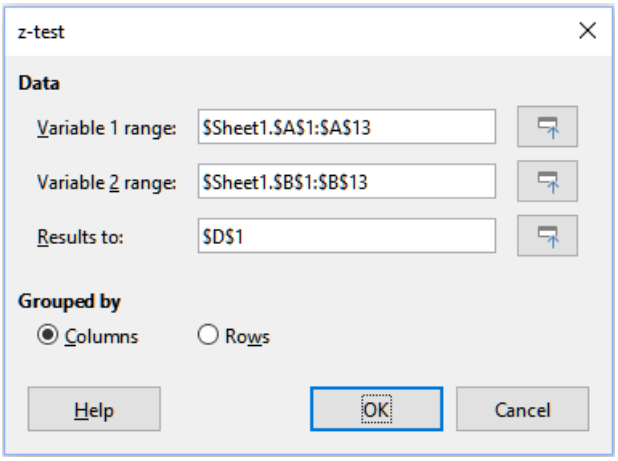


Figure 382: z-test dialog

To provide an example of using this tool, we again make use of the input data set shown in Figure 378. In this case the data in columns A and B represent two data sets, referred to as *Variable 1* and *Variable 2*. Figure 383 shows the Z-test results calculated for this input data using the settings shown in Figure 382.

D	E	F
z-test		
Alpha	0.05	
Hypothesized Mean Difference	0	
	Variable 1	**Variable 2**
Known Variance	125.076923	94.435897
Mean	16.923077	20.461538
Observations	13	13
Observed Mean Difference	-3.538462	
z	-0.861105	
P (Z<=z) one-tail	0.194590	
z Critical one-tail	1.644854	
P (Z<=z) two-tail	0.389180	
z Critical two-tail	1.959964	

Figure 383: Results from Z-test tool

For the Z-test tool to work properly, a known variance for each sample must be inserted in the related cell. In the example shown in Figure 383, the variances (125.076923 and 94.435897) were inserted using the formula `=VAR(A1:A13)` into cell E5 and the formula `=VAR(B1:B13)` into cell F5. The subsequent z and P values will be updated automatically.

It is also possible to insert different values for Alpha (cell E2 in the example) and Hypothesized Mean Difference (cell E3 in the example) inputs. As with the known variances changes described above, after changing the Alpha and the Hypothesized Mean Difference, the subsequent z and P values will be updated automatically.

Tip

When analyzing the Z-test results, compare the selected Alpha level with the appropriate calculated P value (depending whether a one-tailed or two-tailed test is required). If the calculated P value is smaller than the Alpha level, the hypothesis (which, in the example given, is that the means of the two data sets are the same) should be rejected.

Tip

For more information on z-tests, refer to the corresponding Wikipedia article at https://en.wikipedia.org/wiki/Z-test.

Chi-Square Test tool (Test of Independence)

The Chi-Square Test tool calculates the chi-square test of a data sample, which determines how well a set of measured values fit a corresponding set of expected values. Select **Data > Statistics > Chi-square Test** on the Menu bar to access the Test of Independence (Chi-Square) dialog (Figure Error: Reference source not found).

Input range
Specifies the cell range containing the source data.

Results to
Specifies the top left cell of the results area. When you run the tool, it will generate the Chi-square table starting at this cell. Be careful, Calc will replace any data that is in the range of the table to be created.

Columns / Rows
Specifies whether the data to be analyzed is organized in columns or rows.

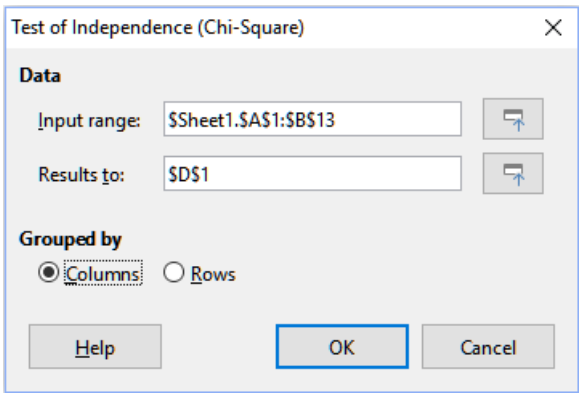


Figure 384: Test of Independence (Chi-Square) dialog

Tip

Use the **Shrink** / **Expand** buttons next to the *Input range* and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

To provide an example of using this tool, we again make use of the input data set shown in Figure 378. In this case the data in column A is the observed data while the data in column B are the corresponding expected values. Figure 385 shows the chi-square results calculated for this input data using the settings shown in Figure Error: Reference source not found.

D	E
Test of Independence (Chi-Square)	
Alpha	0.05
df	12
P-value	2.33E-14
Test Statistic	91.687006
Critical Value	21.026070

Figure 385: Results of chi-square test

In the resulting table, it is possible to insert different values for Alpha. The Critical Value will be updated automatically.

Tip

For more information on chi-square tests, refer to the corresponding Wikipedia article at https://en.wikipedia.org/wiki/Chi-squared_test.

Fourier Analysis tool

The Fourier Analysis tool performs the Fourier analysis of a data set by computing the Discrete Fourier Transform (DFT) of an input array of complex numbers, using Fast Fourier Transform (FFT) algorithms. Select **Data > Statistics > Fourier Analysis** on the Menu bar to access the Fourier Analysis dialog (Figure 386).

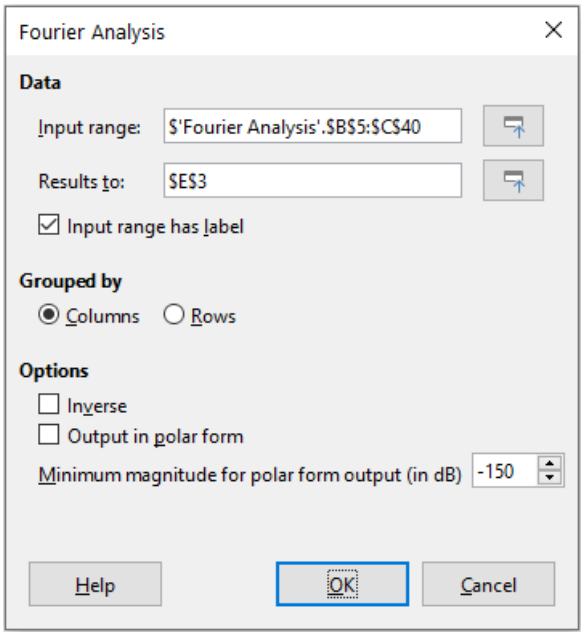


Figure 386: Fourier Analysis dialog

Input range

Specifies the cell range containing the source data. Usually a 2 x N or N x 2 range representing an array of complex numbers to be transformed, where N is the length of the array. The array contains the real and imaginary parts of the data.

Results to

Specifies the top left cell of the results area. When you run the tool, it will generate the Fourier transform table starting at this cell. Be careful, Calc will replace any data that is in the range of the table to be created.

Input range has label
Specifies whether the first row or column of the input array is a label and not part of the data to be analyzed.

Columns / Rows
Specifies whether the data to be analyzed is organized in columns or rows.

Inverse
If ticked, the tool calculates an inverse Discrete Fourier Transform.

Output in polar form
If ticked, the tool outputs the results in polar coordinates (that is, magnitude and phase).

Minimum magnitude for polar form output
This option is only relevant when you select to output results in polar form. All frequency components with magnitude less than the specified value in decibels will be suppressed with a zero magnitude-phase entry. This is useful when looking at the magnitude-phase spectrum of a signal because there is always some tiny rounding error when performing FFT algorithms, which results in incorrect non-zero phase for non-existent frequencies. By providing a suitable value to this parameter, these non-existent frequency components can be suppressed.

Tip

Use the **Shrink** / **Expand** buttons next to the *Input range* and *Results to* fields if you need to shrink the dialog while selecting cells with the mouse.

Tip

Calc utilizes the small, otherwise blank area above the **Help**, **OK**, and **Cancel** buttons to provide feedback on erroneous selections on the dialog. For example, the text “Output address is not valid.” appears if you have not entered a valid cell range in the *Results to* field, and in this circumstance the **OK** button is grayed.

To provide an example of using this tool, we make use of the input data set shown in columns B (real values) and C (imaginary values) of the spreadsheet shown in Figure 387. The data shown in columns E (real values) and F (imaginary values) of the spreadsheet are the Fourier transform results calculated by the tool for this input data, using the settings shown in Figure 386.

Note

For those with a technical interest in the algorithms used by the Fourier Analysis tool, a radix-2 decimation-in-time FFT is used when the length of the input sequence is an even power of 2, while Bluestein’s FFT algorithm is used when the length of the input sequence is not an even power of 2.

Tip

For more information on Fourier analysis, refer to the corresponding Wikipedia article at https://en.wikipedia.org/wiki/Fourier_analysis.

	A	B	C	D	E	F	G
1							
2							
3					**Fourier Transform**		
4		Source Array			Input data range : $B$5:$C$40		
5		Real	Imaginary		Real	Imaginary	
6		0.392555412	0		17.17755787	4.77453E-15	
7		1.208437017	0		3.428868795	2.3716479	
8		0.851477677	0		-6.802716154	-15.13454393	
9		1.785346519	0		-1.605447357	-5.086530604	
10		1.779465061	0		0.395847917	-2.419267855	
11		1.518900602	0		-1.494103833	-2.391480413	
12		1.046946661	0		0.872235793	-1.143940862	
13		0.83110084	0		1.533245851	0.678159169	
14		1.230062285	0		0.450563708	0.229112488	
15		0.133409796	0		0.545106617	0.411028928	
16		0.130471656	0		2.226859964	-2.430922367	
17		0.386478762	0		-1.615228591	-2.416826573	
18		-0.703398288	0		1.302450783	1.454437857	
19		-0.89911531	0		1.579306286	-1.338627366	
20		-0.12404551	0		-1.075722274	-0.921557968	
21		-0.513553513	0		-0.055782418	-1.813360295	
22		-0.613559196	0		-0.57766604	1.388872439	
23		0.326072595	0		-0.826878282	-0.186591001	
24		0.031629781	0		-0.826878282	0.186591001	
25		0.522987259	0		-0.57766604	-1.388872439	
26		0.436798031	0		-0.055782418	1.813360295	
27		0.846212627	0		-1.075722274	0.921557968	
28		0.913061097	0		1.579306286	1.338627366	
29		1.266628753	0		1.302450783	-1.454437857	
30		1.665365048	0		-1.615228591	2.416826573	
31		1.365826362	0		2.226859964	2.430922367	
32		1.467221909	0		0.545106617	-0.411028928	
33		0.661204897	0		0.450563708	-0.229112488	
34		0.701534532	0		1.533245851	-0.678159169	
35		0.658693682	0		0.872235793	1.143940862	
36		0.287522456	0		-1.494103833	2.391480413	
37		-0.409911361	0		0.395847917	2.419267855	
38		-0.583168876	0		-1.605447357	5.086530604	
39		-0.799684084	0		-6.802716154	15.13454393	
40		-0.621417307	0		3.428868795	-2.3716479	
41							

Figure 387: Fourier analysis tool - example input data and results



Calc Guide 7.5

Chapter 11
Linking Data

Sharing data in and out of Calc

Using multiple sheets

Why use multiple sheets?

Chapter 1, Introduction, 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 decides 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.

Note

For users with experience of using Microsoft Excel: what Excel calls a *workbook*, Calc calls a *spreadsheet* (the whole document). Both Excel and Calc use the terms *sheet* and *worksheet*.

Setting up multiple sheets

Chapter 1, Introduction, 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, one sheet named *Sheet1*. You can specify a different number of sheets to be created in a new document, or a different prefix name for new sheets, by going to **Tools > Options > LibreOffice Calc > Defaults** on the Menu bar (Figure 388).

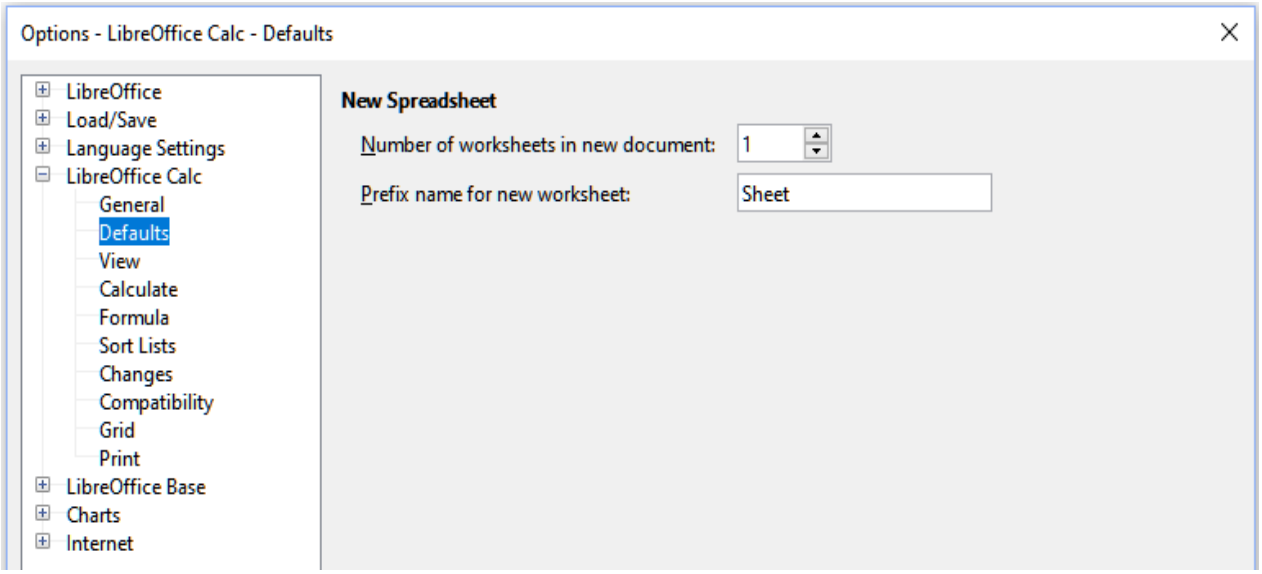


Figure 388: Options > LibreOffice Calc > Defaults dialog

Sheets in Calc are managed using tabs located 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** (+) icon located to the left of the sheet tabs, at the bottom of the spreadsheet. This inserts one new sheet without opening any dialog, with a default name (*Sheet2*, for example) and with the new sheet's tab positioned at the right hand end of the sheet tabs.

Use one of these 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.

- Left-click a sheet tab and select **Sheet > Insert Sheet** on the Menu bar. Calc displays the Insert Sheet dialog with the **Before current sheet** and **New sheet** options preselected.
- Select **Sheet > Insert Sheet at End** on the Menu bar. Calc displays the Append Sheet dialog.
- Select **Sheet > Insert Sheet from File** on the Menu bar. Calc displays the Insert Sheet dialog with the **Before current sheet** and **From file** options preselected. It also displays a file browser dialog on top of the Insert Sheet dialog to enable you to first select the source file containing the sheet to be inserted.
- Right-click on a sheet tab and select **Insert Sheet** in the context menu (Figure 389). Calc displays the Insert Sheet dialog with the **Before current sheet** and **New sheet** options preselected.
- Left-click in the empty space at the right end of the line of sheet tabs (Figure 389). Calc displays the Insert Sheet dialog with the **Before current sheet** and **New sheet** options preselected.
- Right-click in the empty space at the right end of the line of sheet tabs and select **Insert Sheet** in the context menu (Figure 389). Calc displays the Insert Sheet dialog with the **Before current sheet** and **New sheet** options preselected.

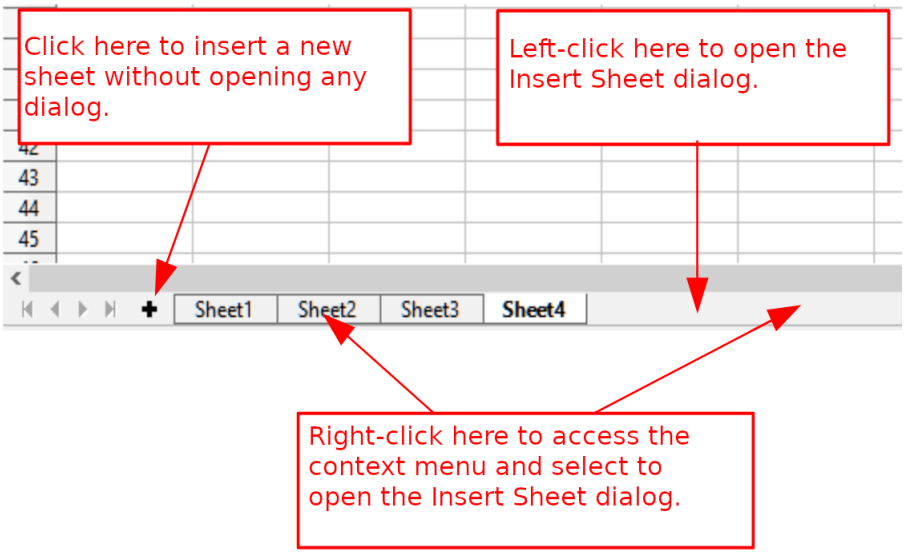


Figure 389: Creating a new sheet through the sheet tabs area

The above methods use either the Insert Sheet dialog (Figure 390) or the Append Sheet dialog (Figure 391).

On the Insert Sheet dialog, you can:

- Choose whether to put the new sheet before or after the currently selected sheet tab.
- Choose how many sheets to insert.

- Choose the name for a single sheet (the *Name* field is unavailable if more than one sheet is to be inserted).

The **From file** option is described in “Inserting sheets from a different spreadsheet” below.

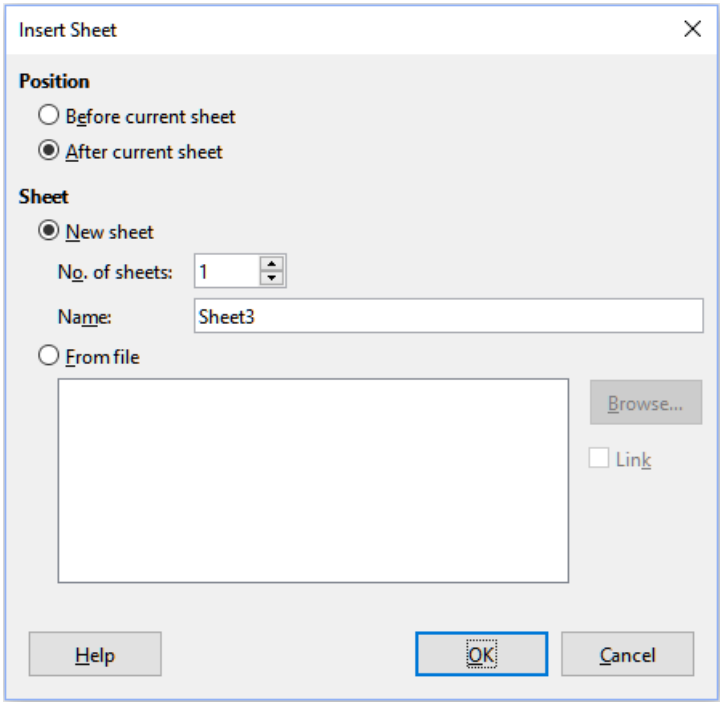


Figure 390: Insert Sheet dialog

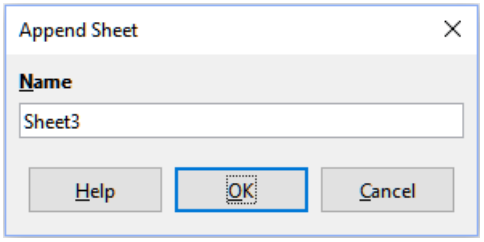


Figure 391: Append Sheet dialog

For John’s spreadsheet we need six sheets, one for each of his five accounts and one as a summary sheet. 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.

After creating a new spreadsheet with one sheet, we could:

- Insert five new sheets and rename all six sheets afterwards
- Rename the existing sheet, then insert the five new sheets one at a time, renaming each new sheet during the insert step.

To insert sheets and rename them afterwards:

1) Make sure that the correct sheet tab is selected and open the Insert Sheet dialog.
2) Choose the position for the new sheets (in this example, we use **After current sheet**).
3) Choose **New sheet** and enter 5 after **No. of sheets:**. Because you are inserting more than one sheet, the *Name* box is not available.
4) Click **OK** to insert the sheets.

For the subsequent steps to rename the sheets, see “Renaming sheets” (below).

To insert sheets and name them at the same time:

1) Rename the existing sheet as Summary, as described in “Renaming sheets” (below).
2) Make sure that the correct sheet tab is selected and open the Insert Sheet dialog.
3) Choose the sheet tab position for the new sheet (**Before current sheet** or **After current sheet**, as applicable).
4) Choose **New sheet** and enter `1` in the **No. of sheets** field. The *Name* box is now available.
5) In the *Name* box, type a name for this new sheet, for example *Checking Account*.
6) Click **OK** to insert the sheet.
7) Repeat steps 2) to 6) for each new sheet, giving them the names *Savings Account*, *Credit Card 1*, *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 (for example, another Calc or Microsoft Excel file), by choosing the **From file** option. Click **Browse**, select the file using the file browser dialog, and click **Open**. A list of the available sheets in that file appears in the adjacent list box (Figure 392). Select the sheet to import (you can only import one at a time). If, after you select the file, no sheets appear, you probably selected an invalid file type (not a spreadsheet, for example).

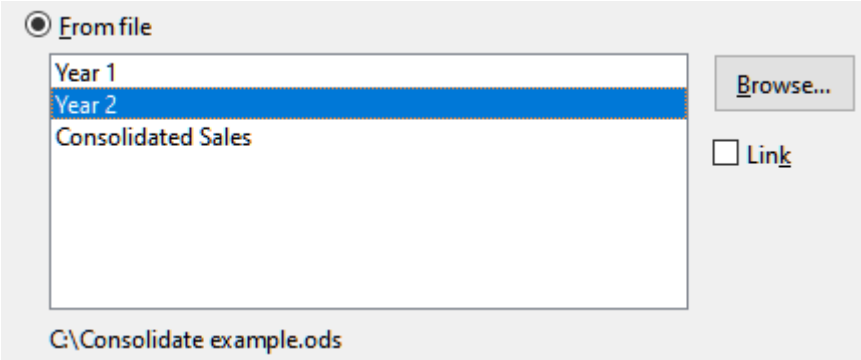


Figure 392: From file area of Insert Sheet dialog showing file path and names of available sheets

If you prefer, select the **Link** option to insert the external sheet as a link instead of as a copy. This is one of several ways to include “live” data from another spreadsheet – see also “Linking to external data” (below). The links can be updated manually to show the current contents of the external file using **Edit > Links to External Files** on the Menu bar. Alternatively the links can be updated automatically whenever the file is opened, depending on the options set on the dialog accessed by selecting **Tools > Options > LibreOffice Calc > General** on the Menu bar. The three options available in the *Update links when opening* section are **Always (from trusted locations)**, **On request**, and **Never**.

To define trusted file locations, select **Tools > Options > LibreOffice > Security > Macro Security** (*Trusted Sources* tab) on the Menu bar. This is useful if you want to use macros in your spreadsheet. For more information about macros see Chapter 13, Macros.

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.
- Double-click on the relevant sheet tab and replace the existing name through the Rename Sheet dialog.

- Right-click on the relevant sheet tab, select **Rename Sheet** in the context menu, and replace the existing name through the Rename Sheet dialog.
- Left-click on the relevant sheet tab, select **Sheet > Rename Sheet** on the Menu bar, and replace the existing name through the Rename Sheet dialog.

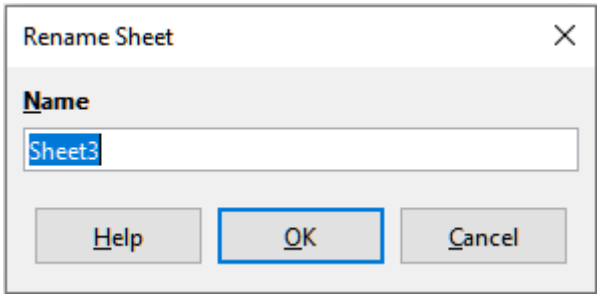


Figure 393: Rename Sheet dialog

A sheet name cannot be empty and must not be a duplicate of an existing name.

Note

The following characters are not allowed in sheet names: colon (:), back slash (\), forward slash (/), question mark (?), asterisk (*), left square bracket ([), right square bracket (]). The apostrophe (') character is not allowed as the first or last character of the name.

Tip

In some LibreOffice Calc installations you can hold down the `Alt` key, click on the sheet name, and enter the new name directly.

Your sheet tab area should now look like this.

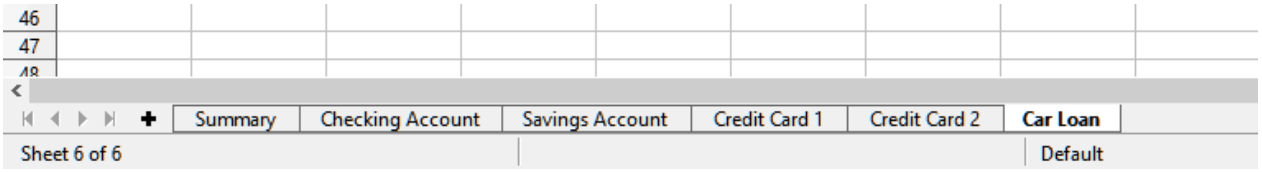


Figure 394: Six renamed sheets

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 395.

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.

F3 | =C3+SUM(B4:B46)

	A	B	C	D	E	F
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						

Figure 395: 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 395 onto each of the five account sheets, 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.

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 396 shows the *Summary* sheet with a blank *Balance* column. We want to place the reference for the Checking Account balance in cell B3.

B3

	A	B	C
1	**My Account Summary**		
2	Account	Balance	
3	Checking Account		
4	Savings Account		
5	Credit Card 1		
6	Credit Card 2		
7	Car Loan		

Figure 396: Blank Summary sheet

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 on the Formula bar. The icons on the Formula bar change and an equals character appears in the Input line (Figure 397).

SUM | =

	A	B	C
1	**My Account Summary**		
2	Account	Balance	
3	Checking Account	=	
4	Savings Account		
5	Credit Card 1		
6	Credit Card 2		
7	Car Loan		

Figure 397: Equals character in Input line of Formula bar

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 (Figure 398).

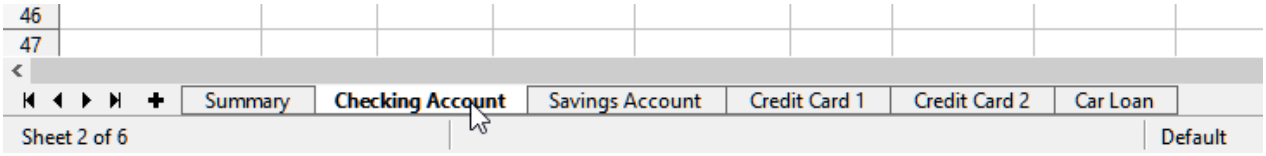


Figure 398: Click on the Checking Account sheet tab

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 (Figure 399) and the selected cell is surrounded by a colored border.

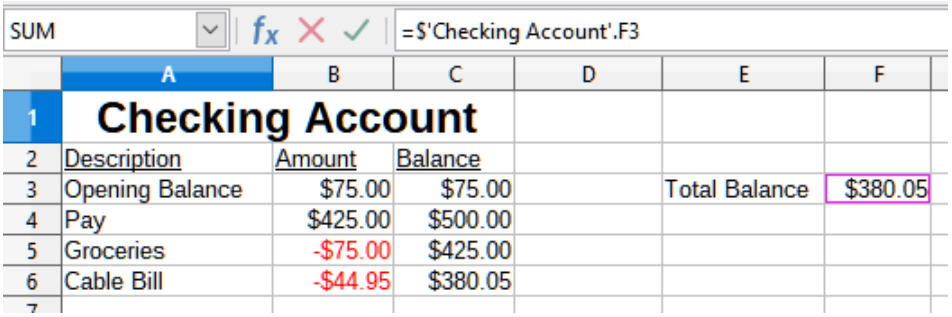


Figure 399: Cell reference selected

4) Click the **Accept** icon in the Input line of the Formula bar, or press the *Enter* key to finish.

5) The *Summary* sheet should now look like Figure 400.

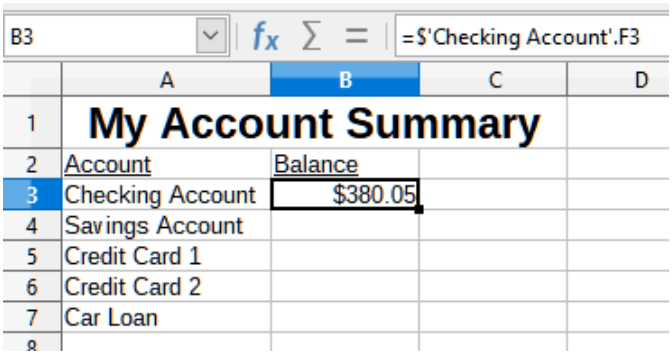


Figure 400: Finished Checking Account reference

Creating the reference with the keyboard

From Figure 400, you can deduce how the cell reference is constructed. The reference has two parts: the sheet name prefixed by a dollar symbol (`$'Checking Account'`), and the cell reference (F3). Notice that they are separated by a period. The default behavior of Calc is to insert the dollar symbol to form an absolute sheet reference while giving a relative cell reference.

Note

The sheet name is in single quotation marks because it contains a space, and the mandatory period (.) always falls outside any quotation marks.

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` (Figure 401).

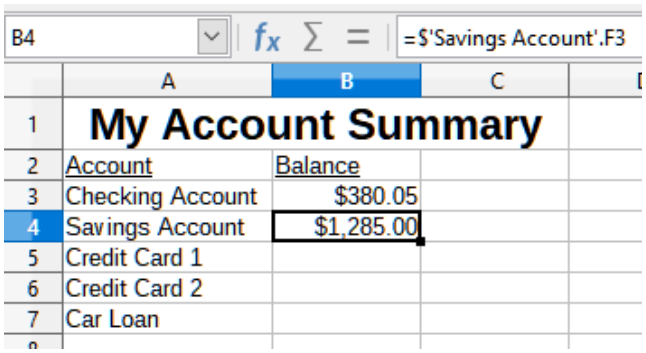


Figure 401: Savings Account cell reference

Protect spreadsheet structure

When you are satisfied with the structure of your spreadsheet in terms of its constituent sheets, select **Tools > Protect Spreadsheet Structure** on the Menu bar to lock that structure. Calc displays the Protect Spreadsheet Structure dialog (Figure 402). Press **OK** to inhibit the addition, deletion, repositioning, and renaming of sheets. To subsequently unlock the structure, select **Tools > Protect Spreadsheet Structure** again.

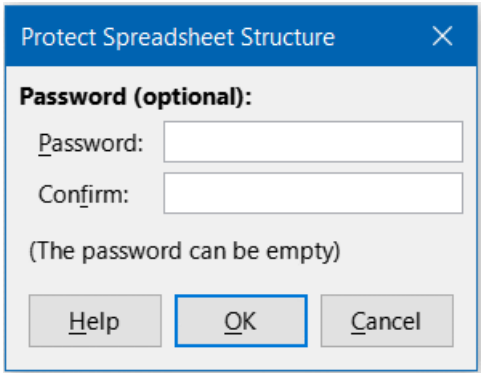


Figure 402: Protect Spreadsheet Structure dialog

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.

1) If necessary, switch to the spreadsheet containing the cell in which the formula is going to be entered.
2) Select the cell in which the formula is going to be entered.
3) Click the **=** icon next to the Input line in the Formula bar.
4) Switch to the other spreadsheet (the process to do this may vary depending on which operating system you are using).
5) Select the sheet (*Savings Account*) and then the reference cell (F3); see Figure 403. You can press the keyboard `Enter` key at this point, or continue with steps 6) and 7).

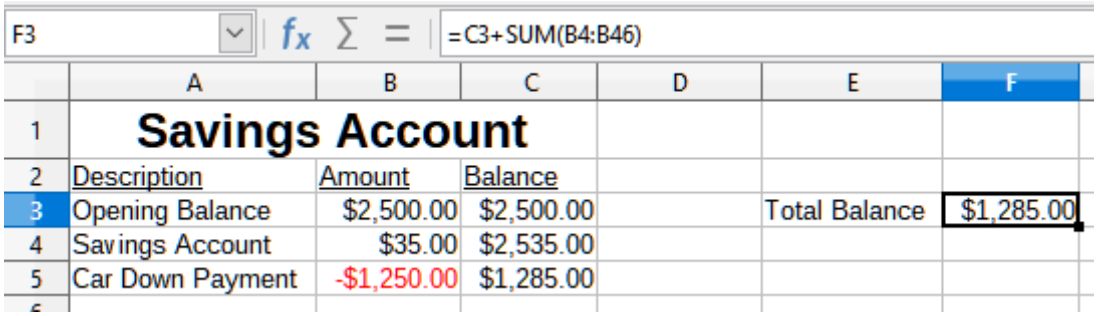


Figure 403: Selecting the Savings Account reference cell

6) Switch back to the original spreadsheet.

7) Click the **Accept** icon in the Formula bar.

Your spreadsheet should now resemble Figure 404.

You will get a good feel for the format of the reference if you look closely at the Input line in the Formula bar. Based on the contents of this line, you can create the reference using the keyboard.

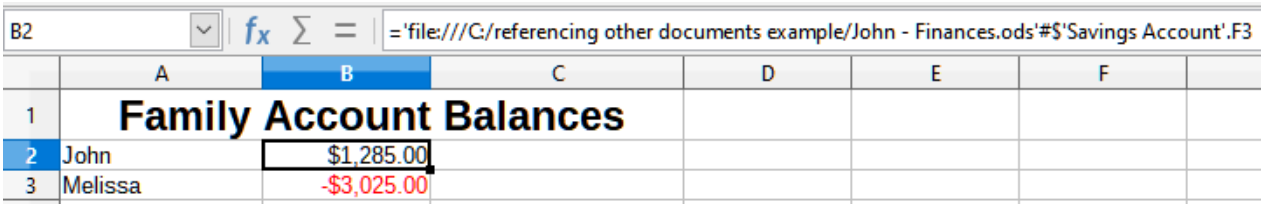


Figure 404: Linked files

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 reference

In Figure 404, you can see that the general format for the reference is:

```
='file:///Path & File Name'#$'SheetName'.CellReference
```

Note

The reference for a file has three forward slashes ///, while the reference for a hyperlink has two forward slashes //. See “Using hyperlinks and URLs” below.

Using 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 pages.

Relative and absolute hyperlinks

Hyperlinks stored within a file can be 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 if the target is moved. A relative link will stop working 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, an absolute hyperlink will break but a relative one will not.

To change the way that Calc stores the hyperlinks in your file, select **Tools > Options > Load/Save > General** and in the *Save* area of the dialog, choose if you want URLs (Universal Resource Locators) saved relatively when referencing the file system, or the Internet, or both.

An absolute path such as *c:\homepage\graphics\picture.gif* would no longer function on a web server. Operating systems such as Unix or macOS do not recognize drive letters, and even if the folder *homepage\graphics* existed, your picture would not be available. It is better to use relative linking for file links. Relative linking is only possible when the document you are working on is on the same drive as the link destination.

Calc will always display an absolute hyperlink. Do not 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

HTML (Hypertext Markup Language) files containing links as relative to the file system that are to be uploaded to a web server require the files be in a file structure matching that of the web server. Otherwise, the links will point to the wrong folder.

Tip

When you rest the mouse pointer on a hyperlink, a help tip displays the absolute reference, because Calc uses absolute path names internally. The complete path and address can only be seen when you view the result of the HTML export (saving a spreadsheet as an HTML file), by loading the HTML file as text, or by opening it with a text editor.

Creating hyperlinks

You can insert a hyperlink into a Calc spreadsheet using one of these methods:

- Select the cell or text within a cell that you want to use for your hyperlink text, or place the text cursor at the point where you want to insert a hyperlink. Select **Insert > Hyperlink** on the Menu bar, or click the **Insert Hyperlink** icon on the Standard toolbar, or press `Ctrl+K`, to access the Hyperlink dialog; see "Hyperlink dialog" (below).
- Drag-and-drop an item from the Navigator to the point where you want to insert the hyperlink (for example, a sheet or cell name).
- Type the target web address or URL at the point where you want to insert the hyperlink. 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 color to the text. If this does not happen, you can enable this feature using **Tools > AutoCorrect Options > Options** on the Menu bar and selecting **URL Recognition**. Make sure you start the hyperlink with `http://`, `www.`, or `ftp.`; if you type only `libreoffice.org` for example, Calc will not recognize it as a hyperlink.

When you use the Hyperlink dialog to insert a hyperlink, you can select either a text hyperlink (Figure 405) or a button hyperlink (Figure 406). In both cases, the visible text can be different from the linked URL.

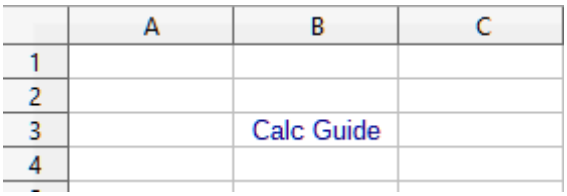


Figure 405: Example text hyperlink

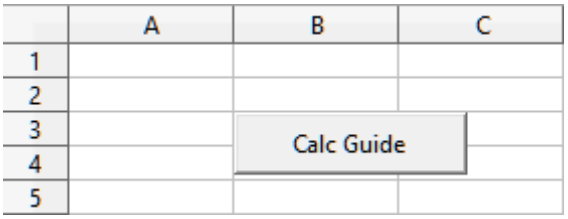


Figure 406: Example button hyperlink

To change the color of text hyperlinks, go to **Tools > Options > LibreOffice > Application Colors** on the Menu bar, scroll to *Unvisited links* and/or *Visited links*, pick the new colors, and click **OK**.

Note

This will change the color for all hyperlinks in all components of LibreOffice, which may not be what you want.

A button hyperlink 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 18, Forms, of the *Writer Guide*.

Opening hyperlinks

To open a text hyperlink, do one of the following:

- Ctrl-click with the mouse pointer positioned over the hyperlink. This method only works if the **Tools > Options > LibreOffice > Security > Security Options and Warnings > Options > Ctrl-click required to open hyperlinks** option is selected.
- Left-click with the mouse pointer positioned over the hyperlink. This method only works if the **Tools > Options > LibreOffice > Security > Security Options and Warnings > Options > Ctrl-click required to open hyperlinks** option is not selected.
- Right-click with the mouse pointer positioned over the hyperlink and select the **Open Hyperlink** option in the context menu.

To open a button hyperlink, left-click the button. This method only works when the form design mode is deactivated; the status of this mode is controlled by clicking the **Design Mode** button on either the Form Controls toolbar or the Form Design toolbar.

Hyperlink dialog

You can insert and modify hyperlinks using the Hyperlink dialog (Figure 407). To display this dialog, choose **Insert > Hyperlink** on the Menu bar, or click the **Insert Hyperlink** icon on the Standard toolbar, or press *Ctrl*+*K*.

On the left side of the dialog, select one of the four categories of hyperlink:

- **Internet**. The hyperlink points to a WWW (World Wide Web) or FTP (File Transfer Protocol) address.
- **Mail**. The hyperlink points to an email address.
- **Document**. The hyperlink points to a location in either the current document or another existing document.
- **New Document**. Opening the hyperlink creates a new document.

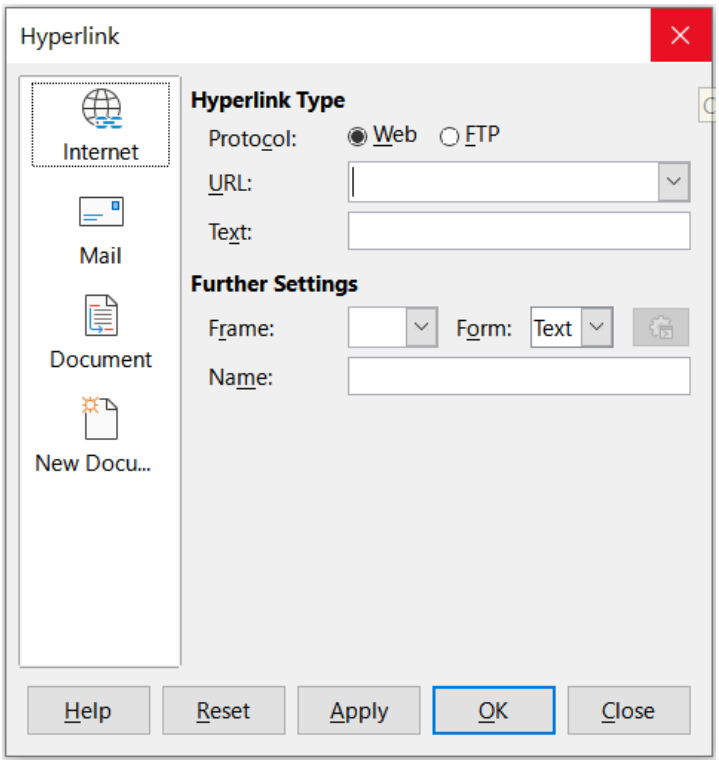


Figure 407: Hyperlink dialog showing details for the Internet category

Figure 407 shows the Hyperlink dialog with the **Internet** category and the **Web** hyperlink type selected.

The *Further Settings* area is provided for all four hyperlink categories. The controls above the *Further Settings* area vary dependent on which of the four hyperlink categories is selected on the left side of the dialog.

A full description of all the choices and their interactions is beyond the scope of this chapter. The following is a summary of the most common choices used in Calc spreadsheets.

Internet

- **Web** / **FTP**. Select the type of hyperlink. On selection of the **FTP** option, the controls above the *Further Settings* area change to those shown in Figure 408.
- **URL**. Enter the required web address.
- **Text**. 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.
- **Login name**. If necessary, enter your login to access the URL. Only applicable for FTP hyperlinks.
- **Password**. If necessary, enter your password to access the URL. Only applicable for FTP hyperlinks.
- **Anonymous user**. Mark this option to access the URL anonymously. Only applicable for FTP hyperlinks.

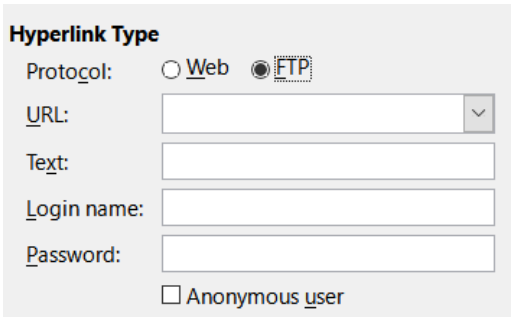


Figure 408: FTP specific controls on the Hyperlink dialog

Mail

For Mail hyperlinks, the controls above the *Further Settings* area change to those shown in Figure 409.

- **Recipient**. Enter the email address of the recipient, or select the address from an existing database accessed by clicking the **Data Sources** button.
- **Subject**. Enter the text to be used as the subject line of the message.

The *Text* field (shown in the *Hyperlink Type* area in Figures 407 and 408, is provided within the *Further Settings* area for Mail, Document, and New Document hyperlinks. Its function for these hyperlinks is as described above for Internet hyperlinks.

The Mail hyperlink only works if a mail client is installed.

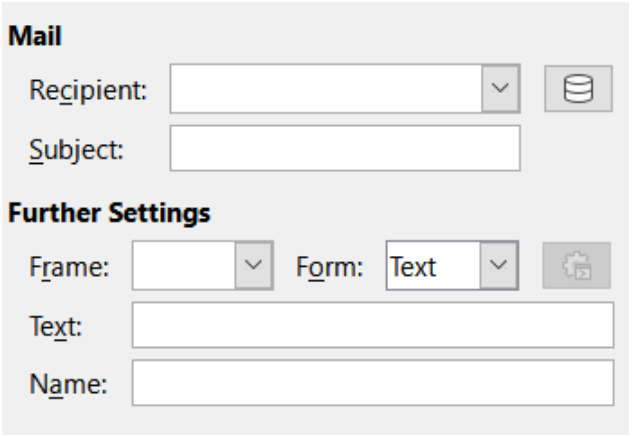


Figure 409: Mail controls on the Hyperlink dialog

Document

For document hyperlinks, the controls above the *Further Settings* area change to those shown in Figure 410.

- **Path**. Specify the path of the file to be opened. Leave this blank if you want to link to a target in the same spreadsheet. The **Open File** icon opens a file browser for you to locate the document to be opened.
- **Target**. Optionally specify the target in the document (for example a specific sheet). Click on the **Target in Document** icon to open a Navigator window where you can select the target, or if you know the name of the target, you can type it into the box.

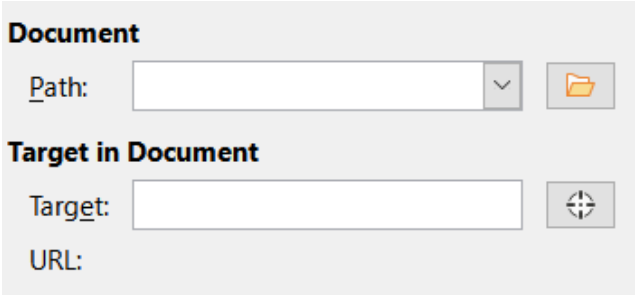


Figure 410: Document controls on the Hyperlink dialog

New Document

For New Document hyperlinks, the controls above the *Further Settings* area change to those shown in Figure 411.

- **Edit now** / **Edit later**. Specify whether to edit the newly created document immediately or just create it.
- **File**. Enter the name of the file to be created. The **Select Path** icon opens a directory picker dialog.
- **File type**. Select the type of document to be created (for example, text document, spreadsheet, or drawing).

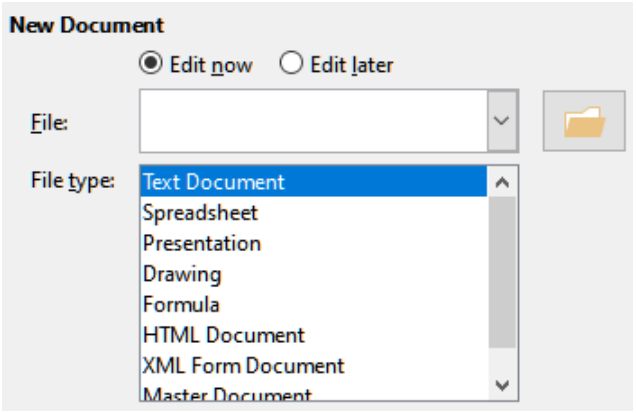


Figure 411: New Document controls on the Hyperlink dialog

The *Further Settings* section on the Hyperlink dialog is common to all the hyperlink categories, although some choices are more relevant to some types of links and the *Text* option is omitted from this area for Internet hyperlinks.

- Set the value of **Frame** to determine how the hyperlink will open. This applies to documents that open in a web browser. Options are *_top*, *_parent*, *_blank*, and *_self*.
- **Form** specifies if the link is to be presented as text or as a button.
- **Text** specifies the text that will be visible to the user. If this is left blank, 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: opens the Assign Macro dialog. Select a macro to run when the link is clicked. This function is not covered further in this chapter.

Editing hyperlinks

To edit an existing text hyperlink, do any of the following:

- If the **Tools > Options > LibreOffice > Security > Security Options and Warnings > Options > Ctrl-click required to open hyperlinks** option is selected, then click the cell containing the hyperlink. Select **Insert > Hyperlink** on the Menu bar, or click the **Insert Hyperlink** icon on the Standard toolbar, or press *Ctrl*+*K*.
- Select the cell containing the hyperlink. In some cases you may need to select a nearby cell that does not contain a hyperlink and use the arrow keys to move the selection to the hyperlink cell. Select **Insert > Hyperlink** on the Menu bar, or click the **Insert Hyperlink** icon on the Standard toolbar, or press *Ctrl*+*K*.
- Right-click on the hyperlink and select the **Edit Hyperlink** option in the context menu.

In all cases, Calc opens the Hyperlink dialog, where you can modify the characteristics of the hyperlink.

For a button hyperlink, the spreadsheet must have the form design mode enabled in order to edit the hyperlink. With the button selected, select **Insert > Hyperlink** on the Menu bar, or click the **Insert Hyperlink** icon on the Standard toolbar, or press *Ctrl*+*K*. Make your changes and click **OK**.

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**.

You can also edit a button hyperlink by selecting the button (with form design mode enabled), right-clicking, and selecting **Control Properties** in the context menu. Calc displays the Properties dialog. Modify the button text by editing the *Label* field and modify the link address by editing the **URL** field. Note that the Properties dialog do not contain an **OK** button, so after executing the desired changes, just close the dialog.

Removing hyperlinks

To remove a text or button hyperlink from the document completely, select it and use one of the many available deletion mechanisms (for example, select **Edit > Cut** on the Menu bar or **Cut** on the Standard toolbar; or right-click on the hyperlink and select **Cut** in the context menu; or press *Backspace* or *Delete* on the keyboard).

Linking to external data

You can insert data from another document into a Calc spreadsheet as a link.

Two methods are described in this section: using the External Data dialog and using the Navigator. If your file has named ranges, database ranges, or named tables, and you know the name of the range or table you want to link to, using the External Data dialog is quick and easy. However, if the file has several ranges and 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.

Calc provides other methods for including linked data from external sources, see for example “Linking to registered data sources” (below) and “Dynamic Data Exchange (DDE)” (below).

Note

When you open a file that contains links to external data, depending on your settings you may be prompted to update the links or they may be updated automatically. Depending on where the linked files are stored, the update process can take several minutes to complete.

Using the External Data dialog

The External Data dialog inserts data from an HTML, Calc, CSV (Comma-Separated Values), or Microsoft Excel file into the current sheet as a link. Calc utilizes a Web Page Query import filter, enabling you to insert tables from HTML documents.

To insert a link to external data 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 cell of the external data is to be inserted.
3) Choose **Sheet > External Links** on the Menu bar. Calc displays the External Data dialog (Figure 412).
4) Type the URL of a web resource that is to be used as a data source, or type the address of a source file, or select an entry in the drop-down list, or select a source file from the file selection dialog accessed through the **Browse** button. For entries typed in, press *Enter* on completion.
5) If you selected a HTML file as the data source at step 4), Calc displays the Import Options dialog (Figure 414). On this dialog you can choose the import language of the site. Select **Automatic** to let Calc import the data directly, or select **Custom** and choose from the drop-down list of languages available. You can also select the option to have Calc recognize special numbers, such as dates, on import.

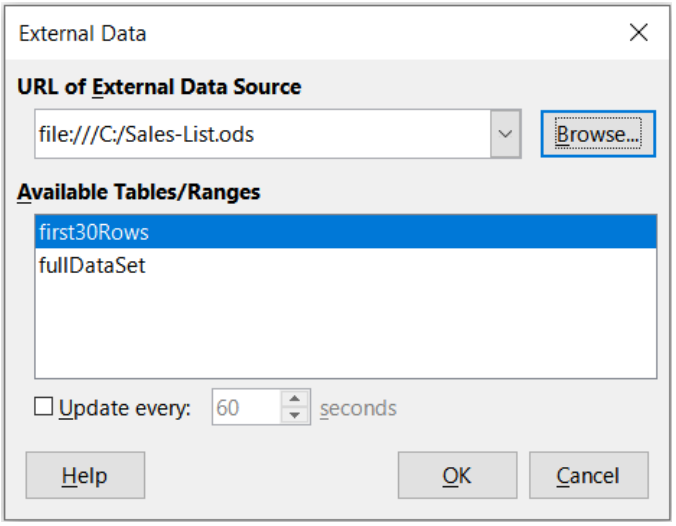


Figure 412: External Data dialog

a) Click **OK** on the Import Options dialog. Calc loads the list of available tables/ranges into the *Available Tables/Ranges* area of the External Data dialog. The Web Page Query import filter can create names for cell ranges as they are imported. As much formatting as possible is retained while the filter intentionally does not import any images. The filter additionally creates two additional entries in the list: *HTML_all* to permit selection of the entire document and *HTML_tables* to permit selection of all the tables. Where a HTML table has a caption element, the text of the caption is appended to the associated entry in the list of available tables and ranges (Figure 413) and this helps identify a table of interest when there are many listed.

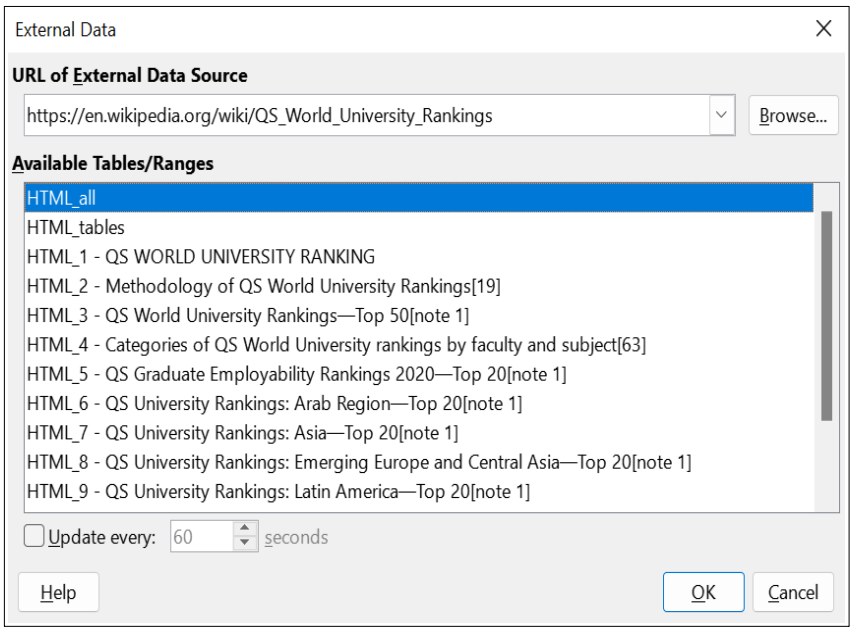


Figure 413: External Data dialog, with table captions

b) In the *Available Tables/Ranges* area, select the named ranges or tables you want to insert (hold `Ctrl` to select multiple entries). The **OK** button then becomes available.

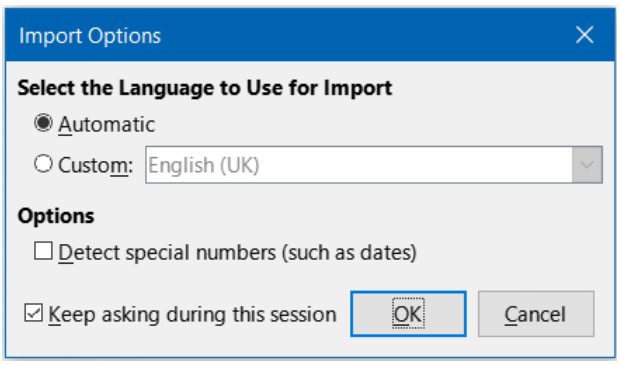


Figure 414: Import Options dialog

6) If you selected a CSV file as the data source at step 4), Calc displays the Text Import dialog (Figure 415). This dialog is described in detail in Chapter 1, Introduction. Click **OK** on the Text Import dialog and select *CSV_all* in the *Available Tables/Ranges* area of the External Data dialog. The **OK** button then becomes available.

7) If you selected a Calc or Microsoft Excel file as the data source at step 4), Calc populates the *Available Tables/Ranges* area of the External Data dialog with the list of range names and database ranges that are defined in the source file. Select the range names and database ranges that you want to insert (hold `Ctrl` to select multiple entries) and the **OK** button then becomes available.

Note

If the source Calc or Microsoft Excel spreadsheet contains no range names or database ranges, then you cannot use that document as the source file in the External Data dialog.

8) For all external data source file types, you can also specify that the data is refreshed at a specific frequency, defined in seconds.

9) Click **OK** to close the External Data dialog and insert the linked data.

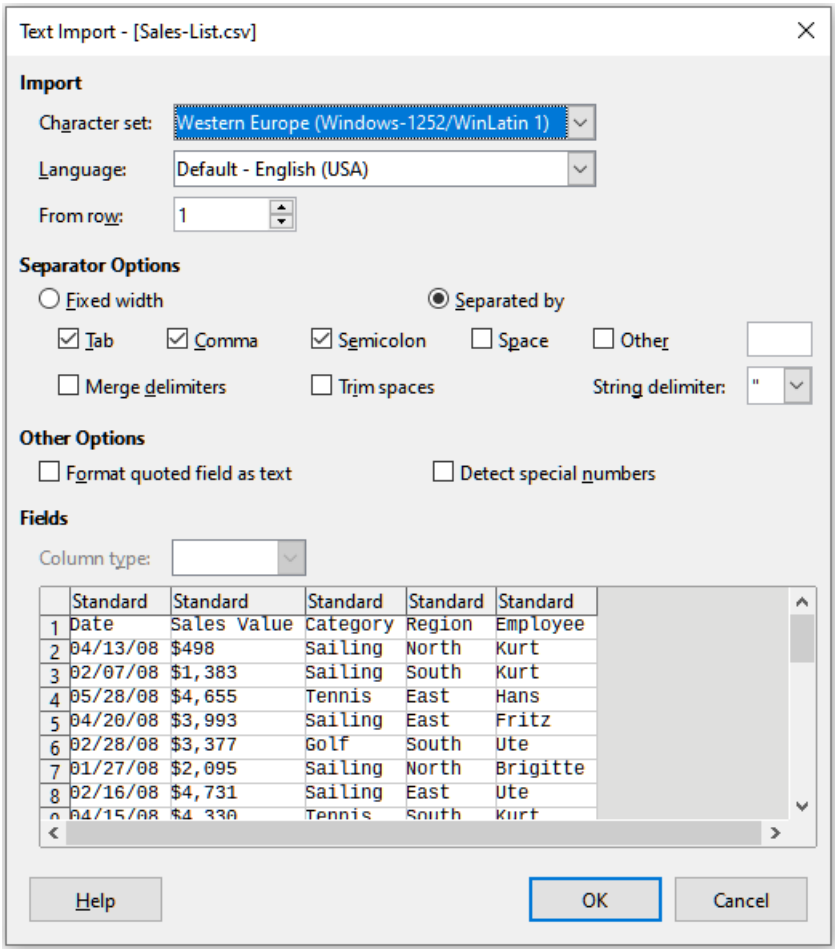


Figure 415: Text import dialog

Calc adds the new entry to the *Linked areas* list in the Navigator (Figure 416). If you double-click this entry, Calc highlights the linked data within the sheet. When you hover the mouse pointer over the entry, a tooltip indicates the file location of the linked data.

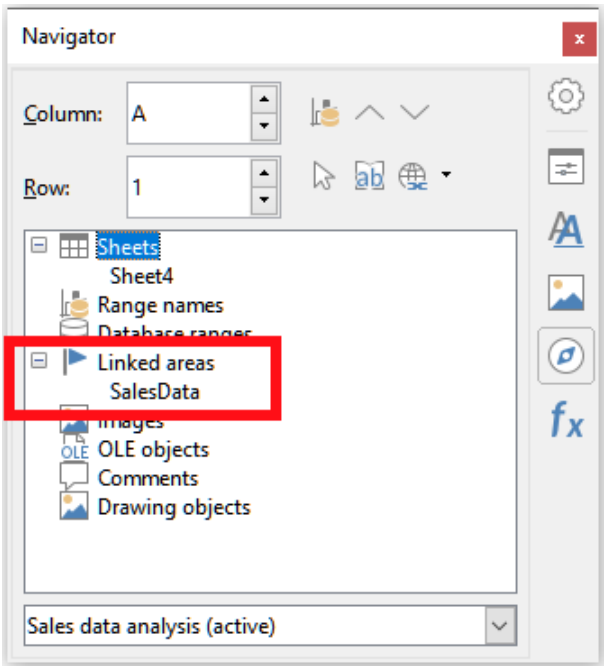


Figure 416: Linked areas in the Navigator

To view a list of all external data links in the spreadsheet, select **Edit > Links to External Files** on the Menu bar. Calc displays the Edit Links dialog (Figure 417).

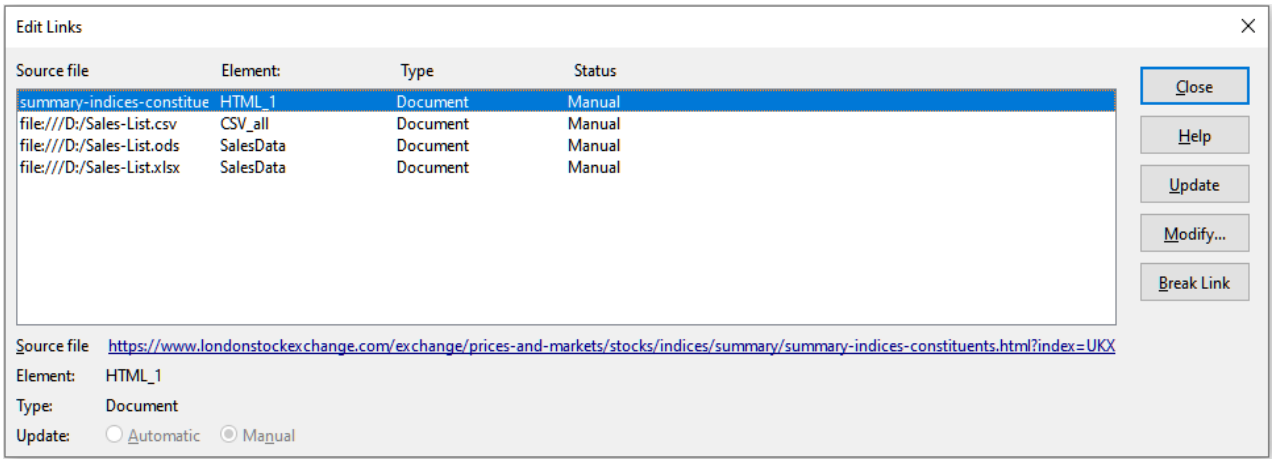


Figure 417: Edit Links dialog

Note

The Edit Links dialog can display information about other links that were not created using the External Data dialog.

For links that have been created using the External Data dialog, you can access that dialog again by selecting the link on the Edit Links dialog and clicking the **Modify** button, or double-clicking the link. If you click **Break Link** and confirm that you want to remove the selected link, the previously-linked data becomes embedded in the spreadsheet. Click **Update** to refresh the linked data in the target file so that it matches that in the source file.

Note

The *Status* column on the Edit Links dialog always shows *Manual* for a link created using the External Data dialog. The status shown in this column does not reflect the setting of the **Update every … seconds** option on the External Data dialog.

Using the Navigator

You can also use the Navigator dialog or the Navigator deck of the Sidebar to link external data. Access the Navigator dialog by selecting **View > Navigator** on the Menu bar, or pressing `F5`. See Chapter 1, Introduction, for more details about the Navigator.

To insert a link to external data 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) in Calc. The source document does not need to be a Calc file; it could, for example, be a Microsoft Excel file, an HTML file, or a CSV file. In the case of a HTML file, Calc displays the Import Options dialog (Figure 414) before opening the file.
3) In the target document, open the Navigator (Figure 418). This illustration shows the Navigator for a new file called *Untitled 1*, which currently has no range names, database ranges, or linked areas.
4) At the bottom of the Navigator, select the source document in the drop-down menu (Figure 419). In this case the source is called *summary-indices-constituents* and the file contains three range names which are highlighted with a red box. You may need to click the **+** icon at the left of the *Range names* field to view the names.

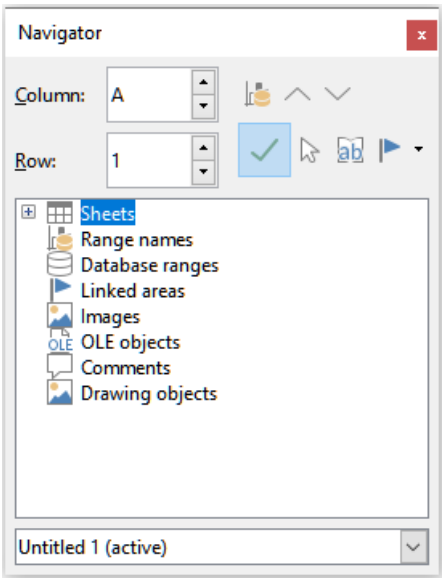


Figure 418: Navigator for target file

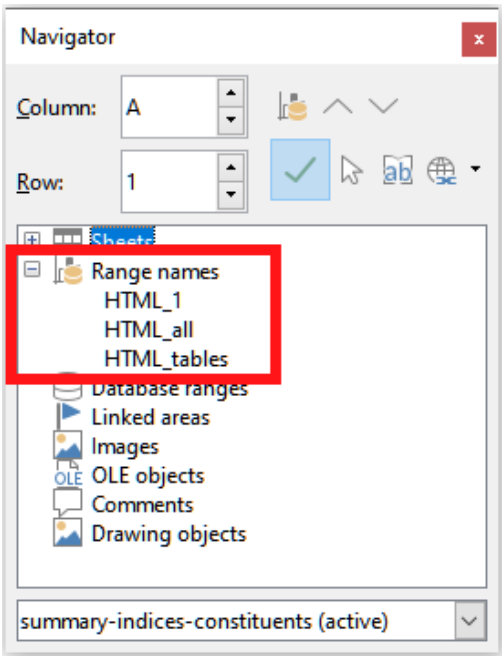


Figure 419: Navigator for source file

5) In the Navigator, select the **Insert as Link** option in the *Drag Mode* menu, as shown in Figure 420.

You can also change the drag mode by right-clicking on a range name and selecting the required option in the context menu.

Tip

The graphic on the **Drag Mode** icon on the Navigator changes to reflect the currently selected drag mode.

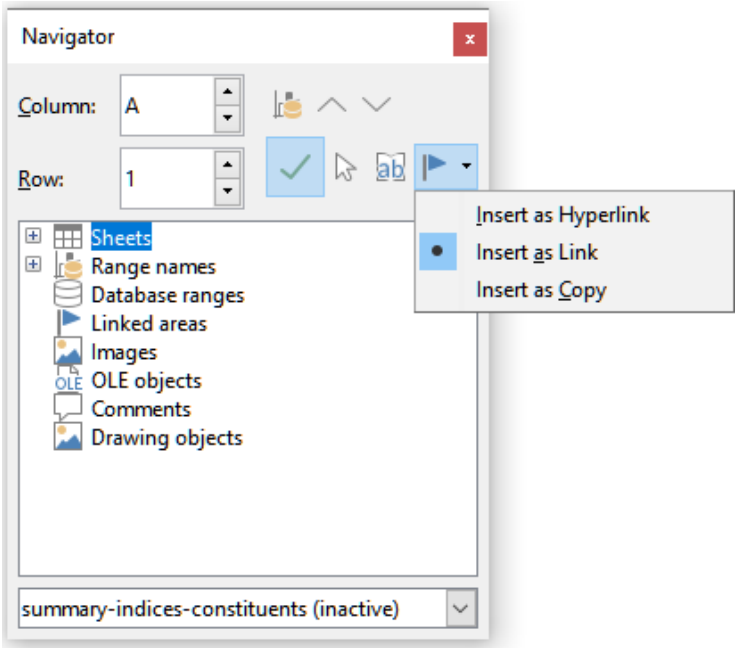


*Figure 420: Select **Insert as Link** from Drag Mode menu*

6) Select the required *Range names* or *Database ranges* entry and drag it from the Navigator into the target document, to the cell where you want the upper left cell of the data range to be.

7) Re-select the target document in the drop-down menu at the bottom of the Navigator. Instead of a **+** icon next to *Range names*, it shows a **+** icon next to *Linked areas*. Click the **+** icon to see the entry dragged across from the source document, similar to Figure 416.

How to find the required data range or table

Calc's Web Page Query import filter displays the data ranges (tables) in source order from the web page. It also creates two additional range names:

- *HTML_all* – designates the entire document
- *HTML_tables* – designates all HTML tables in the document

If any of the data tables in the source HTML document have been given meaningful names (using the *ID* attribute on the *TABLE* tag), those names appear in the *Range names* list, along with the ranges Calc has sequentially numbered.

If the data range or table you want is not meaningfully 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. The example in Figure 421 shows a table of best-selling albums of recorded music by year worldwide and was extracted from Wikipedia's *List of best-selling albums* page (https://en.wikipedia.org/wiki/List_of_best-selling_albums).

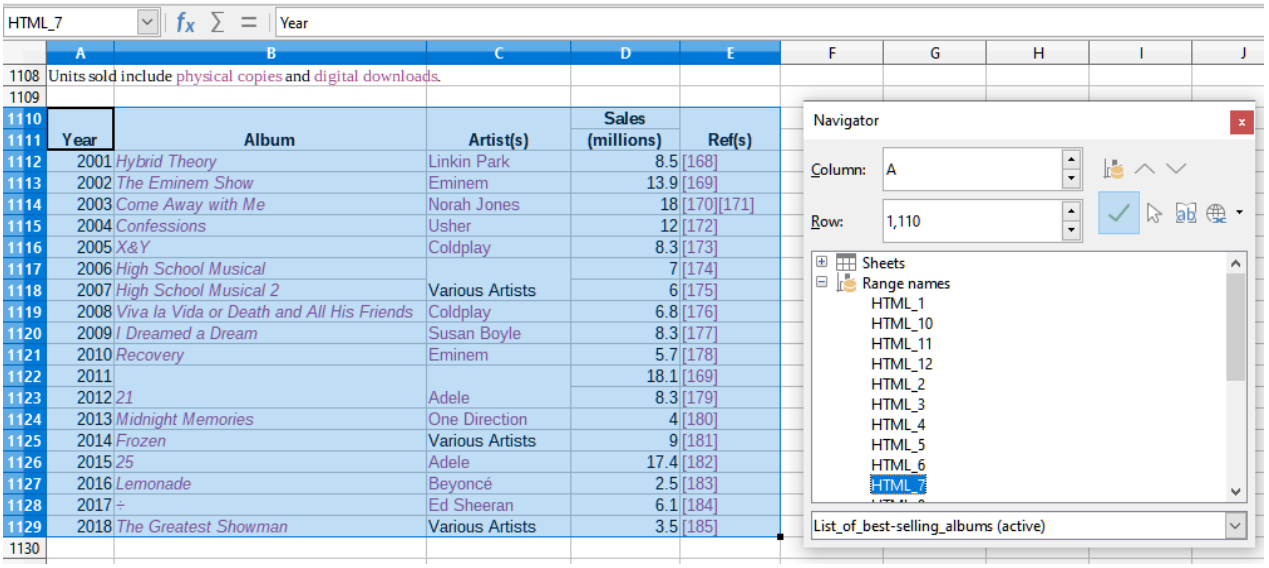


Figure 421: Using the Navigator to find a data range name

If the Formula bar is visible, the range name is also displayed in the Name Box at the left end (Figure 422). The range name can be selected in the drop-down list to highlight it on the page.

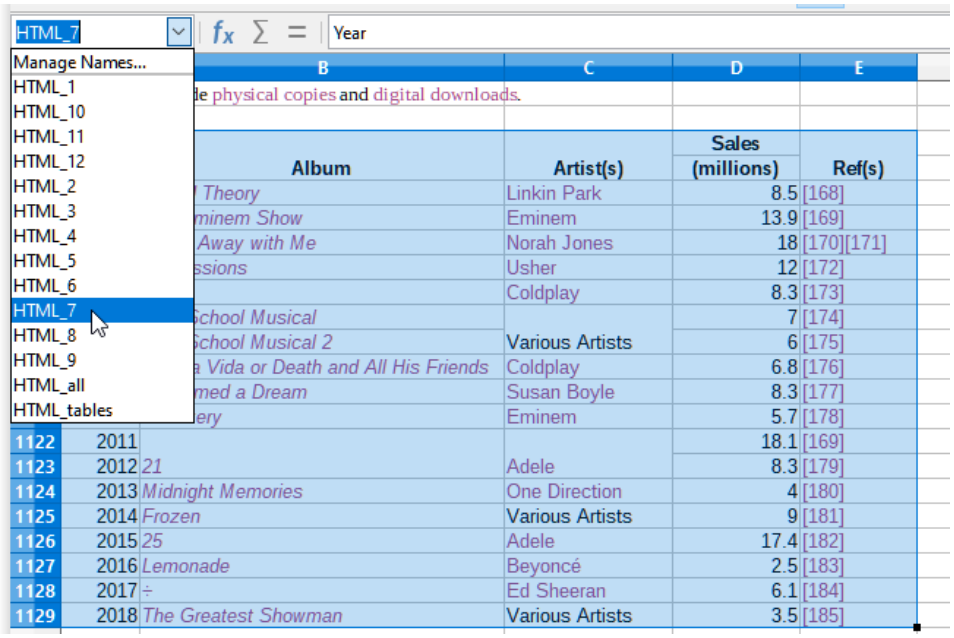


Figure 422: Using the Name Box to find a data range name

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) Select **Tools > Options > LibreOffice Base > Databases** on the Menu bar. Calc displays the dialog shown in Figure 423.

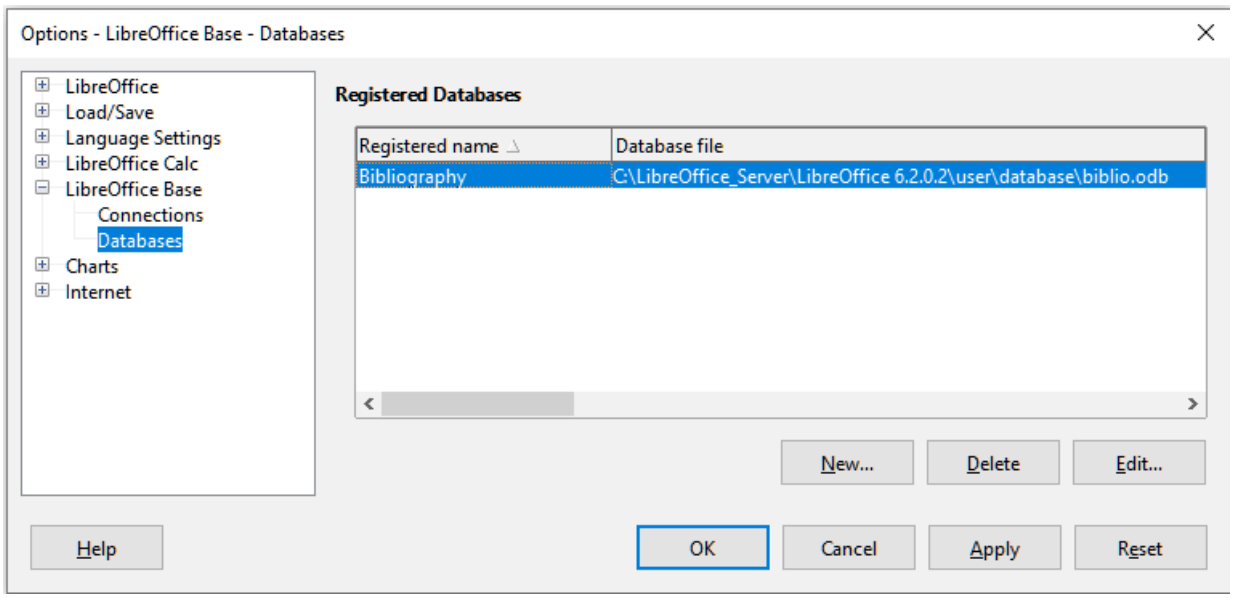


Figure 423: Options – LibreOffice Base – Databases dialog

2) Click the **New** button to open the Create Database Link dialog (Figure 424).

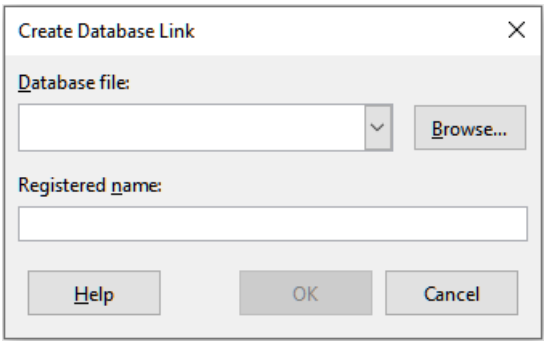


Figure 424: Create Database Link dialog

3) Enter the location of the database file, select a database file in the drop-down list, 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 and LibreOffice uses the registered name to access the database.

Note

The **OK** button on the Create Database Link dialog is enabled only when both the *Database file* and *Registered name* fields are filled in.

To register a data source that is not in *.odb format:

1) Choose **File > New > Database** on the Menu bar to open the Database Wizard (Figure 425). For more about the Database Wizard, see Chapter 2, Creating a Database, of the *Base Handbook*.

2) Select **Connect to an existing database** and select the appropriate database type in the drop-down menu. 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. The example database type menu shown in Figure 425 relates to a Windows 10 installation.

Note

The exact interactions required to connect to a database vary depending on the type of database. Steps 3) and 4) assume that you selected dBASE at step 2).

3) Click **Next**. Type the path to the folder where the dBase files are stored or click **Browse** and use the folder selection dialog to navigate to the relevant folder before clicking the **Select Folder** button.

4) Click **Next**. Select **Yes, register the database for me**, but clear the **Open the database for editing** checkbox.

5) Click **Finish**. Name and save the database in the location of your choice.

Note

The above steps create a *.odb format database based on the content of the original dBASE database. The original dBASE database remains unchanged.

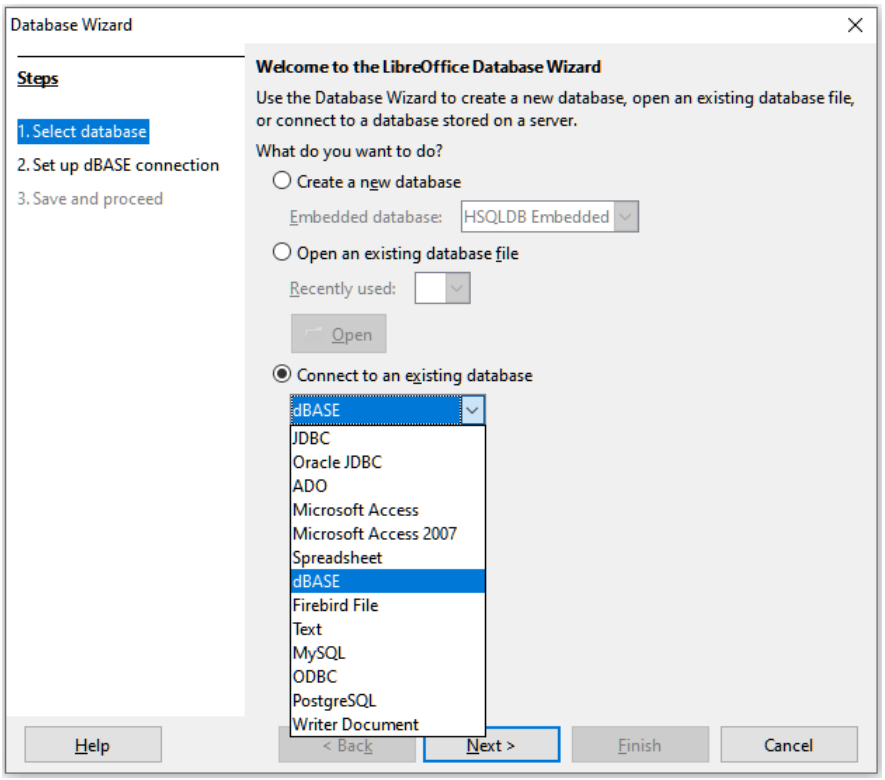


Figure 425: Database Wizard

Once a data source has been registered, it can be used by any LibreOffice component (for example, Calc or Writer).

Viewing data sources

Open a document in Calc. To view the data sources available, select **View > Data Sources** on the Menu bar, or press *Ctrl*+*Shift*+*F4*. Calc opens the Data Source window above the spreadsheet.

The Data Source window has four main components:

The Table Data toolbar

- The Table Data toolbar (Figure 426) is by default located at the top of the Data Source window.



Figure 426: Table Data toolbar

- The Table Data toolbar provides the following icons, from left to right:
  - **Save current record**
  - **Edit Data**
  - **Cut**
  - **Copy**
  - **Paste**
  - **Undo**
  - **Find Record**

- **Refresh**
- **Sort**
- **Sort Ascending**
- **Sort Descending**
- **AutoFilter**
- **Apply Filter**
- **Standard Filter**
- **Reset Filter/Sort**
- **Data to Text**
- **Data to Fields**
- **Mail Merge**
- **Data Source of Current Document**
- **Explorer On/Off**

The Data Source Explorer

- The Data Source Explorer (Figure 427) is by default located on the left side of the Data Source window, below the Table Data toolbar.
- The Data Source Explorer provides a list of the registered databases, which by default includes the built-in *Bibliography* database.
- To view each database, click on the expand icon to the left of the name of the database. This has already been done for the *Automobiles* database in Figure 427. Click on the expand icon left of *Tables* to view the individual tables within the selected database; similarly you can click on the expand icon left of *Queries* to view the individual queries within the selected database. Click on the name of a table to view all the records held in that table.



Figure 427: Data Source Explorer

Data records for selected table

- The data records for the selected table are displayed in the area at the right side of the Data Source window, below the Table Data toolbar.

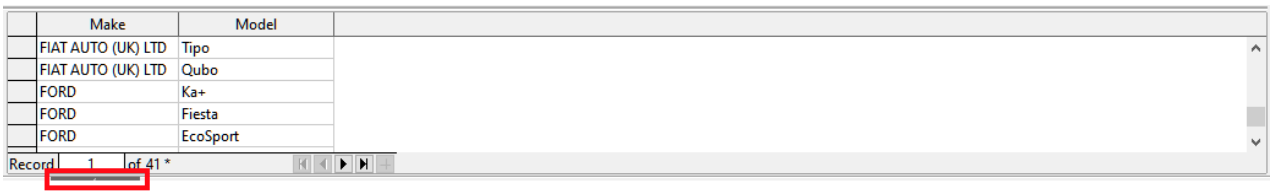


Figure 428: Data Source window records

- To see more columns in this area, you can click the **Explorer On/Off** icon on the Table Data toolbar to hide the Data Source Explorer. Click again to show it back.
- Below the data records is a navigation bar, which shows which record is selected and the total number of records. This provides the following buttons, from left to right:
  - **First record**
  - **Previous record**
  - **Next record**
  - **Last record**
  - **Add new record**
- A horizontal scroll bar appears when the available columns do not all fit in the visible area. A vertical scroll bar appears when the available data records do not all fit in the visible area.

Show / hide window

- At the bottom center of the Data Source window is a control to hide and show the entire window. This control is highlighted with a red box in Figure 428.

Editing data sources

Only registered Data Sources can be edited in the Data Source window.

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" below. 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 Explorer. Right-click on a database, *Tables*, a table name, *Queries,* or a query name, and then select **Edit Database File** in the context menu. 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,* or the *Base Guide*.

Using data sources in Calc spreadsheets

Data from a table displayed on the right side of the Data Source window can be placed into a Calc document in a variety of ways.

You can select a single cell, a single row, or multiple rows in the Data Source window and drag and drop the data into the spreadsheet. The data is inserted at the place where you release the mouse button. If you selected one or more rows, Calc will also include the column headings above the data you insert. To select the rows of data you want to add to the spreadsheet:

1) Click the gray box to the left of the first row you want to select. That row is highlighted.
2) To select multiple adjacent rows, hold down the `Shift` key while clicking the gray box of the last row you need.
3) To select multiple separate rows, hold down the `Control` key while selecting each row. The selected rows are highlighted.
4) To select all the rows, click the gray box in the upper left corner. All rows are highlighted.

An alternative method uses the **Data to Text** icon on the Table Data toolbar 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) Select the rows of data you want to add to the spreadsheet, as described in the previous paragraph.
3) Click the **Data to Text** icon in the Table Data toolbar 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) Drag and drop the gray box at the top of the column (containing the field name you wish to use) to where you want the record to appear in the spreadsheet.
2) Repeat step 1) until you have moved all of the fields you need to where you want them.
3) Close the Data Source window by selecting **View > Data Sources** on the Menu bar or pressing *Ctrl*+*Shift*+*F4*.
4) Save the spreadsheet and select **Edit > Edit Mode** on the Menu bar, or press *Ctrl*+*Shift*+*M*, to make the spreadsheet read-only.
5) Select **File > Reload** on the Menu bar. All of the fields will show the value for the data of the first record of the data source that you selected.
6) Select **View > Toolbars > Form Navigation** to show the Form Navigation toolbar (Figure 429). By default, this toolbar opens at the bottom of the Calc window, just above the Status bar.



Figure 429: Form Navigation toolbar

7) Click the arrows on the Form Navigation toolbar to view the different records of the table. The toolbar indicates which record is currently displayed and the total number of records available. The current record number changes as you move through the records and the data in the spreadsheet fields updates to correspond to the data for that particular record number.

   From left to right, the Form Navigation toolbar provides the following interactions:

   - **Find Record** (provides access to the Record Search dialog)
   - **Absolute Record** (type in the number of the required record)
   - **First Record**
   - **Previous Record**
   - **Next Record**
   - **Last Record**
   - **New Record**
   - **Save Record**
   - **Undo**
   - **Delete Record**
   - **Refresh**
   - **Refresh Control**

- **Sort**
- **Sort Ascending**
- **Sort Descending**
- **AutoFilter**
- **Apply Filter**
- **Form-Based Filters**
- **Reset Filter/Sort**
- **Data source as Table**

Embedding spreadsheets

Spreadsheets can be embedded in other LibreOffice files and vice versa. This is often used in Writer or Impress documents so that Calc data can be used in a text document or a presentation. You can embed the spreadsheet as either an OLE (Object Linking and Embedding) or DDE (Dynamic Data Exchange) 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 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 is that it is quick and easy to edit its 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 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.

Note

If your OLE object is empty, inactive, and not displayed as an icon, then it will be transparent.

To embed a spreadsheet as an OLE object in a presentation:

1) Place the cursor in the document at the location where you want the OLE object to be.
2) Select **Insert > Object > OLE Object** on the Menu bar. Impress opens the Insert OLE Object dialog shown in Figure 430, with the **Create new** option selected by default.
3) You can either create a new OLE object or create the OLE object from an existing file.

To create a new object:

1) Select the **Create new** option and select the required option from those available in the *Object Type* list. In this example, you would select *LibreOffice 7.2 Spreadsheet*.
2) Click **OK**.

3) LibreOffice places an empty container in the slide, ready for you to enter information. By default the Menu bar changes to reflect the Calc Menu bar; when you click on the slide, anywhere outside the spreadsheet area, the Menu bar reverts to the Impress Menu bar.

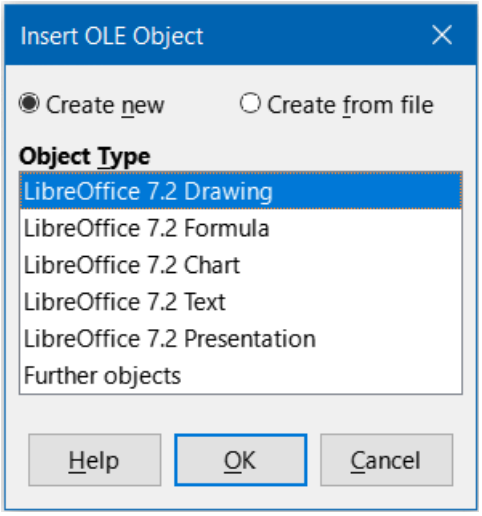


*Figure 430: Insert OLE Object dialog with **Create new** option selected*

After clicking outside the spreadsheet area, double-click on the OLE object to re-enter the edit mode of the object. The application devoted to handling that type of file (Calc in our example) will open the object.

To save the inserted spreadsheet:

1) Click anywhere outside the spreadsheet to leave the edit mode.
2) Right-click on the spreadsheet and select **Save Copy as** in the context menu or select **Edit > Object > Save Copy as** on the Menu bar.
3) Choose the name of the new file and the folder in which it will be saved.
4) Click the **Save** button.

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 on OLE object from an existing file, select the **Create from file** option. The Insert OLE Object dialog changes to that shown in Figure 431.

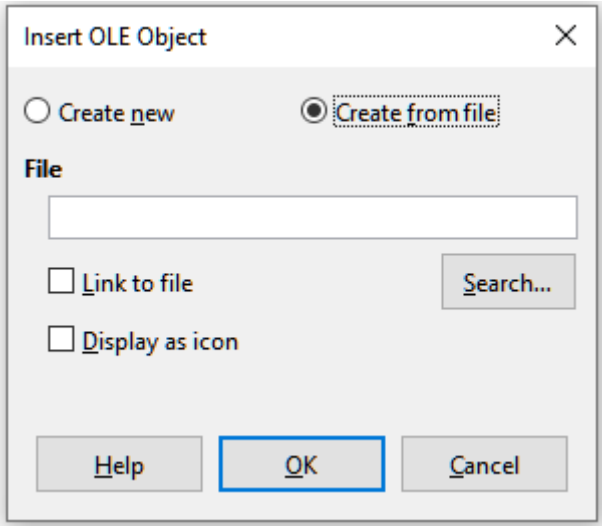


*Figure 431: Insert OLE Object dialog with **Create from file** option selected*

2) Click **Search**, select the required file in the file browser, and then click **Open**.

Note

This facility is not limited to LibreOffice files; you can create OLE objects using existing files from many other applications.

3) To insert the object as a link to the original file, select the **Link to file** option. Otherwise, the object will be embedded in your document.

4) If you want the object to appear as a selectable icon, rather than a section of your file, select the **Display as icon** option.

5) Click **OK**. A section of the inserted file is shown in the document. If your source spreadsheet has multiple sheets, it's possible to navigate between them in the edit mode.

Other OLE objects

Under Windows, when you select the **Create new** option on the Insert OLE Object dialog, there is an extra entry *Further objects* in the *Object Type* list.

1) Double-click on the entry *Further objects* to open the Insert Object dialog (Figure 432).

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 an existing file.

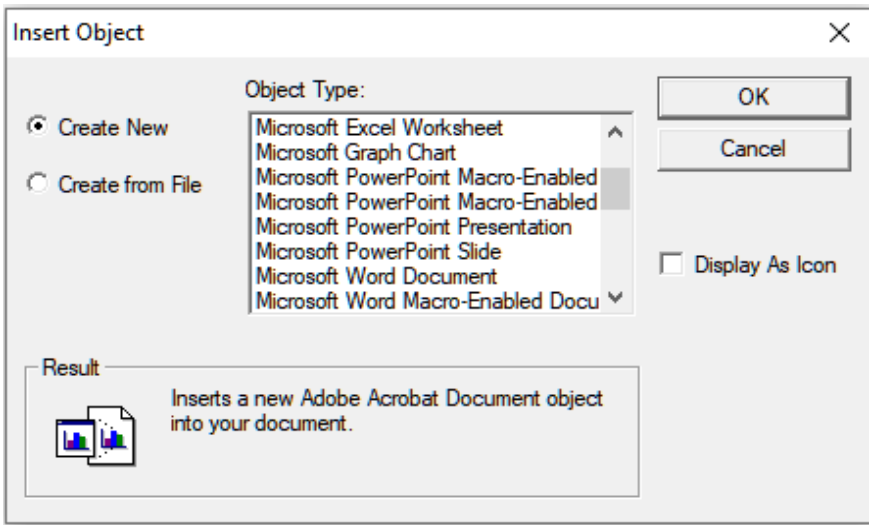


Figure 432: Inserting an OLE object under Windows

3) If you choose **Create from File**, the layout of the Insert Object dialog changes to that shown in Figure 433. 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.

4) Click **OK**.

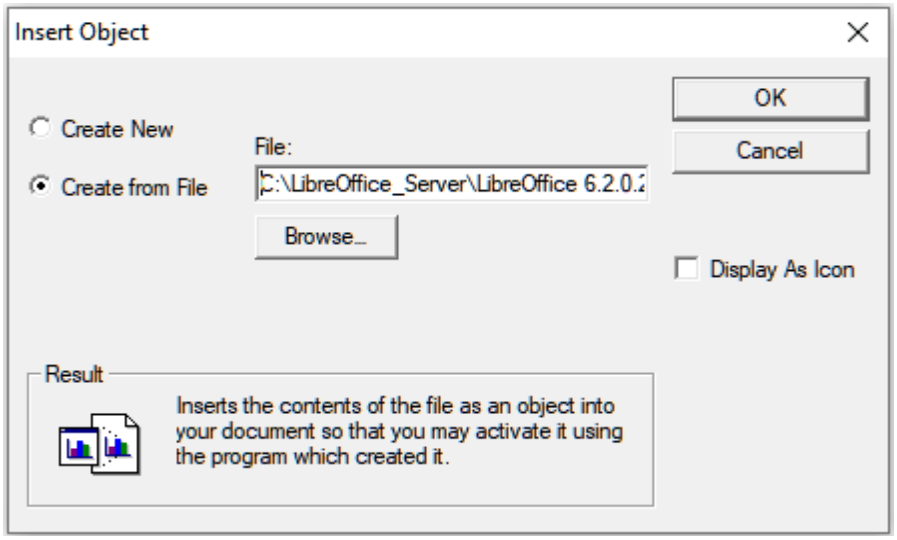


Figure 433: Insert OLE object from a file under Windows

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

If the spreadsheet OLE object is linked and 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. Carry out the following steps to create a DDE link from one Calc spreadsheet to another:

1) In Calc, open the spreadsheet that contains the original data that you want to link to.
2) Select the cells that you want to make the DDE link to.
3) Copy the cells to the clipboard by selecting **Edit > Copy** on the Menu bar, or clicking the **Copy** icon on the Standard toolbar, or right-clicking the selected area and selecting **Copy** in the context menu, or pressing *Ctrl*+*C*.
4) Open the second spreadsheet that will contain the linked data.
5) Click in the top left cell of the area in the second spreadsheet where you want the linked data to appear.
6) On the second spreadsheet, select **Edit > Paste Special > Paste Special** on the Menu bar, or right-click the top left cell of the area and select **Paste Special** > **Paste Special** in the context menu, or press *Ctrl+Shift+V*.
7) Calc displays the Paste Special dialog (Figure 434).
8) Select the **As Link** option on the Paste Special dialog (highlighted with a red box on Figure 434) and then click **OK**.
9) If you now click on one of the linked cells you will see that the Formula bar shows a reference beginning with the characters {='. See Figure 435 for an example, highlighted with a red box.
10) Save and close both spreadsheets.

If you subsequently edit the original cells in their spreadsheet and save the changes, next time you open the spreadsheet containing the linked cells, the values in those linked cells will update to reflect the latest values of the original cells.

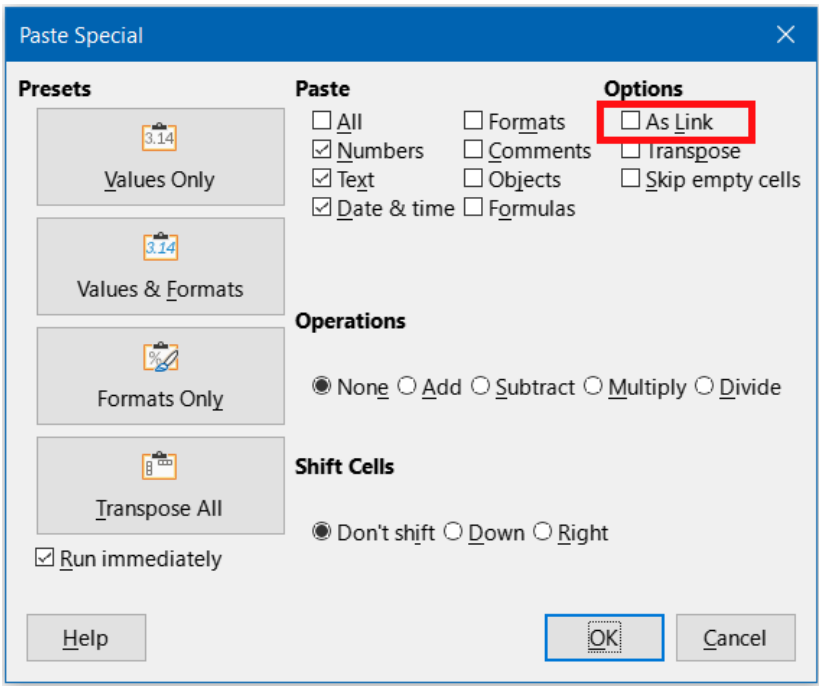


Figure 434: Paste Special dialog

A2 {='file:///C:/Sales-List.ods'#$'Sales List'.A1:E157}

	A	B	C	D	E
1	Date	Sales Value	Category	Region	Employee
2	39551	498	Sailing	North	Kurt
3	39485	1383	Sailing	South	Kurt
4	39596	4655	Tennis	East	Hans
5	39558	3993	Sailing	East	Fritz
6	39506	3377	Golf	South	Ute
7	39474	2095	Sailing	North	Brigitte
8	39494	4731	Sailing	East	Ute
9	39553	4330	Tennis	South	Kurt
10	39558	3664	Golf	South	Kurt
11	39606	769	Tennis	West	Brigitte

Figure 435: Example of DDE link to another Calc spreadsheet

Note

When you open a spreadsheet containing linked data, you may get a warning message indicating that automatic update of external links has been disabled. You will need to click the associated button to allow updating of the linked cells. You can avoid this message and interaction by making sure that the spreadsheet containing the original data is in a trusted file location and that the option is selected to always update links from trusted locations when opening. Check these settings via **Tools > Options > LibreOffice > Security > Macro Security** (*Trusted Sources* tab) and **Tools > Options > LibreOffice Calc > General** (*Update links when opening* section) respectively.

DDE link in Writer

The process for creating a DDE link from Calc to Writer is similar to creating a link within Calc. You can check more details of this feature in Chapter 19, Spreadsheets, Charts, Other Objects of the *Writer Guide*.

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 > Paste Special**.
3) Writer displays its Paste Special dialog (Figure 436).
4) Select the **Dynamic Data Exchange (DDE link)** option in the *Selection* list.
5) Click **OK**.
6) Now the link has been created in Writer. When the Calc spreadsheet is updated, the table in Writer is automatically updated.

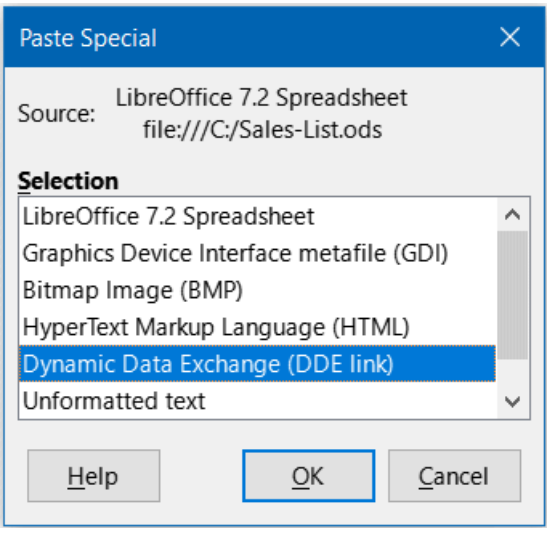


Figure 436: Paste Special dialog in Writer, with DDE link selected

XML Source

The XML Source feature allows a user to import data from arbitrarily structured XML content into cells in an existing spreadsheet document. It allows XML content to be imported either partially or in full, depending on the structure of the XML content and the map definitions that the user defines. The user can specify multiple non-overlapping sub-structures to be mapped to different cell positions within the same document, and can select to import either element contents, attribute values, or both.

Note:

The XML Source feature currently allows you to import XML data as a one-time event; it will not store the information about the data source once the data is imported.

Suppose that you have sales data in an XML file, such as the following:

```
<sales>
  <sale>
    <date>01/19/08</date>
    <value>$2,032</value>
    <category>Golf</category>
```

```
    <region>West</region>
    <employee>Brigitte</employee>
  </sale>
  <sale>
    <date>01/25/08</date>
    <value>$3,116</value>
    <category>Sailing</category>
    <region>East</region>
    <employee>Hans</employee>
  </sale>
  <sale>
    <date>01/26/08</date>
    <value>$2,811</value>
    <category>Tennis</category>
    <region>South</region>
    <employee>Fritz</employee>
  </sale>
 </sales>
```

To import this data into your Calc spreadsheet, take the following steps:

1) Select **Data > XML Source**. Calc displays the XML Source dialog (Figure 437).

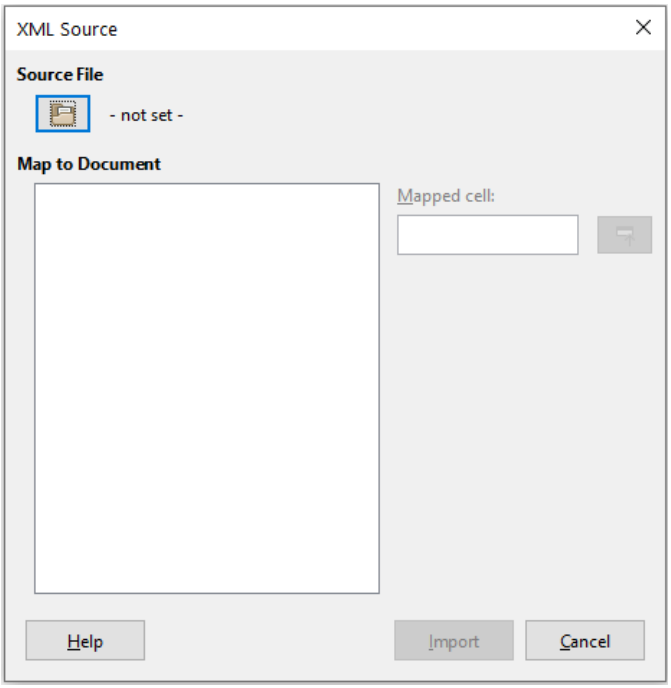


Figure 437: XML Source dialog (on initial display)

2) Click the icon in the *Source File* area at the top of the dialog. Calc displays the Open dialog, which lets you specify the path to the XML file that you wish to import into your document.
3) Navigate to the correct folder, select the required file, and click the **Open** button.
4) Calc reads the content of the specified file and then populates the *Map to Document* area on the XML Source dialog to show the structure of the XML, as can be seen in Figure 438. The *Map to Document* area is described further below.
5) In the case of our example data, select sale in the *Map to Document* area. This will import all <`sale`> entries within the XML content into the spreadsheet.

6) Click on the cell at the top left of the area where the data is to appear in your spreadsheet. In the case of our example, click cell A1. A tellback of the cell clicked appears in the *Mapped cell* text box.

7) The contents of the XML Source dialog should now look like that shown in Figure 438.

8) Click the **Import** button. This action starts the import process based on the link definitions that the user has provided. Once the import finishes, the dialog will close.

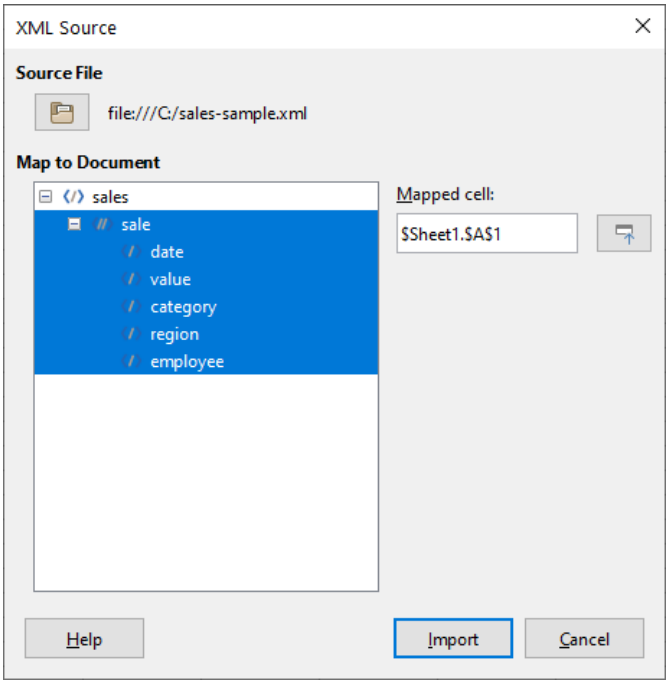


Figure 438: XML Source dialog (populated)

Calc will place the XML content into the specified position in the spreadsheet, as shown in Figure 439.

J22

	A	B	C	D	E
1	date	value	category	region	employee
2	01/19/08	$2,032.00	Golf	West	Brigitte
3	01/25/08	$3,116.00	Sailing	East	Hans
4	01/26/08	$2,811.00	Tennis	South	Fritz

Figure 439: Imported XML content

The *Map to Document* area of the XML Source dialog shows the structure of the source XML content as a tree. It is initially empty and gets populated when you specify the source file.

Each element in the tree can be one of three types:

- Attribute, represented by the symbol @.
- Single non-recurring element, represented by the symbol </>. A non-recurring element is an element that can only occur once under the same parent. It is mapped to a single cell in the document.
- Recurring element, represented by the symbol <//>. A recurring element is an element that can appear multiple times under the same parent. It serves as an enclosing parent of a single record entry of multiple record entries. These entries are imported into a range whose height equals the number of entries plus one additional header row.

The *Mapped cell* field specifies the position of a cell in the document that an element or an attribute is linked to. If it is a non-recurring element or an attribute, it simply points to the cell where the value of the linked element/attribute will get imported. If it is a recurring element, it points to the top-left cell of the range where the whole record entries plus header will get imported.



Calc Guide 7.5

Chapter 12
Sharing and Reviewing Spreadsheets

Introduction

This chapter covers methods for collaboration through sharing and reviewing spreadsheets: simultaneous editing, recording changes, adding comments, reviewing changes, merging and comparing documents, saving, and using document versions.

Some menu commands are not available (grayed out) when sharing or change tracking are active.

Sharing spreadsheets

Sharing a spreadsheet allows several users to open the same file for editing at the same time. The spreadsheet needs to be on a shared drive, server, website, or similar. Some conditions must be met on operating systems with user permission management:

- The shared file needs to reside in a location which is accessible by all collaborators.
- The file permissions for both the document and the corresponding lock file need to be set so that all collaborators can create, delete, and change the files.

Consult your operating system's documentation for details on setting file permissions. See also "Opening and saving files on remote servers" in Chapter 1, Introducing LibreOffice, in the *Getting Started Guide*.

Tip

In order to correctly identify the changes, each collaborator should enter their name in **Tools > Options > LibreOffice > User Data** on the Menu bar.

Setting up a spreadsheet for sharing

With the spreadsheet open, choose **Tools > Share Spreadsheet** on the Menu bar to enable or disable sharing.

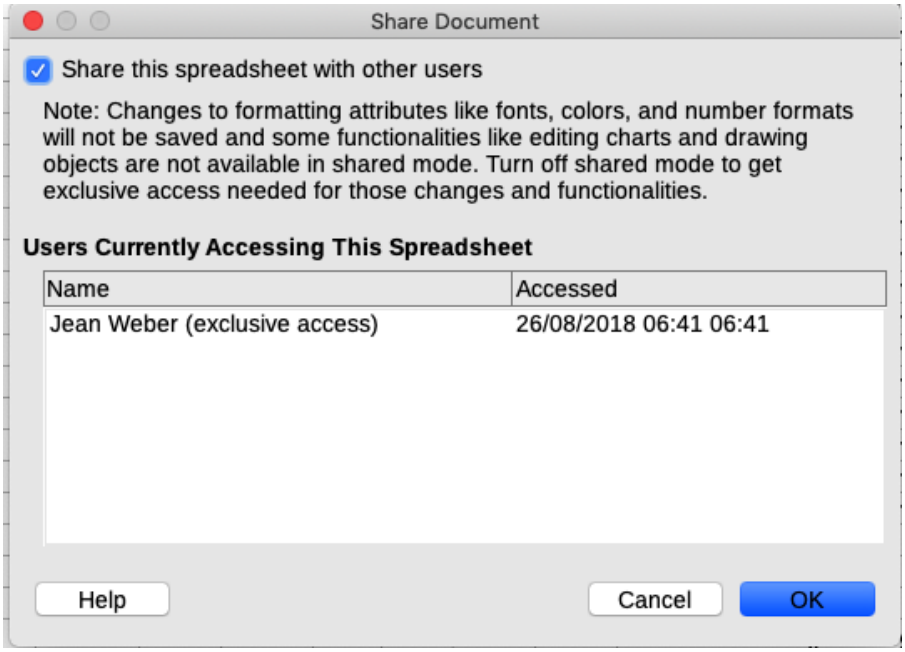


Figure 440: Share Document dialog

To enable sharing, select the checkbox at the top of the dialog (Figure 440) and click **OK**. If the spreadsheet has been saved previously, a message appears stating that you must save it to activate shared mode; click **Yes** to continue. If the spreadsheet has not been saved previously, the Save dialog opens. After saving, the text "(shared)" is shown on the Title bar, after the title.

Tools > Share Spreadsheet on the Menu bar can also be used to switch a spreadsheet from shared to unshared. However, this means that other users can no longer edit it. Instead, you may wish to save a copy of the shared spreadsheet using another name or path, thus creating a copy of the shared spreadsheet, and then switch the copy to unshared.

Opening a shared spreadsheet

When you open a shared spreadsheet, a message appears stating that some features are not available in this mode. After reading it, click **OK** to remove the message and open the document. You can select the option to not show the warning again.

The following features are disabled in a shared spreadsheet:

Edit > Track Changes, except for **Merge Document**

Insert > Media > Audio or Video
Insert > Comment
Insert > Object
Insert > Chart
Insert > Named Range or Expression
Insert > Pivot Table
Insert > Floating Frame
Insert > Fontwork
Insert > Signature Line

Format > Merge Cells
Format > Print Ranges

Sheet > Move or Copy Sheet
Sheet > Delete Sheet
Sheet > Insert Sheet from File
Sheet > Named Ranges and Expressions
Sheet > Rename Sheet
Sheet > Sheet Tab Color

Data > Define Range
Data > Sort
Data > Sort Ascending
Data > Sort Descending
Data > Subtotals
Data > Validity
Data > Multiple Operations
Data > Consolidate
Data > Group and Outline
Data > Pivot Table

Tools > Protect Sheet
Tools > Protect Spreadsheet Structure

Saving a shared spreadsheet

When you save a shared spreadsheet, and if it has not been modified and saved by another user since you opened it, it is saved as usual.

If the spreadsheet has been modified and saved by another user since you opened it, one of the following will occur:

- If the changes do not conflict, the document is saved, the message “Your spreadsheet has been updated with changes saved by other users” appears, and any cells modified by the other user are shown with a red border.

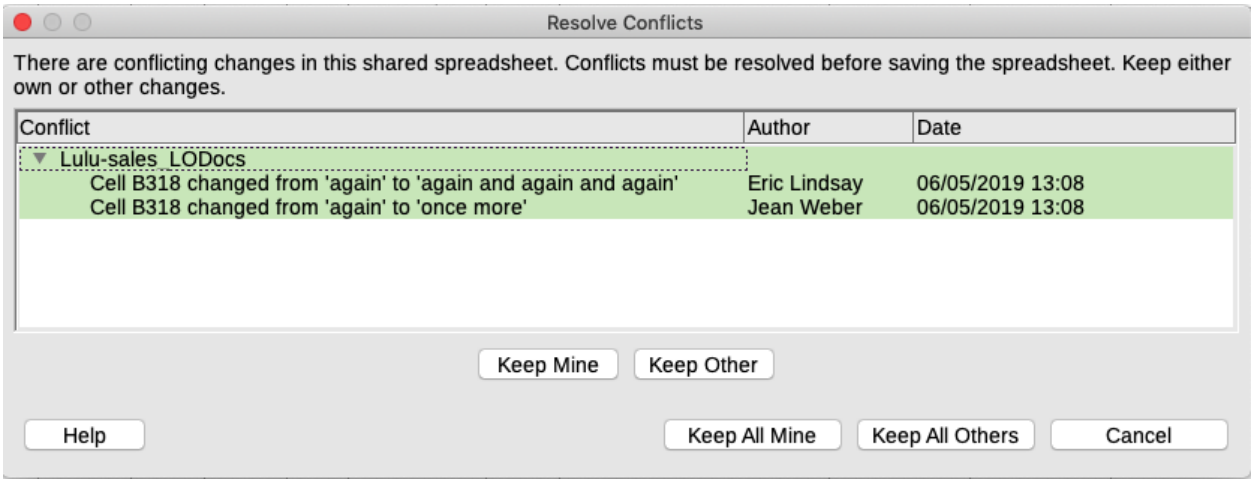


Figure 441: Resolve Conflicts dialog

- If the changes conflict, the Resolve Conflicts dialog (Figure 441) 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.
- If another user is trying to save the shared spreadsheet and resolve conflicts, they see a message that the file is locked due to a merge in progress. They can cancel the Save command and retry saving later.

When you successfully save a shared spreadsheet, the document shows the latest version of all changes saved by all users.

Reviewing documents

You can use several methods to review, edit, and comment on a spreadsheet. Each reviewer works on a separate copy of the document.

- You can use change marks to show added and deleted material. Later, you or another person can review the document and accept or reject each change.
- 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 “Comparing documents” below.
- You can save versions that are stored as part of the original file. See “Saving versions” below.

Reviewers can leave comments in the document, either attached to specific changes or standalone.

Preparing a document for review (optional)

Before you send a spreadsheet to someone else to review or edit, you may want to set it up so that the editor or reviewer does not have to remember to turn on the revision marks.

After you have turned on revision marks, you can optionally password protect the spreadsheet so that any user must enter the correct password in order to accept or reject changes.

1) Open the spreadsheet and select **Edit > Track Changes > Record** on the Menu bar. You can also use **File > Properties > Security** and select **Record changes**.
2) If you want to protect the spreadsheet, click **Edit > Track Changes > Protect** on the Menu bar. On the Protect Records dialog, type a password (twice) and click **OK**. You can also use **File > Properties > Security** and click the **Protect** button to open the similar Enter Password dialog. Guidelines for choosing a suitable password are in the Help.

Recording changes

To record changes, open the spreadsheet and make sure that the **Edit > Track Changes > Record** menu item has a check mark next to it, indicating that change recording is active.

Caution

After making some changes, do **not** turn off change recording. Turning off change recording in Calc causes all the recorded changes to be accepted and no longer shown as changes. A message box will warn if you try to do this.

When changes are made in a cell, a colored border with a dot in the upper left-hand corner appears around the cell (Figure 442). A deleted column or row is marked by a heavy colored bar.

	A	B	C	D	E	
1			*Baseball Budget Proposal*			
2	**Item Description**	**Quantity**	**Cost/Item**	**Total**		**Comments**
3	Uniforms	10	$50.00	$500.00		Need to update the tea
4	Baseballs	250	$2.00	$500.00		We need 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 variou
7	Snacks	0	$15.00	$0.00		Max cost per game for
8	Batting helmets	5	$40.00	$200.00		We need a minimum o
9	Catching gear	1	$300.00	$300.00		Need to protect catche
10	Spare gloves	2	$45.00	$90.00		Just in case someone
11				**$3,015.00**		**Total**
12						

Figure 442: Edited document with red border on changed cells

To see the changed information, hover the mouse pointer over the changed cell. See Figure 443.

1		Ba	Jean Weber, 26/05/2019 08:50:29: Cell B3 changed from '25' to '10'		
2	**Item Description**	**Quantity**	**Cos**		
3	Uniforms	10	$50.00	$500.00	Need to updat
4	Baseballs	250	$2.00	$500.00	We need 10 p
5	Umpire fees	25	$50.00	$1,250.00	1 umpire per g

Figure 443: Showing details of the change

Note

Some changes, for example cell formatting, are not recorded and marked.

Tip

To change the color that indicates a changed cell, select **Tools > Options > LibreOffice Calc > Changes** on the Menu bar.

You may want to explain your rationale for the changes. You can do this 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 or provide any other helpful insights.

To add a comment to a change:

1) Make the change to the spreadsheet.
2) Select the cell with the change.
3) Choose **Edit > Track Changes > Comment** on the Menu bar. A small dialog opens. Type your comment and click **OK**. See Figure 444.

Note

Do **not** use **Insert > Comment** on the Menu bar or the context menu for this purpose. Comments inserted using that method are handled differently (see "Adding other (general) comments" below) and do not appear in the Manage Changes dialog.

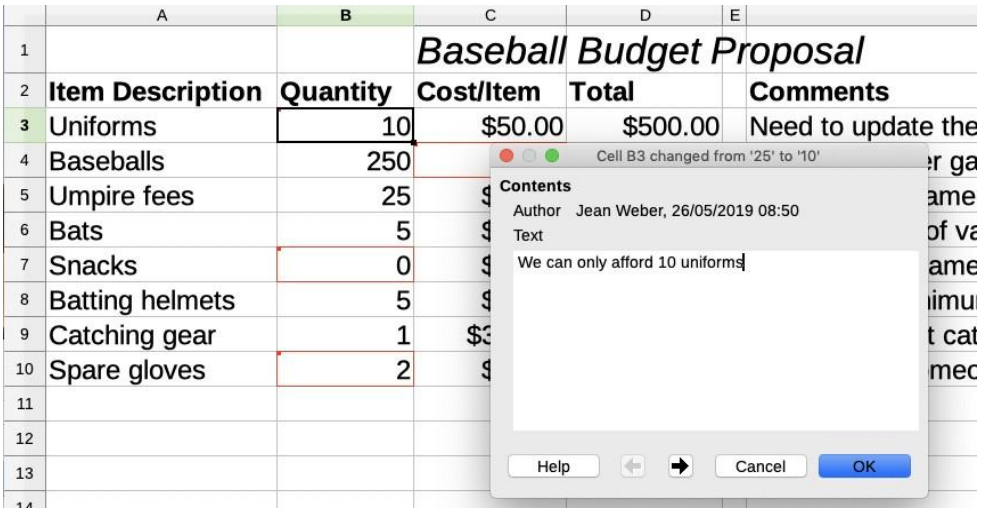


Figure 444: Entering a comment associated with a change

After you have added a comment to a changed cell, you can see the change and the comment by hovering the mouse pointer over the cell, as shown in Figure 445.

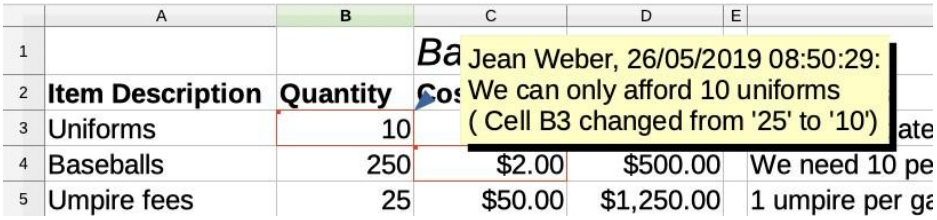


Figure 445: Comment added to cell B3

The comment also appears on the Manage Changes dialog when you are accepting and rejecting changes, as shown in the first line of Figure 449 on page 480.

Editing comments on changes

1) Select the cell with the change comment that you want to edit.
2) Choose **Edit > Track Changes > Comment** on the Menu bar. The box shown in Figure 444 opens.
3) Edit the comment and click **OK**.

The automatically-added comment provided by Calc cannot be edited.

You can move through the comments by using the arrows at the bottom of the dialog.

Adding other (general) comments

Calc provides another type of comment, which authors and reviewers often use to exchange ideas or ask for suggestions.

To add a general comment:

1) Select the cell that the comment applies to.
2) Select **Insert > Comment** on the Menu bar, or right-click and select **Insert Comment** in the context menu, or press *Ctrl*+*Alt*+*C*. The box shown in Figure 446 appears.

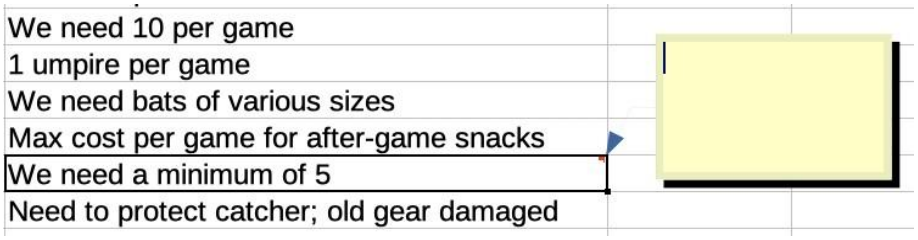


Figure 446: Inserting a comment

3) Type your comment in the box, then click outside the box to close it.

Now the cell to which you added the comment has a colored dot in the upper right-hand corner, as shown in Figure 447. It does not have a colored border, unless the cell was also changed.

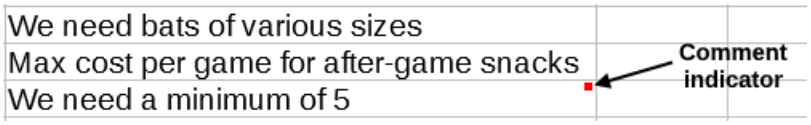


Figure 447: Colored dot in cell containing a comment

Tip

You can change the colors Calc uses for comments by selecting **Tools > Options > LibreOffice > Application Colors** and adjusting the color for *Notes background* in the *Spreadsheet* section.

To view the comment you just added, hover the mouse pointer over the cell that has a comment. The comment appears, as shown below.

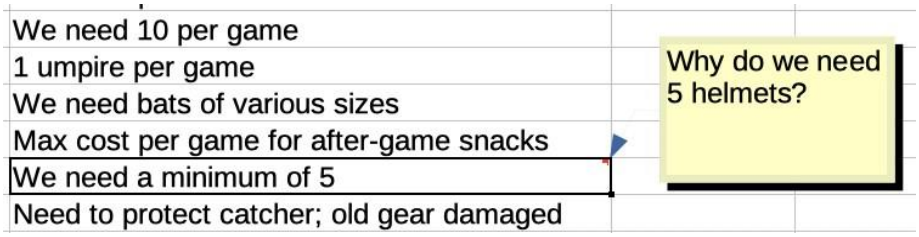


Figure 448: Viewing a comment

Note

If you hover the mouse pointer over a cell that has both a change comment and a general comment, both comments are shown in the displayed tip.

Editing general comments

You can edit and format the text of a general comment, just as you do for any other text.

1) Right-click on the cell containing the comment marker and choose **Edit comment** in the context menu, or left-click on the cell and press *Ctrl*+*Alt*+*C*.
2) Calc shows the cell's comment. The pointer changes to the usual text-entry pointer, and the Formatting toolbar changes to show text attributes.
3) When editing is done, click outside the comment to deselect it.

Formatting general 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** in 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 6, Using Images and Graphics, for more information.

   You can also right-click on the comment to see a menu of choices, some of which lead to dialogs where you can fine-tune the formatting; these dialogs are also discussed in Chapter 6.
3) When done, click outside the comment to deselect it. To hide the comment again, right-click on the cell and choose **Hide Comment** in the context menu.

Finding general comments

The small comment markers in the corners of cells can be difficult to see, so Calc provides two other ways to find them: by showing all comments and by using the Navigator. To show all general comments, choose **View > Comments** on the Menu bar. To hide all comments, choose **View > Comments** again.

If any general comments are in the spreadsheet, the Navigator shows a symbol (usually a + or an arrow) next to the word *Comments*. Click on this symbol to display a list of comments. Double-click on a comment in the list to jump directly to the cell it is associated with.

Note

View > Comments and the Navigator show general comments but not the comments associated with tracked changes.

Accepting or rejecting changes

When you receive a document with changes, you can step through each change and decide how to proceed. To begin this process:

1) Open the edited document.
2) Select **Edit > Track Changes > Manage** on the Menu bar. The Manage Changes dialog shown in Figure 449 appears.
3) You can step through the changes one at a time, choosing to accept or reject each change as you go through. You can also accept or reject all changes at one time.

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.

If a change has been superseded by a later change (by either the same person or another person), the changes are hierarchically arranged with an expansion symbol for opening up the hierarchy.

Below the list of changes to be accepted or rejected are shown any changes that have previously been dealt with.

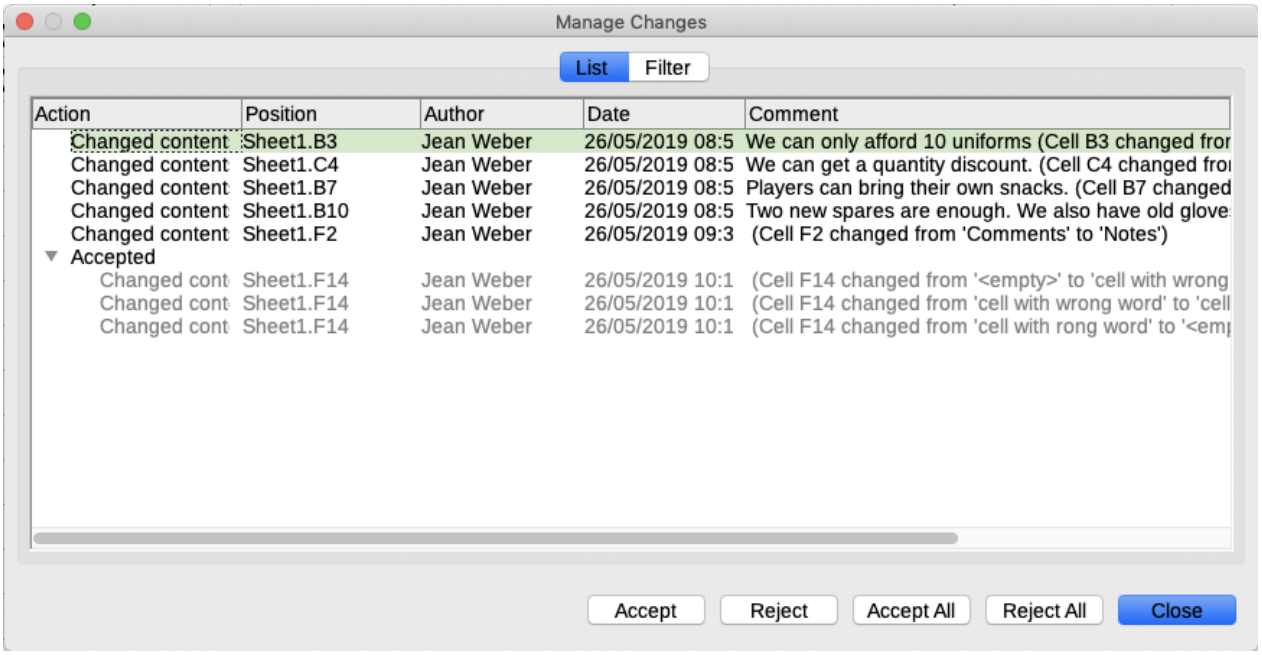


Figure 449: Manage Changes dialog – List tab

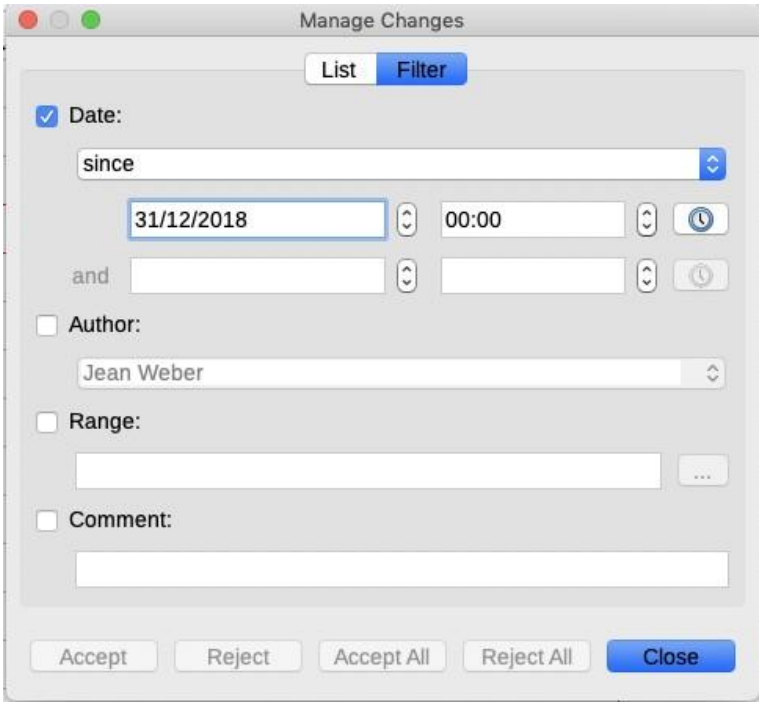


Figure 450: Manage Changes dialog – Filter tab

On the *Filter* tab of the Manage Changes dialog (Figure 450), 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. Filtering the changes affects only the contents of the *List* tab on the dialog, you will not see any filtered results in your spreadsheet.

Merging documents

The processes discussed to this point are effective when you have one reviewer at a time. Sometimes, however, multiple reviewers all return edited copies of a spreadsheet. In this case, it may be faster to review all of the 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 (but not the original document) need to have recorded changes in them.

1) Open the original document into which you want to merge all the copies.
2) Select **Edit > Track Changes > Merge Document** on the Menu bar.
3) A file selection dialog opens. Select a file you want to merge and click **Open**.
4) After the documents merge, the Manage Changes dialog opens, 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 cells outlined in different colors.

Comparing documents

Sometimes reviewers may not record the changes they make. Calc can find the changes by comparing documents.

To compare documents, you need to have the original document and the one that is edited.

1) Open the edited document that you want to compare with the original document.
2) Select **Edit > Track Changes > Compare Document**.
3) A file selection dialog opens. Select the original document and click **Open**.
4) Calc opens the Manage Changes dialog showing the changes identified.

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 in the original document that 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 described earlier.

Saving versions

For auditing and other purposes, you may need to save new versions of a spreadsheet. You can do this by saving a copy of the spreadsheet (under a different name) after each revision, or by using Calc's version feature.

Caution

If you select **File > Save As** on the Menu bar, or press *Ctrl*+*Shift*+*S*, for 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** on the Menu bar. A version management dialog (Figure 451) opens, showing a list of the existing versions saved in this file.

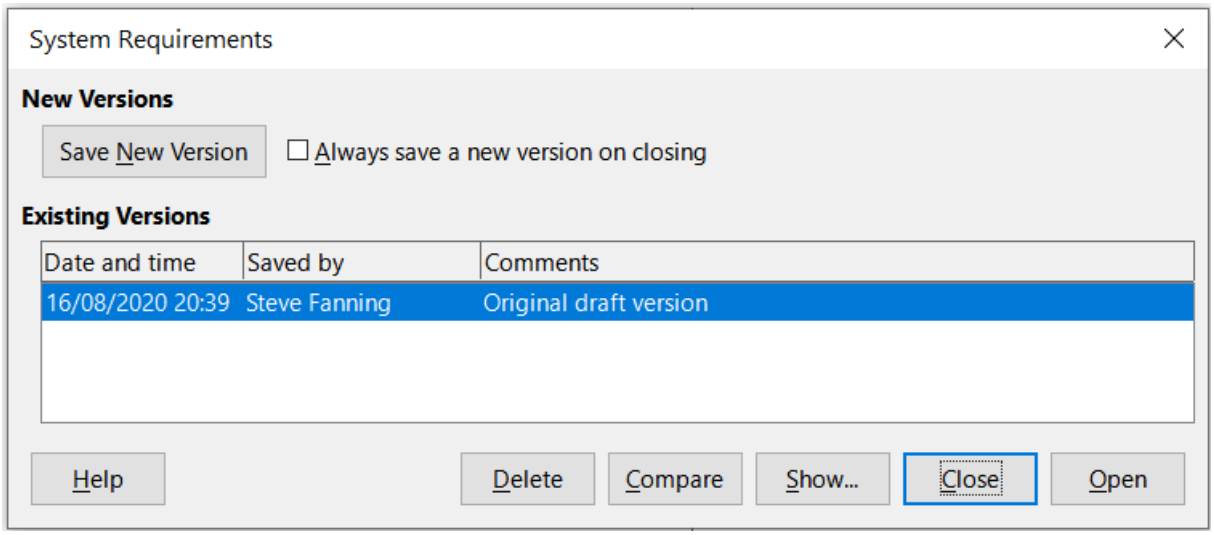


Figure 451: Version management dialog

2) Click the **Save New Version** button to save a new version. The Insert Version Comment dialog (Figure 452) opens where you can enter comments about this version.

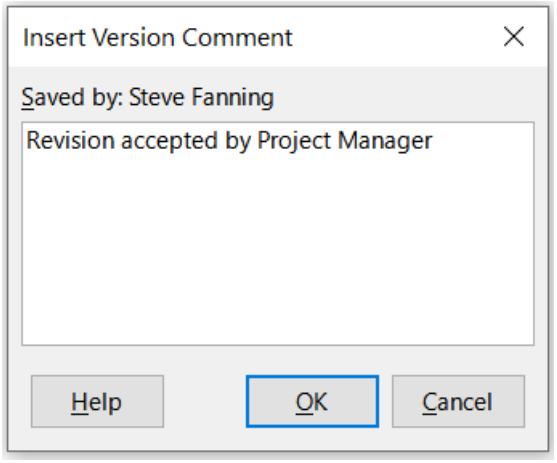


Figure 452: Insert Version Comment dialog

3) After you enter your comment and click **OK**, the new version is included in the *Existing Versions* list (Figure 453).

4) Save the file. Both versions are now included in the same file.

From this point you can:

- View an old version – Select the version and click **Open**. A read-only copy of a previous version opens.
- Compare all versions – Clicking **Compare** performs an action similar to merging documents. A Manage Changes dialog opens, showing all of the changes through the different versions.
- Review the version comments – Select a version and click **Show** to display the full comments made by yourself or other reviewers.
- Delete a version – Select a version and click **Delete**. Be careful with this option, when deleting a version, there is no request for confirmation.

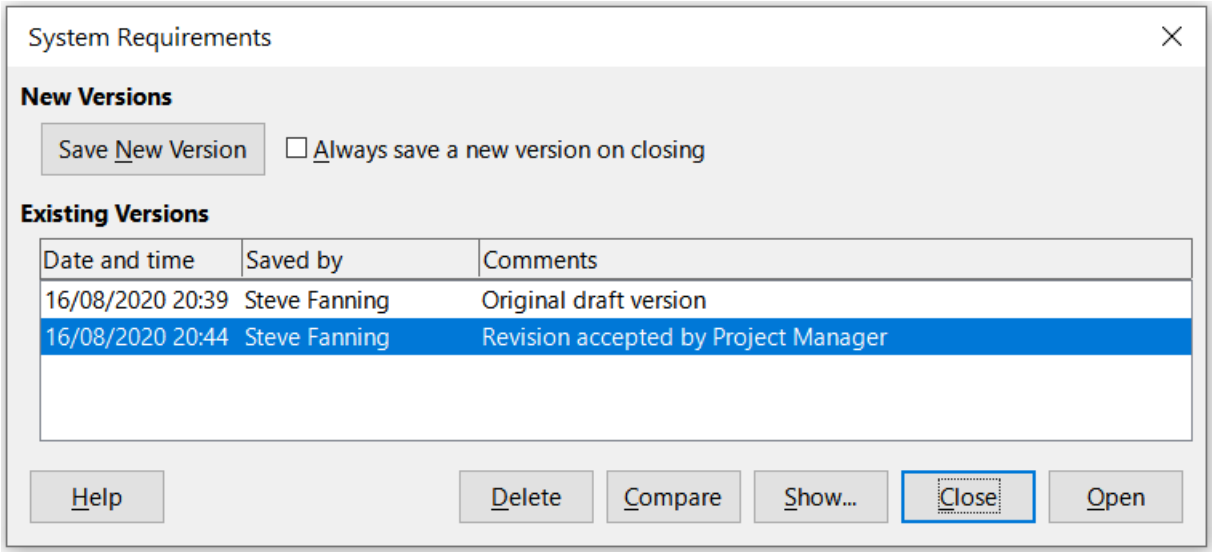


Figure 453: Updated version list



Calc Guide 7.5

Chapter 13 Macros

Automating repetitive tasks

Introduction

Chapter 13 of the *Getting Started Guide* (entitled *Getting Started with Macros*) is an introduction to the macro facilities that are available in LibreOffice. The current chapter provides further introductory information about the use of macros within a Calc spreadsheet.

A macro is a set of commands or keystrokes that are stored for later use. An example of a simple macro is one that enters your address into the current cell of an open spreadsheet. You can use macros to automate both simple and complex tasks, and they enable you to introduce new features that are not built into Calc.

The simplest way to create a macro is to record a series of actions through Calc's user interface. Calc saves recorded macros using the open-source LibreOffice Basic scripting language, which is a dialect of the well-known BASIC programming language. Such macros can be edited and enhanced after recording using the built-in LibreOffice Basic Integrated Development Environment (IDE).

The most powerful macros in Calc are created by writing code using one of the four supported scripting languages (LibreOffice Basic, Python, JavaScript, and BeanShell). This chapter provides an overview of Calc's macro facilities, mostly focused on its default macro scripting language, LibreOffice Basic. Some examples are included for the Python, JavaScript, and BeanShell scripting languages but fuller descriptions of the facilities for these languages are beyond the scope of this document.

On Visual Basic for Applications (VBA) compatibility

The LibreOffice Basic programming language and the VBA programming language – found in many Microsoft Office documents including Excel spreadsheets – are dialects of the BASIC language. 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.

Some tips for converting Excel macros written in VBA are detailed at the end of this chapter.

Using the macro recorder

Chapter 13, *Getting Started With Macros*, of the *Getting Started Guide* includes examples showing how to use the macro recorder and understand the generated LibreOffice Basic scripts. The following steps give a further example, specific to a Calc spreadsheet, without the more detailed explanations of the *Getting Started Guide*. A macro is created and saved which performs a paste special with multiply operation across a range of spreadsheet cells.

Note

Use **Tools > Options > LibreOffice > Advanced** on the Menu bar and select the **Enable macro recording (may be limited)** option to enable the macro recorder.

1) Use **File > New > Spreadsheet** on the Menu bar to create a new spreadsheet.
2) Enter the numbers shown in Figure 454 into cells A1:C3 of *Sheet1* in the new spreadsheet.

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

Figure 454: Enter numbers into cells A1:C3

3) Select cell A3, which contains the number 3, and use **Edit > Copy** on the Menu bar to copy the value to the clipboard.

4) Select all cells in the range A1:C3.

5) Use **Tools > Macros > Record Macro** on the Menu bar to start the macro recorder. Calc displays the Record Macro dialog, which includes a **Stop Recording** button (Figure 455).

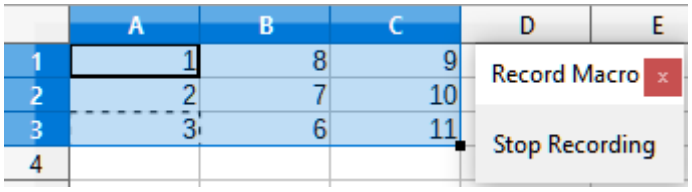


Figure 455: Record Macro dialog with Stop Recording button

6) Use **Edit > Paste Special > Paste Special** on the Menu bar to open the Paste Special dialog (Figure 456).

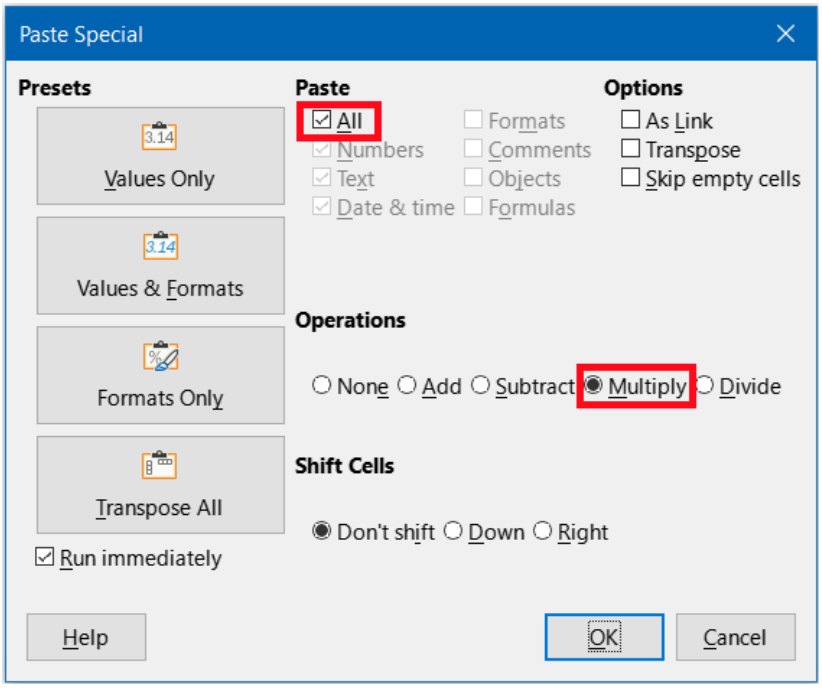


Figure 456: Paste Special dialog

7) Select the **All** option in the *Paste* area and **Multiply** in the *Operations* area (both options are highlighted with a red box in Figure 456), and click **OK**. The values in cells A1:C3 are now multiplied by 3 (Figure 457).

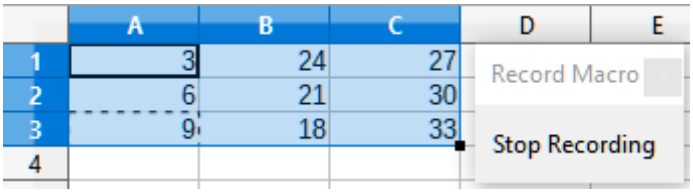
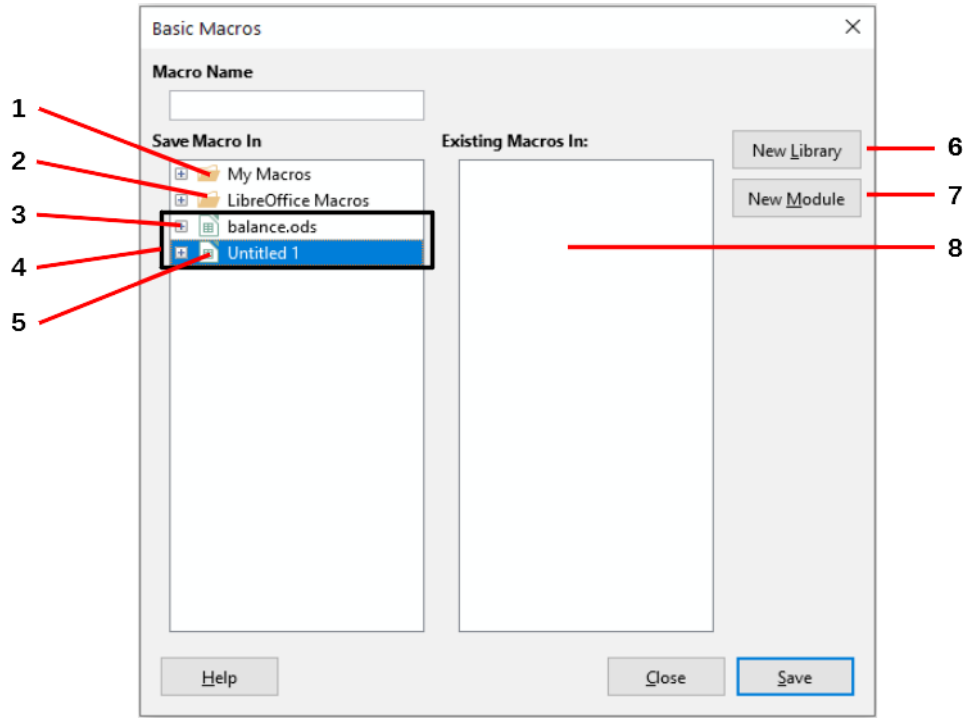


Figure 457: Cells A1:C3 multiplied by 3

8) Click the **Stop Recording** button to stop the macro recorder. Calc displays a variant of the Basic Macros dialog (Figure 458).

Note

The *Save Macro In* area of the Basic Macros dialog shows the existing LibreOffice Basic macros, hierarchically structured into library containers, libraries, modules, and macros as described in Chapter 13 of the *Getting Started Guide*. Figure 458 shows the *My Macros* library container, the *LibreOffice Macros* library container, the library container for the open balance.ods file, and the library container for the untitled file created at step 1). Use the expand/collapse icons to the left of each library container name to view the libraries, modules, and macros within that container.



1	*My Macros*	**5**	Current document
2	*LibreOffice Macros*	**6**	Create new library
3	Expand/collapse icon	**7**	Create new module in library
4	Open documents	**8**	Macros in selected module

Figure 458: Parts of the Basic Macros dialog

9) Select the entry for the current document in the *Save Macro In* area. As the current document in this example has not been saved, it is referred to by its default name *Untitled 1*.

10) Documents that have been saved include a macro library named *Standard*. This library is not created until the document is saved or the library is needed, so at this point in the example procedure your new document does not contain a library. You can create a new library to contain the macro you have just created, but this is not necessary.

11) Click the **New Module** button. Calc displays the New Module dialog (Figure 459). Type a name for the new module or leave the name as the default *Module1*.

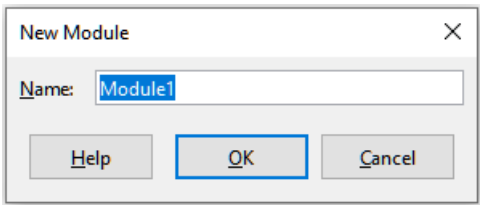


Figure 459: New Module dialog

Note

The libraries, modules, and macro names must follow some strict rules. Following the main rules, the names must:

- Comprise lower case letters (a..z), upper case letters (A..Z), digits (0..9), and underscore characters (_)
- Begin with a letter or an underscore
- Not contain any other spaces, punctuation symbols, or special characters (including accents)

12) Click the **OK** button to create a new module. As no macro libraries exist in our current document, Calc automatically creates and uses a *Standard* library.

13) On the Basic Macros dialog, select the entry for the newly created module in the *Save Macro In* area, type the text `PasteMultiply` in the *Macro Name* box, and click the **Save** button (Figure 460).

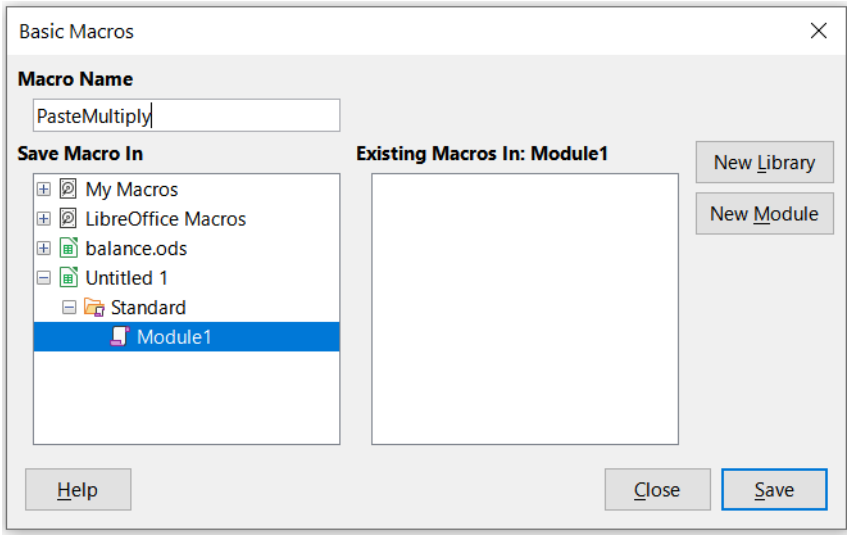


Figure 460: Select the module and name the macro

The macro is saved with the name *PasteMultiply* in the newly created module within the *Standard* library of the *Untitled 1* document. Listing 1 shows the contents of the macro.

Listing 1. Paste special with multiply macro

```
Sub PasteMultiply
  '
  ' define variables
  dim document   as object
  dim dispatcher as object
  '
  ' get access to the document
  document   = ThisComponent.CurrentController.Frame
  dispatcher = createUnoService("com.sun.star.frame.DispatchHelper")

  '
  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
```

Note

The component model used in LibreOffice is Universal Network Objects (UNO) and the macro recorder uses the UNO dispatcher for most commands. However, there are two problems associated with this technical approach. One is that the dispatches are not fully documented and may be subject to change. Another is that the recorder ignores some values from dialogs that are opened while recording a macro – it is possible, therefore, that you will record a complicated macro that will not actually execute everything as expected. For more information, search for “macro recording – limitations” in the Help index.

Write your own functions

Create a function macro

You can write a macro and then call it as you would call a Calc function. Use the following steps to create a simple function macro:

1) Use **File > New > Spreadsheet** on the Menu bar to create a new spreadsheet, save it with the name CalcTestMacros.ods, and leave it open in Calc.

2) Use **Tools > Macros > Organize Macros > Basic** on the Menu bar to open the Basic Macros dialog (Figure 461). Note that the layout of the Basic Macros dialog in this circumstance is different from the version that Calc displays when the user clicks the **Stop Recording** button on the Record Macro dialog (Figure 458).

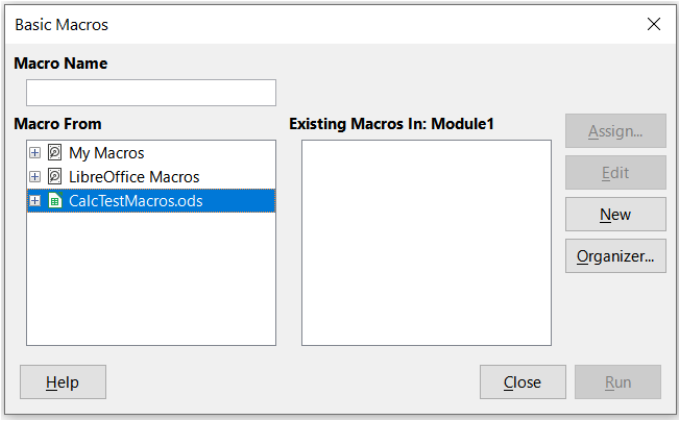


Figure 461: Basic Macros dialog

3) The *Macro From* area lists the available macro library containers, including those relating to any LibreOffice documents that are currently open. *My Macros* contains macros that you write or add to LibreOffice and are available to more than one document. *LibreOffice Macros* contains macros that were included with your LibreOffice installation and should not be changed.

4) Click **Organizer** to open the Basic Macro Organizer dialog (Figure 462).

   Click on the *Libraries* tab and, in the *Location* area, select the entry for the name of the current document. The *Library* area updates to show the name of the empty *Standard* library.

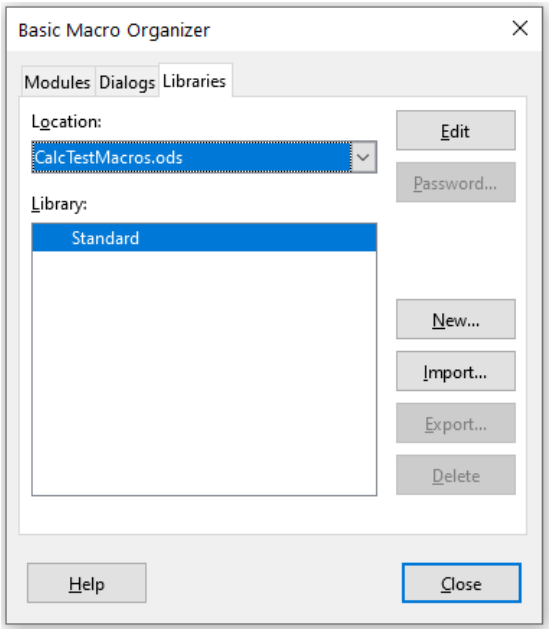


Figure 462: Basic Macro Organizer

5) Click **New** to open the New Library dialog to create a new library for this document (Figure 463).

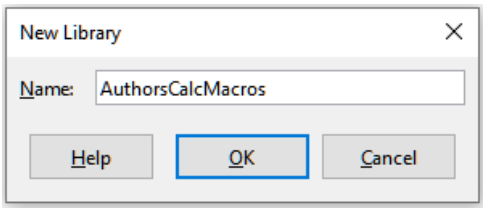


Figure 463: New Library dialog

6) Enter a descriptive library name (such as `AuthorsCalcMacros`) and click **OK** to create the library. The *Library* area of the Basic Macro Organizer dialog updates to include the name of the newly created library. A library name can comprise up to 30 characters. Note that in some cases, the dialog may show only a portion of the name.

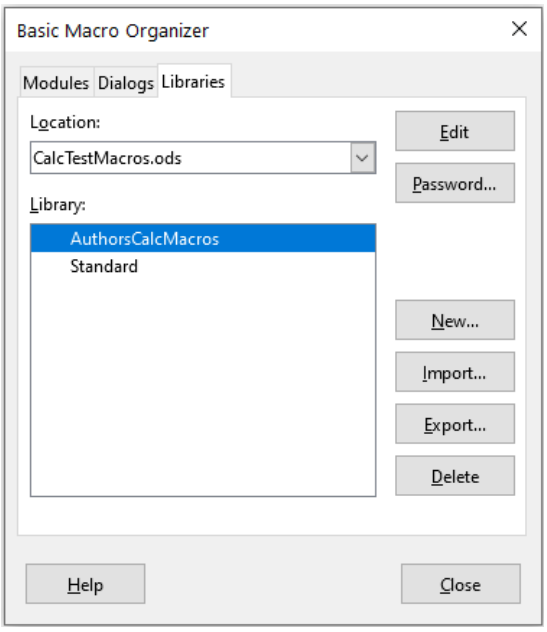


Figure 464: The new library is shown in the Library area

7) Select the *AuthorsCalcMacros* entry in the *Library* area and click **Edit** to edit the library. Calc automatically creates a module named *Module1* and a macro named *Main*. Calc displays the LibreOffice Basic Integrated Development Environment (IDE), shown in Figure 465.

   Figure 465 shows the default configuration for the LibreOffice Basic IDE. This comprises:

   - A menu bar.
   - Two toolbars (Macro and Standard). The Macro toolbar provides various icons for editing and testing programs.
   - The Object Catalog, enabling the selection of the required library container, library, module, and macro.

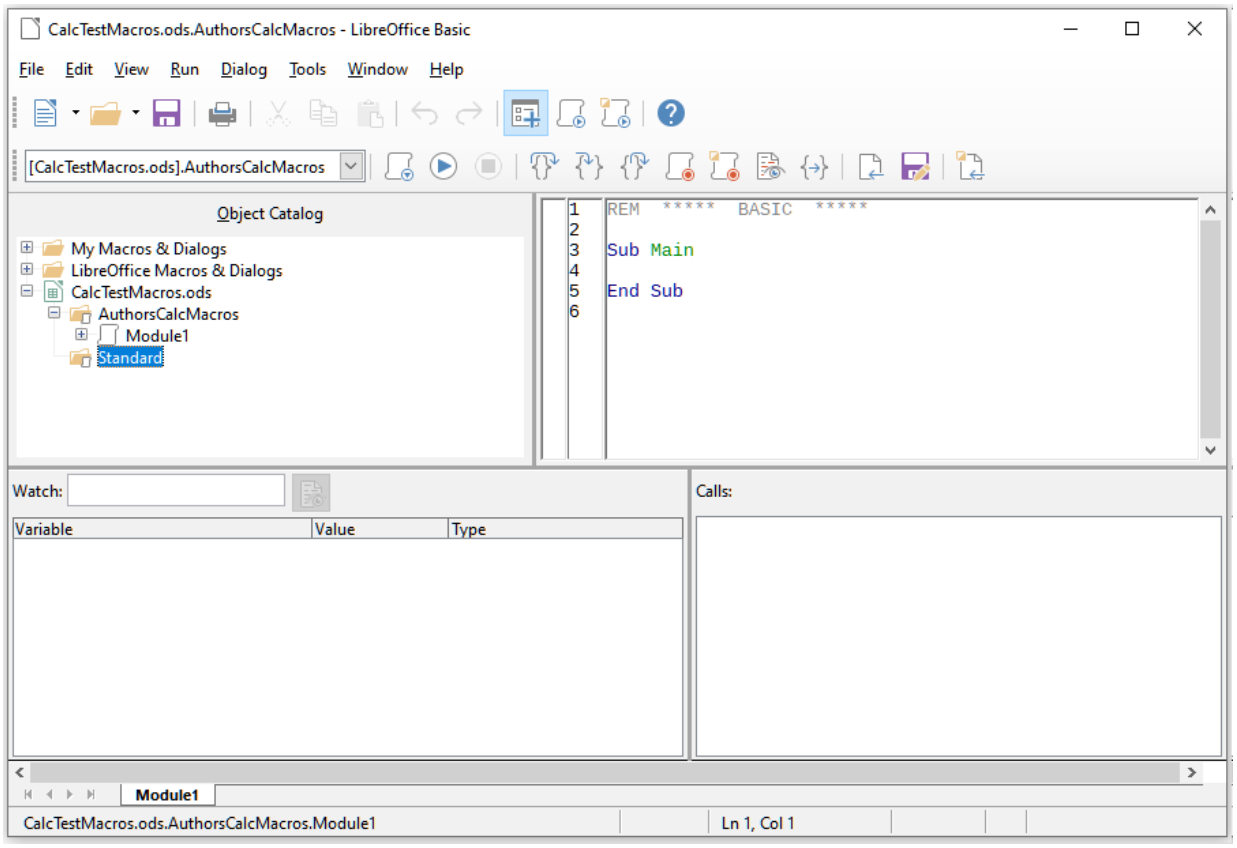


Figure 465: LibreOffice Basic Integrated Development Environment

- The Editor Window, in which you can edit the LibreOffice Basic program code. The column on the left side is used to set breakpoints in the program code.
- The Watch Window (located at the left, below the Object Catalog and Editor Window) displays the contents of variables or arrays during a single step process.
- The Calls Window (located to the right, below the Object Catalog and Editor Window) provides information about the call stack of procedures and functions when a program runs.
- A tab control area.
- A status bar.

The LibreOffice Basic IDE provides powerful facilities for the development and debugging of LibreOffice Basic macros. A fuller description of this facility is beyond the scope of this document, but more information can be found in the Help system.

8) In the Editor Window, 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 value 5.

Tip

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`.

Listing 2. Function that returns the value 5

```
' ***** BASIC *****
Option Explicit

Sub Main

End Sub

Function NumberFive ()
  NumberFive = 5
End Function
```

9) Within the LibreOffice Basic IDE select **File > Save** on the Menu bar, or click the **Save** icon on the Standard toolbar, or press *Ctrl+S*, to save the modified *Module1*.

Using a macro as a function

Using your newly created `CalcTestMacros.ods` spreadsheet, select a cell and enter the formula `=NumberFive()` (Figure 466). Calc finds the macro, calls it, and displays the result (5) in that cell.

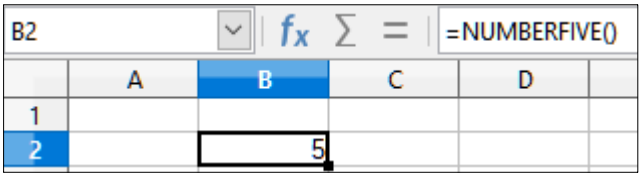


Figure 466: Use the NumberFive macro as a Calc function

Tip

Function names are not case sensitive. In Figure 466, the function name was entered as `NumberFive` but Calc displays it as `NUMBERFIVE` in the Formula bar.

Macro security warnings

You should now save the Calc document, close it, and open it again. Depending on your settings in the Macro Security dialog accessed using **Tools > Options > LibreOffice > Security > Macro Security** on the Menu bar, Calc may display one of the warnings shown in Figures 467 and 468.

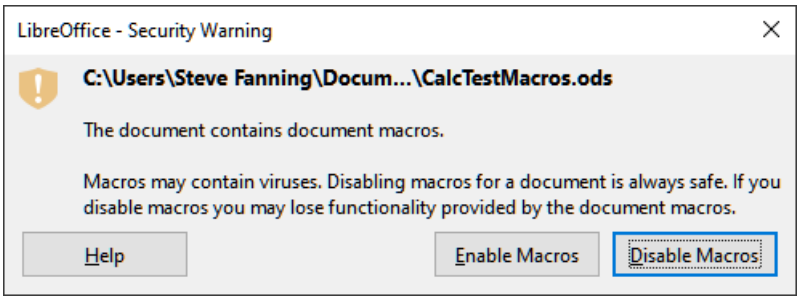


Figure 467: Warning that a document contains macros

In the case of the warning shown in Figure 467, you will need to click **Enable Macros**, or Calc will not allow any macros to be run in 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.

In the case of the warning shown in Figure 468, Calc will not allow any macros to be run in the document and you should click the **OK** button to remove the warning from the screen.

When the document loads with macros disabled, Calc will not be able to find any macro functions and will indicate an error in any affected cell by displaying the text `#NAME?` in that cell.

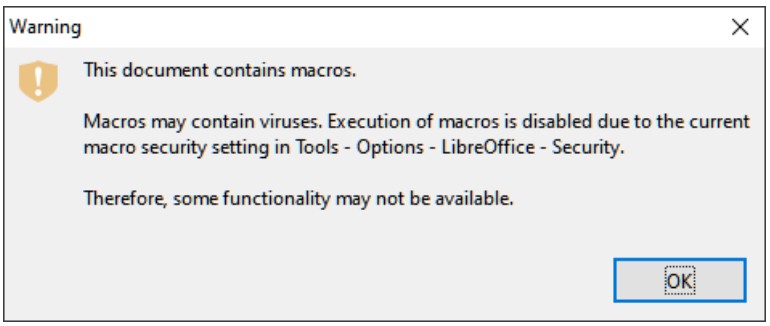


Figure 468: Warning that macros in the document are disabled

Loaded / unloaded libraries

When it opens a spreadsheet, Calc does not open all macro libraries that it can find in the available library containers because this would be a waste of resources. Instead, Calc automatically loads just the *Standard* library within the *My Macros* library container and the document's own *Standard* library.

When you re-open your CalcTestMacros.ods spreadsheet, Calc does not contain a function named *NumberFive()*, so it checks all visible, loaded macro libraries for the function. Loaded libraries in *LibreOffice Macros*, *My Macros*, and the document are checked for an appropriately named function. In our initial implementation, the *NumberFive()* function is stored in the *AuthorsCalcMacros* library, which is not automatically loaded when the document is opened. Hence the *NumberFive()* function is not found and an error condition appears in the cell where it is called (Figure 469).

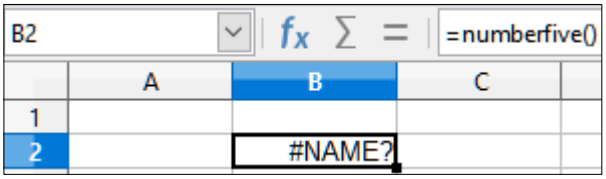


Figure 469: The macro function is not available

Use **Tools > Macros > Organize Macros > Basic** on the Menu bar to open the Basic Macros dialog (Figure 470). The icon for a loaded library (for example, *Standard*) has a different appearance to the icon for a library that is not loaded (for example, *AuthorsCalcMacros*).

Click the expand icon next to *AuthorsCalcMacros* to load the library. The icon changes appearance to indicate that the library is now loaded. Click **Close** to close the Basic Macros dialog.

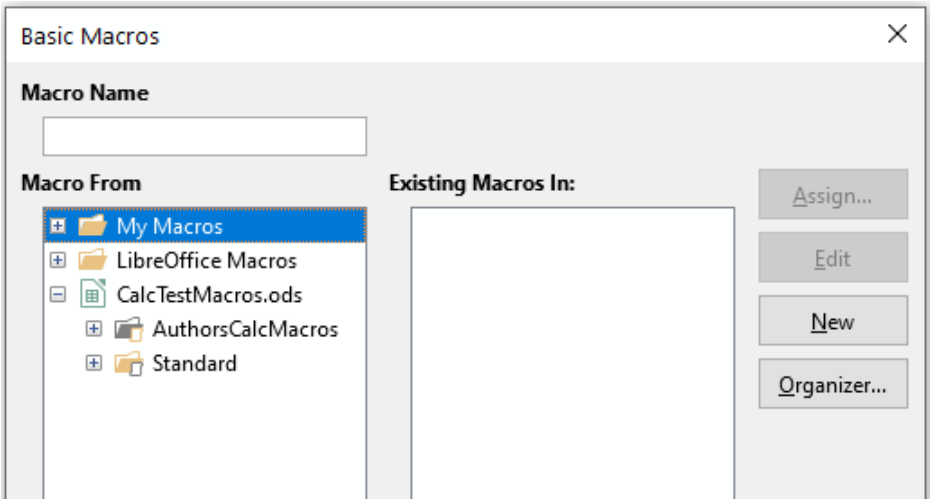


Figure 470: Different symbols for loaded and unloaded libraries

Unfortunately, the cell containing `=NumberFive()` in our initial implementation is still 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. The following steps illustrate this method.

1) Use **Tools > Macros > Organize Macros > Basic** on the Menu bar to open the Basic Macros dialog. Select the *NumberFive* macro and click **Edit** to open the macro for editing (Figure 471).

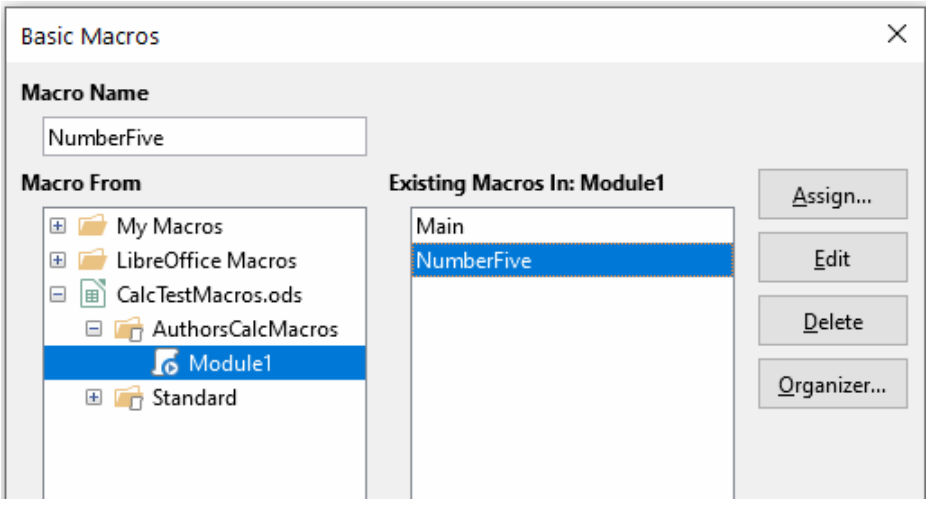


Figure 471: Select a macro and click Edit

2) Calc displays the LibreOffice Basic IDE (Figure 465), with the input cursor in the Editor Window at the line `Function NumberFive ()`. Change the name of *NumberFive* to *NumberFive_Implementation* so that the function's code matches Listing 3.

Listing 3. Change the name of NumberFive to NumberFive_Implementation

```
Function NumberFive_Implementation ()
  NumberFive_Implementation = 5
End Function
```

3) Click the **Select Macro** button in the Standard toolbar of the LibreOffice Basic IDE to open the Basic Macros dialog (Figure 471).

4) Select the *Standard* library in the `CalcTestMacros.ods` document and click the **New** button to create a new module. Enter a meaningful name such as `CalcFunctions` and click **OK**. Calc automatically creates a macro named Main and opens the module for editing.

5) Create a macro in the *CalcFunctions* module of the *Standard* library that loads the *AuthorsCalcMacros* library if it is not already loaded, and then calls the implementation function. See Listing 4.

Listing 4. Create a new NumberFive function to call the NumberFive_Implementation function

```
Function NumberFive()
  If NOT BasicLibraries.isLibraryLoaded("AuthorsCalcMacros") Then
    BasicLibraries.LoadLibrary("AuthorsCalcMacros")
  End If
  NumberFive = NumberFive_Implementation()
End Function
```

6) Save, close, and reopen the Calc document. This time, if macros are enabled, the *NumberFive()* function works as expected.

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 its 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, Calc outputs a warning message every time the macro is called. If Calc calls the function many times, then the error is displayed many times.

2) The function `IsMissing` checks that an argument was passed before it is used.

3) The function `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. In both these cases, `IsArray` returns the value `False`.

4) If a range is passed to the function, it is passed as a two-dimensional array of values; for example, `=PositiveSum(A2:B5)`. The functions `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, but 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 comma; for example, `=TestMax(3, -4)`.

Listing 6. TestMax accepts two arguments and returns the larger one

```
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 for experienced programmers and is beyond the scope of this guide. Some information, along with links to more detailed reading, is available in the Help.

Deleting LibreOffice Basic macros

Use the following steps to delete an unwanted macro:

1) Use **Tools > Macros > Organize Macros > Basic** on the Menu bar to open the Basic Macros dialog (Figure 471).
2) Select the macro to be deleted and click the **Delete** button.
3) Calc displays a confirmation dialog. Click **Yes** to continue.
4) Click the **Close** button to remove the Basic Macros dialog from the screen.

Use the following steps to delete an unwanted module:

1) Use **Tools > Macros > Organize Macros > Basic** on the Menu bar to open the Basic Macros dialog (Figure 471).
2) Click the **Organizer** button to open the Basic Macro Organizer dialog (Figure 472).

3) Make sure that the *Modules* tab is selected.

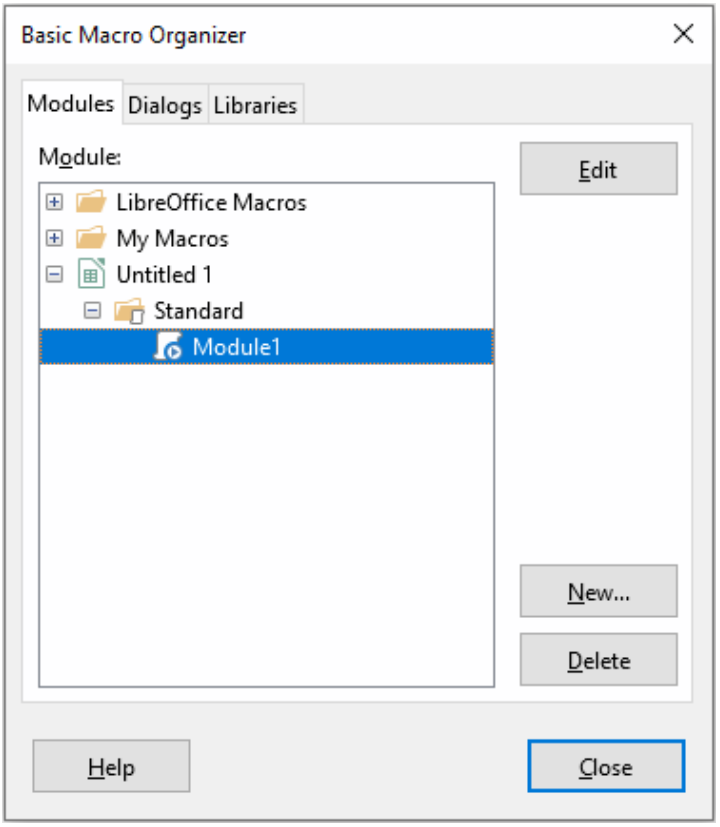


Figure 472: Basic Macro Organizer dialog, Modules tab

4) Select the module to be deleted in the *Module* area.
5) Click the **Delete** button.
6) Calc displays a confirmation dialog. Click **Yes** to continue.
7) Click the **Close** button to remove the Basic Macro Organizer dialog from the screen.
8) Click the **Close** button to close the Basic Macros dialog.

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 automatically set to reference the current document when the macro starts. A Calc document contains sheets and the macro accesses these via a call to `ThisComponent.getSheets()`. Use `getCellByPosition(col, row)` to return a cell at a specific row and column.

Listing 7. SumCellsAllSheets adds the values in cell A2 of every sheet

```
Function SumCellsAllSheets()
  Dim TheSum As Double
  Dim i As integer
  Dim oSheets
  Dim oSheet
  Dim oCell

  TheSum = 0
  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. SumCellsAllSheets adds the values in cells A2:C5 of 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()

  TheSum = 0
  oSheets = ThisComponent.getSheets()
  For i = 0 To oSheets.getCount() - 1
    oSheet = oSheets.getByIndex(i)
    oCells = oSheet.getCellRangeByName("A2:C5")

    ' The getDataArray() method returns strings and numbers
    ' but is not used in this function.

    ' The getData() method returns only numbers and is applicable
    ' to this function.

    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 sheet from which the macro was called, except the value of the cell that contains the function.

Sorting

Consider sorting the data shown in Figure 473. First, sort on column B descending and then on column A ascending.

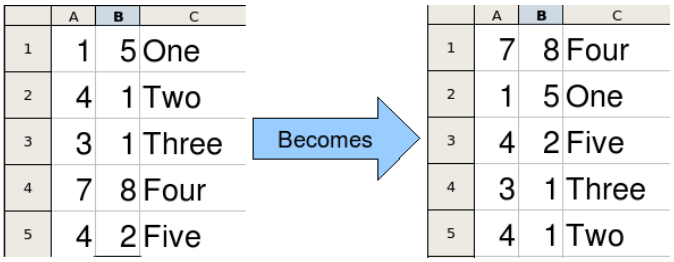


Figure 473: Sort column B descending and column A ascending

The example in Listing 9 demonstrates how to sort on these two columns. Run the macro by clicking the **Run** icon in the Macro toolbar of the LibreOffice Basic IDE.

Listing 9. SortRange sorts cells A1:C5 of Sheet 1

```
Sub SortRange
  Dim oSheet         ' Calc sheet containing data to sort.
  Dim oCellRange     ' Data range to sort.

  ' An array of sort fields determines the columns that are
  ' sorted. This is an array with two elements, 0 and 1.
  ' To sort on only one column, use:
  ' Dim oSortFields(0) As New com.sun.star.util.SortField
  Dim oSortFields(1) As New com.sun.star.util.SortField

  ' The sort descriptor is an array of properties.
  ' The primary property contains the sort fields.
  Dim oSortDesc(0) As New com.sun.star.beans.PropertyValue

  ' Get the sheet named "Sheet1"
  oSheet = ThisComponent.Sheets.getByName("Sheet1")

  ' Get the cell range to sort
  oCellRange = oSheet.getCellRangeByName("A1:C5")

  ' Uncomment the following code to select the range to sort.
  ' The only purpose would be to emphasize the sorted data.
  'ThisComponent.getCurrentController.select(oCellRange)

  ' The columns are numbered starting with 0, so
  ' column A is 0, column B is 1, etc.
  ' Sort column B (column 1) descending.
  oSortFields(0).Field = 1
  oSortFields(0).SortAscending = FALSE
  ' If column B has two cells with the same value,
  ' then use column A ascending to decide the order.
  oSortFields(1).Field = 0
  oSortFields(1).SortAscending = TRUE

  ' Setup the sort descriptor.
  oSortDesc(0).Name = "SortFields"
  oSortDesc(0).Value = oSortFields()

  ' Sort the range.
  oCellRange.Sort(oSortDesc())
End Sub
```

Overview of BeanShell, JavaScript, and Python macros

Introduction

Many programmers may not be familiar with LibreOffice Basic and so Calc supports macros written in three other languages that may be more familiar. These are BeanShell, JavaScript, and Python.

The primary macro scripting language for Calc is LibreOffice Basic and the standard LibreOffice installation provides a powerful integrated development environment (IDE) together with more options for this language.

Macros are organized in the same way for all four scripting languages. The *LibreOffice Macros* container holds all the macros that are supplied in the LibreOffice installation. The *My Macros* library container holds your macros that are available to any of your LibreOffice documents. Each document can also contain your macros that are not available to any other document.

When you use the macro recording facility, Calc creates the macro in LibreOffice Basic. To use the other available scripting languages you must write the code yourself.

When you select to run a macro using **Tools > Macros > Run Macro** on the Menu bar, Calc displays the Macro Selector dialog. This dialog enables the selection and running of any available macro, coded in any of the available languages (Figure 474).

When you select to edit a macro using **Tools > Macros > Edit Macros** on the Menu bar, Calc displays the LibreOffice Basic IDE. This dialog enables selection and editing of any available LibreOffice Basic macro, but not macros in other languages.

The component model used in LibreOffice is known as Universal Network Objects or UNO. LibreOffice macros in any scripting language use a UNO runtime application programming interface (API). The `XSCRIPTCONTEXT` interface is provided to macro scripts in all four languages and provides a means of access to the various interfaces which they might need to perform some action on a document.

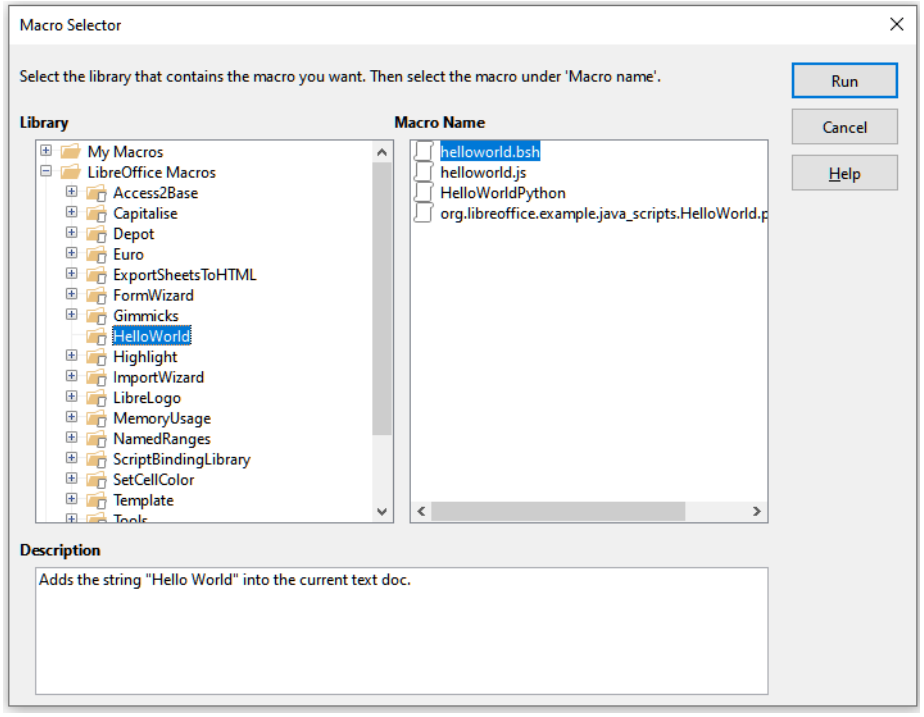


Figure 474: Macro Selector dialog

BeanShell macros

BeanShell is a Java-like scripting language that was first released in 1999.

When you select **Tools > Macros > Organize Macros > BeanShell** on the Menu bar, Calc displays the BeanShell Macros dialog (Figure 475).

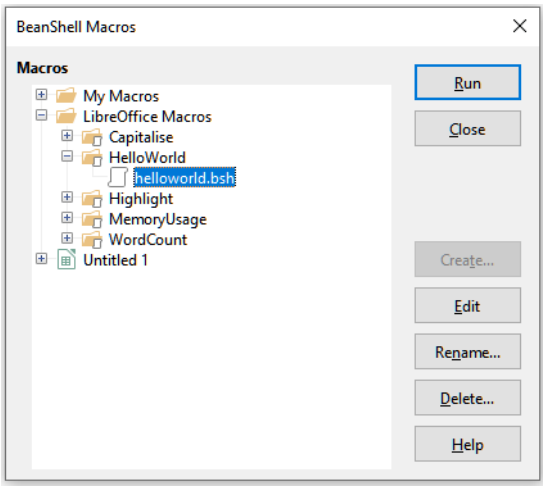


Figure 475: BeanShell Macros dialog

Click the **Edit** button on the BeanShell Macros dialog to access the BeanShell Debug Window (Figure 476).

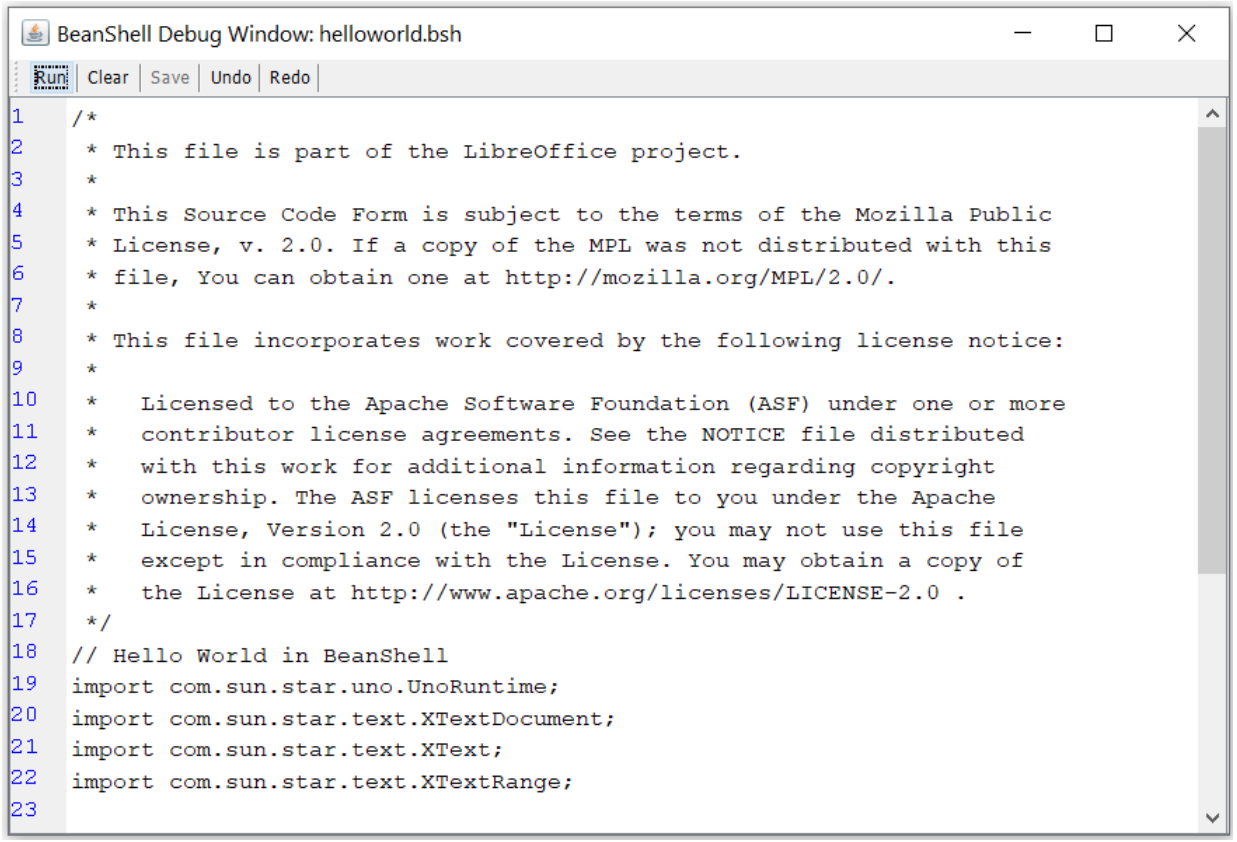


Figure 476: BeanShell Debug Window

Listing 10 is an example of a BeanShell macro that inserts the text “Hello World from BeanShell” in cell A1 of the active Calc spreadsheet.

Listing 10. Sample BeanShell macro

```
import com.sun.star.uno.UnoRuntime;
import com.sun.star.sheet.XSpreadsheetView;
import com.sun.star.text.XText;
```

```
model = XSCRIPTCONTEXT.getDocument();

controller = model.getCurrentController();

view = UnoRuntime.queryInterface(XSpreadsheetView.class, controller);

sheet = view.getActiveSheet();

cell = sheet.getCellByPosition(0, 0);

cellText = UnoRuntime.queryInterface(XText.class, cell);

textCursor = cellText.createTextCursor();

cellText.insertString(textCursor, "Hello World from BeanShell", true);

return 0;
```

JavaScript macros

JavaScript is a high-level scripting language that was first released in 1995.

When you select **Tools > Macros > Organize Macros > JavaScript** on the Menu bar, Calc displays the JavaScript Macros dialog (Figure 477).

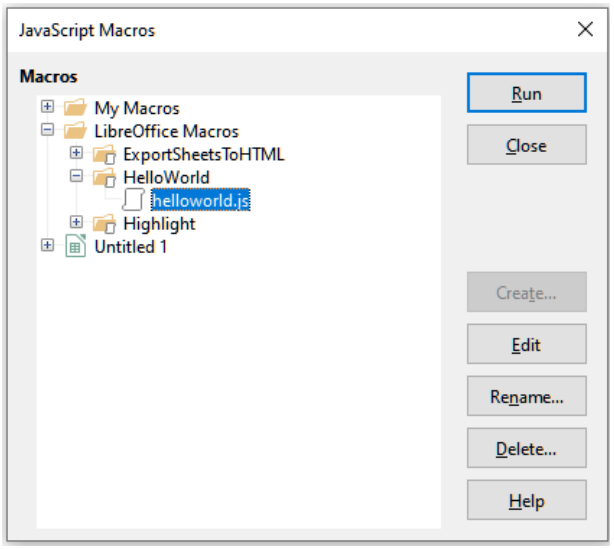


Figure 477: JavaScript Macros dialog

Click the **Edit** button on the JavaScript Macros dialog to access the Rhino JavaScript Debugger (Figure 478). Rhino is an easy-to-use open source JavaScript engine from the Mozilla Foundation and more information can be found at https://github.com/mozilla/rhino.

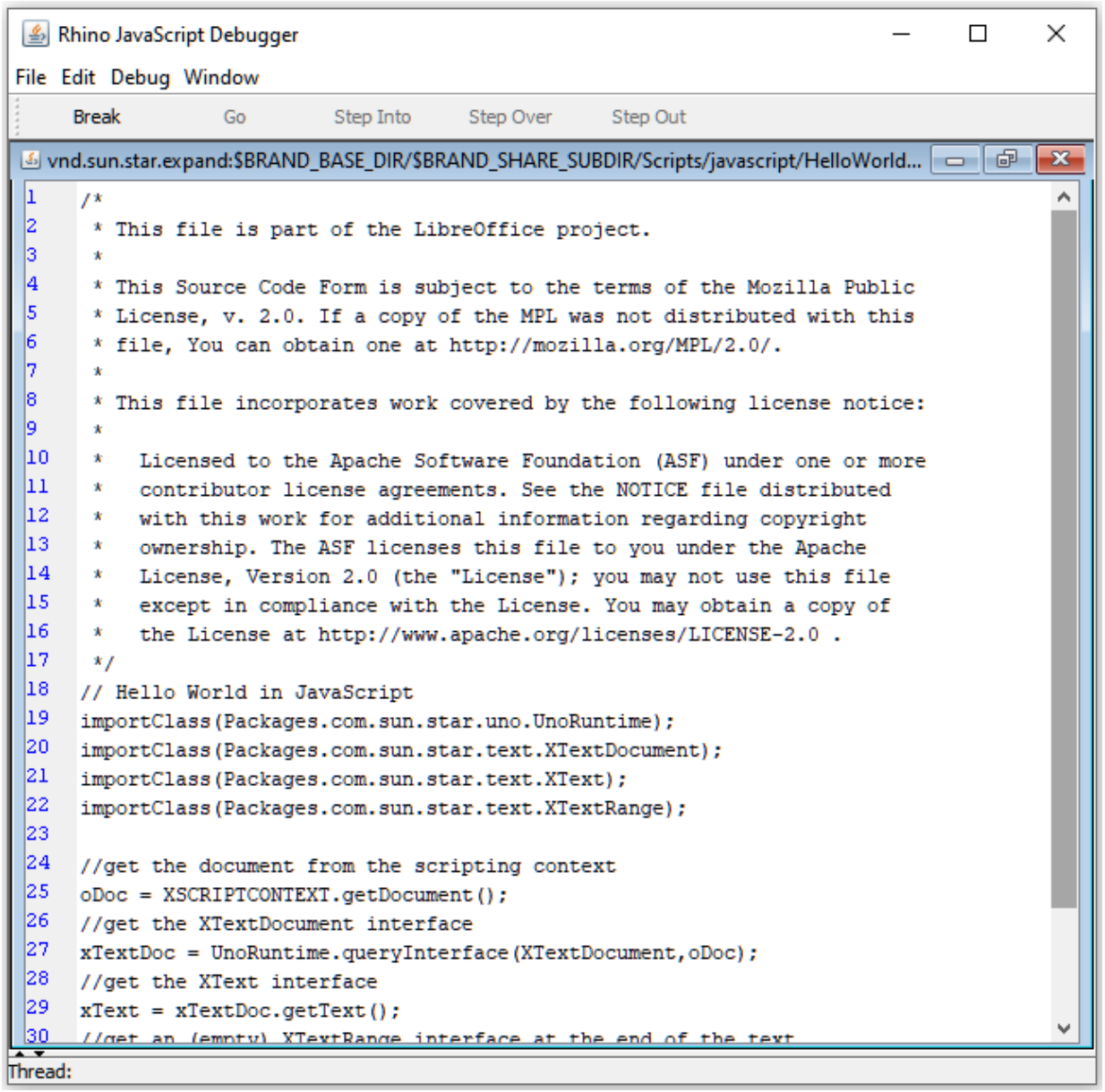


Figure 478: Rhino JavaScript Debugger

Listing 11 is an example of a JavaScript macro that inserts the text “Hello World from JavaScript” in cell A1 of the first sheet in a Calc spreadsheet.

Listing 11. Sample JavaScript macro

```
importClass(Packages.com.sun.star.uno.UnoRuntime);
importClass(Packages.com.sun.star.sheet.XSpreadsheetDocument);
importClass(Packages.com.sun.star.container.XIndexAccess);
importClass(Packages.com.sun.star.table.XCellRange);
importClass(Packages.com.sun.star.table.XCell);

documentRef = XSCRIPTCONTEXT.getDocument();

spreadsheetInterface = UnoRuntime.queryInterface(XSpreadsheetDocument, documentRef);

allSheets = UnoRuntime.queryInterface(XIndexAccess,
spreadsheetInterface.getSheets());

theSheet = allSheets.getByIndex(0);

Cells = UnoRuntime.queryInterface(XCellRange,theSheet);

cellA1 = Cells.getCellByPosition(0,0);

theCell = UnoRuntime.queryInterface(XCell,cellA1);

theCell.setFormula("Hello World from JavaScript");
```

Python macros

Python is a high-level, general-purpose programming language that was first released in 1991. In recent years it has grown in popularity and is commonly used by data scientists

When you select **Tools > Macros > Organize Macros > Python** on the Menu bar, Calc displays the Python Macros dialog (Figure 479).

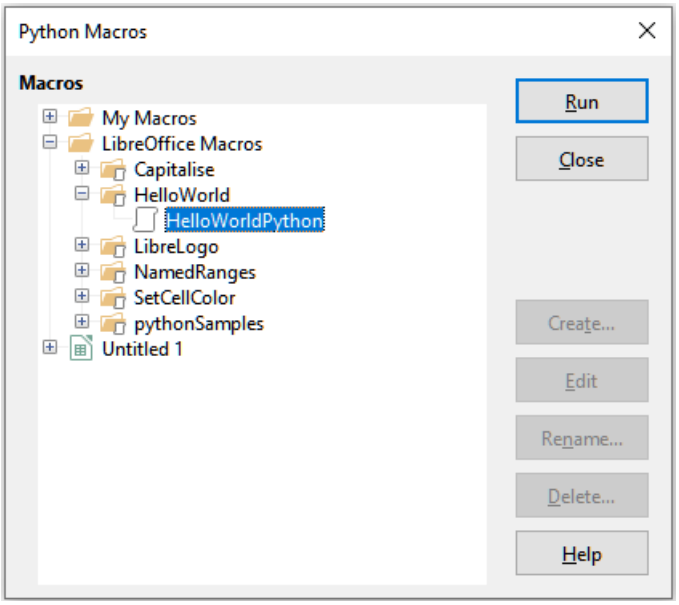


Figure 479: Python Macros dialog

Facilities to edit and debug Python scripts are not currently integrated into the standard LibreOffice user interface. However, you can edit Python scripts with your preferred text editor or an external IDE. The Alternative Python Script Organizer (APSO) extension eases the editing of Python scripts, in particular when embedded in a document. Using APSO you can configure your preferred source code editor, start the integrated Python shell and debug Python scripts. For more information search for "Python macros" in the LibreOffice Help system and visit the *Designing & Developing Python Applications* section of The Document Foundation's wiki (https://wiki.documentfoundation.org/Macros/Python_Design_Guide).

Listing 12 is an example of a Python macro that sets cell A1 of the first sheet in a Calc spreadsheet to the text "Hello World from Python".

Listing 12. Sample Python macro

```
import uno

def HelloWorld():
    doc = XSCRIPTCONTEXT.getDocument()
    cell = doc.Sheets[0]['A1']
    cell.setString('Hello World from Python')
    return
```

ScriptForge library

Macro programmers frequently need to perform tasks such as creating and opening files, accessing form controls, reading data from databases embedded in LibreOffice Base documents, and so forth. The objective of the *ScriptForge* library is to simplify the creation of macros by making it easier to execute such commands without having to learn the required LibreOffice APIs (Application Programming Interfaces) and commands, which may be difficult for casual programmers.

The *ScriptForge* library supports both LibreOffice Basic and Python. It is organized into a set of services, each of which provides methods and properties related to a specific topic. For example, the *Dialog* service provides access to dialogs available in script modules and the *Database* service allows execution of SQL commands in Base documents.

Chapter 13, Getting Started with Macros, of the *Getting Started Guide* contains additional introductory material about the *ScriptForge* library and includes a simple example. More detailed information and many examples can be found in the LibreOffice Help system, by searching for the term "ScriptForge" in the index.

Built-in object inspector

LibreOffice has an extensive API (Application Programming Interface) that can be used by macro programmers to automate almost any aspect of its applications. However, one of the main challenges for programmers is to discover UNO (Universal Network Objects) object types as well as their supported services, methods, and properties.

The built-in object inspector can be used to help macro developers inspect objects and discover how they can be accessed and used. To access this tool, go to **Tools > Development Tools** on the Menu bar and an object inspector window (Figure 480) will be opened. By default this window is docked at the bottom of the user interface.

The left portion of the window consists of the Document Object Model (DOM) navigator, which allows the user to navigate through all the objects in the document. When an object is selected, the following information about the object is shown on tabs within the right portion of the window:

- The names of all implemented interfaces.

- The names of all services supported by the object.
- The names and types of all properties available in the object.
- The names, arguments and return types of all methods that can be called by the object.

Instead of inspecting objects using the DOM navigator, it is possible to directly inspect the currently selected object in the document by toggling the **Current Selection** button.

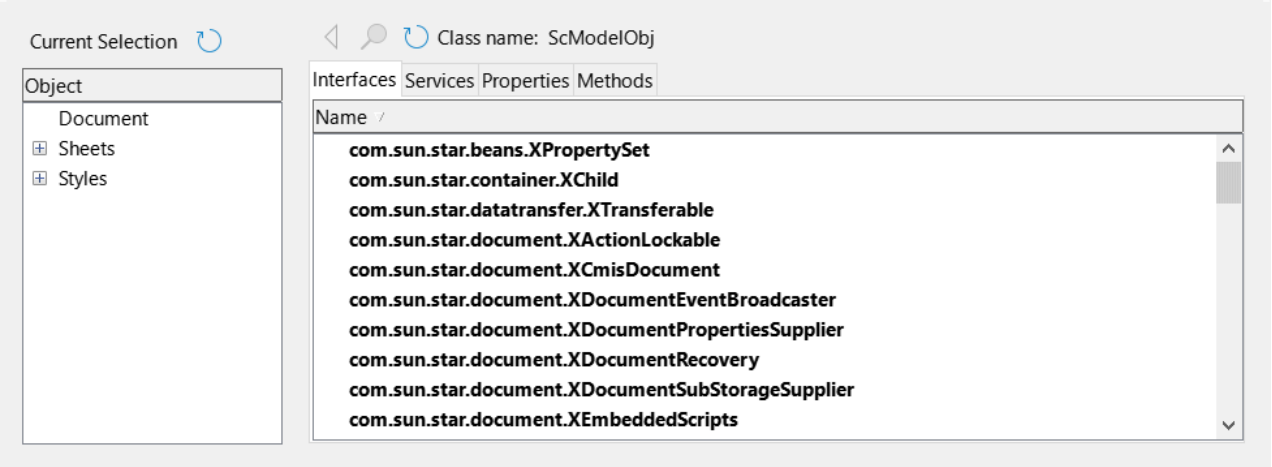


Figure 480: Object inspector window

Chapter 13, Getting Started with Macros, of the *Getting Started Guide* contains additional information about the built-in object inspector. More detailed information and examples can be found in the LibreOffice Help system, by searching for the term “development tools” in the help index.

Working with VBA macros

For the Excel/VBA programmer, LibreOffice Basic is a programming language very similar to VBA. The primary reason that VBA does not work in Calc, even though Calc can read the Excel workbook, is that Calc uses a different mechanism to access the workbook (called spreadsheet in Calc) components, such as cells on the worksheet (called sheet in Calc). Specifically, the objects, attributes, and methods use different names and the corresponding behavior is sometimes slightly different.

To convert VBA code, you must first load the VBA code in LibreOffice.

Loading VBA code

On the VBA Properties page (**Tools > Options > Load/Save > VBA Properties**), you can choose whether to keep any macros in Microsoft Office documents that are opened in LibreOffice.

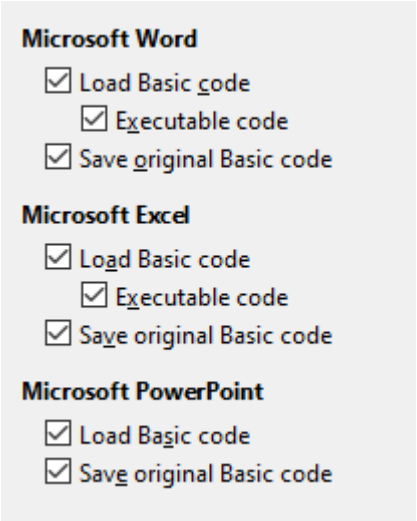


Figure 481: Choosing Load/Save VBA Properties

If you choose **Load Basic code**, you can edit the macros in LibreOffice. The changed code is saved in an ODF document but is not retained if you save it into a Microsoft Office format.

If you choose **Save original Basic code**, the macros will not work in LibreOffice but are retained unchanged if you save the file into Microsoft Office format.

If you are importing a Microsoft Word or 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 Basic IDE you will notice that it is all commented), with this option the code is ready to be executed.

Save original Basic code takes precedence over **Load Basic code**. If both options are selected and you edit the disabled code in LibreOffice, the original VBA code will be saved when saving in a Microsoft Office format.

To remove any possible macro viruses from the Microsoft Office document, deselect **Save original Basic code**. The document will be saved without the VBA code.

Option VBASupport statement

The `Option VBASupport` statement specifies that LibreOffice Basic will support some VBA statements, functions, and objects. The statement must be added before the executable program code in a module.

Note

The support for VBA is not complete but covers a large portion of the common usage patterns.

When VBASupport is enabled, LibreOffice Basic function arguments and return values are the same as their VBA counterparts. When the support is disabled, LibreOffice Basic functions may accept arguments and return values different from their VBA counterparts.

Listing 13. Option VBASupport usage

```
Option VBASupport 1
Sub Example
    Dim sVar As Single
    sVar = Worksheets("Sheet1").Range("A1")
    Print sVar
End Sub
```

Without the `Option VBASupport` statement, the code in Listing 13 must be converted to the LibreOffice Basic of Listing 14.

Listing 14. Converted VBA code

```
Sub Example
    Dim sVar As Single
    Dim oSheet as Object
    Dim oCell as Object
    ' Worksheets("Sheet1").
    oSheet = ThisComponent.getSheets().getByIndex(0)
    ' Range("A1")
    oCell = oSheet.getCellByPosition(0, 0)
    sVar = oCell.getValue()
    Print sVar
End Sub
```

`Option VBASupport` may affect or assist in the following situations:

- Allow special characters as identifiers. All characters that are defined as letters in the Latin-1 (ISO 8859-1) character set, are accepted as part of identifiers. For example, variables with accented characters in their names.
- Create VBA constants including non-printable characters (`vbCrLf`, `vbNewLine`,...).
- Support `Private`/`Public` keywords for procedures.
- Compulsory `Set` statement for objects.
- Default values for optional parameters in procedures.
- Named arguments when multiple optional parameters exist.
- Preload of LibreOffice Basic libraries.

VBA UserForms (LibreOffice Basic Dialogs)

UserForms (Dialogs) appear frequently in macros that demand your interaction and parameter selections. The code snippet below is a recipe for such conversions, which are not handled automatically by VBA options.

Listing 15. VBA display of a UserForm [Dialog] called "MyForm"

```
Sub MyProc
    MyForm.Show
End Sub
```

Listing 16. LibreOffice Basic display of a UserForm [Dialog] called "MyForm"

```
' oDlg should be visible at the module level
Dim oDlg As Object
Sub MyProc
    DialogLibraries.LoadLibrary("Standard")
    oDlg = CreateUnoDialog(DialogLibraries.Standard.MyForm)
    oDlg.execute()
End Sub
```

Note

The `oDlg` variable is visible at the module level to all other procedures that are accessing controls on the dialog. This means all the procedures manipulating or accessing controls on this dialog panel are housed in a single module.

Conclusion

This chapter provides an overview of how to create libraries and modules, using the macro recorder, using macros as Calc functions, writing your own macros without the macro recorder, and converting VBA to LibreOffice Basic. 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.

If you are already familiar with the BASIC language (or with one programming language), the LibreOffice Extensions website (https://extensions.libreoffice.org) has a set of LibreOffice Basic quick reference cards. These can be located quickly by selecting the Documentation and Macro tag filters.

Additional detail about Calc's macro facilities can be obtained from the LibreOffice Help system (search for "macros" in the index for general information, or search for "VBA Support" to find some specific VBA Support information), The Document Foundation's wiki pages (https://wiki.documentfoundation.org/Macros) and other Internet sources (for example the https://ask.libreoffice.org/ Q&A site).



Calc Guide 7.5

Chapter 14
Calc as a Database

Introduction

In many everyday scenarios, Calc spreadsheets can be used to aggregate sets of data and to perform analyses on them. As the data in a spreadsheet is laid out in a table view, plainly visible and easily edited or extended, some users may not need the comprehensive relational database facilities provided by the Base component of LibreOffice. For such users, Calc has sufficient functionality to act as a simple yet capable database-like platform. This chapter presents an overview of these capabilities.

For those users who initially choose to manage their data in a Calc spreadsheet and subsequently decide that they need to use a more comprehensive database system, migrating Calc data to Base is straightforward. In the other direction, for Base users who wish to take advantage of some of Calc's features to analyze or visualize their data, Base can be used for creating linked data ranges in Calc files, for pivot table analysis, or as the basis for charts. See the *Base Guide* for more information.

Earlier versions of this chapter contained several examples with LibreOffice Basic macros. These are now available on The Document Foundation's wiki at https://wiki.documentfoundation.org/Macros/Calc. Much of the macro information on those pages is drawn or adapted from Andrew Pitonyak's book, *OpenOffice.org Macros Explained* (OOME) and LibreOffice's API reference at https://api.libreoffice.org/docs/idl/ref/index.html.

A database primer

In a typical database, related data is organized into tables, which are arranged in a grid-like series of rows and columns similar to a spreadsheet. Each row of a table represents a data record, while each column represents a field within each record. Each cell in a field contains an individual data item or attribute, such as a name, while each record consists of related attributes that correspond to a single entity, like a person. A database table tends to have a fixed number of fields, but can have an indefinite number of records.

While a table may have hundreds or thousands of rows, individual records can be easily found, retrieved, and updated using information requests, called queries, that search for records that meet a specified set of criteria. It is this ease of access that makes a database table more useful than simply filing away information in an unordered spreadsheet.

To illustrate this concept of a database table, consider the example of a class grading sheet (Figure 482). In this sheet, each row represents individual students taking the class, while each column contains their names and grades. With this table, you can quickly look up individual students' grades simply by searching for their names, and you can determine which students are passing the class by filtering out records with failing average scores.

	A	B	C	D	E	F	G	H
1	**Student**	**HW #1**	**HW #2**	**HW #3**	**Quiz #1**	**Quiz #2**	**Test #1**	**Average**
2	Andrew	90	100	82	90	88	92	90.33
3	Bethany	95	100	82	80	88	93	89.67
4	Charles	80	93	73	80	75	84	80.83
5	David	75	86	91	40	88	79	76.50
6	Emily	100	100	81	100	75	94	91.67
7	Ferdinand	85	93	73	60	50	72	72.17
8	Georgia	70	80	55	39	75	67	64.33
9	Haley	85	93	82	70	75	76	80.17
10	Ian	100	100	91	90	100	96	96.17
11	Jennifer	85	93	73	80	100	90	86.83

Figure 482: Grading sheet example

Many modern database management systems are based on the *relational database model*, in which the data and relationships are represented by a series of inter-related tables. The Base component of LibreOffice is a fully featured relational database management system. Calc does not support the relational database model.

Calc as a database-like program

A Calc sheet is similar to a flat, non-relational database table, and it is possible for a database table to be contained in a Calc sheet. The data can be deeply analyzed using a wide range of tools and functions. It can be sorted, filtered, pivoted, and presented visually in 2-D/3-D charts and graphics. Calc is not a replacement for a fully featured database application but it can be useful for managing data in many small-scale personal or professional contexts.

Associating a range with a name

In order to set up a database table in a Calc sheet, you first need to set up an area for it to occupy. This is necessary since some of Calc's database-like features depend on accessing or modifying a table's location. Such an area is represented by a *range*, which is a contiguous group of one or more cells. To make the range for a table easy to access, you can assign a meaningful name to it. Doing this has four particular benefits:

- **Giving a range a name makes it easier to identify,** especially if you are working with multiple ranges in a document.
- **A named range can be referenced by its name rather than just by its address.** For example, if you have a range named *Scores*, you can simply reference it in a cell with a formula like `=SUM(Scores)`.
- **References by name to a named range are automatically updated every time the range's address is changed.** This avoids the need to change individual references every time a range's location is modified.
- **All named ranges can be quickly viewed and accessed through the Navigator**, which is opened by selecting **View > Navigator** on the Menu bar, pressing the *F5* key, or clicking the **Navigator** icon on the Sidebar tab panel.

Two types of named range exist in Calc: *database ranges*, which store settings for database-like operations, and standard *named ranges*, which do not.

Named ranges

Technically a named range is a named formula expression and its content is always set as a string. A commonly used type of expression is an absolute cell range like "`$Sheet1.$A$1:$E$15`". However, other expression types are possible. For example, the expression "`$Sheet1.$A$1:$A$4~$Sheet1.$B$1:$B$4`" encompasses two separate cell ranges (the tilde character is a reference concatenation operator). Alternatively a formula expression such as "`PI()*B1*B1`" might be defined to calculate the area of a circle, given the radius. In the remainder of this section we will be concerned only with named ranges defined as a single matrix-like cell range.

A quick way of creating a new named range is to select the relevant cells in your sheet and then simply start typing a name in the Name Box, located at the left of the Formula bar. Notice the "Define Name for Range" tooltip that appears as you type and press the *Enter* key when you have finished typing.

Named ranges are also created using the Define Name dialog (Figure 483), which is opened either by selecting **Sheet > Named Ranges and Expressions > Define** on the Menu bar or by clicking the **Add** button on the Manage Names dialog (Figure 484).

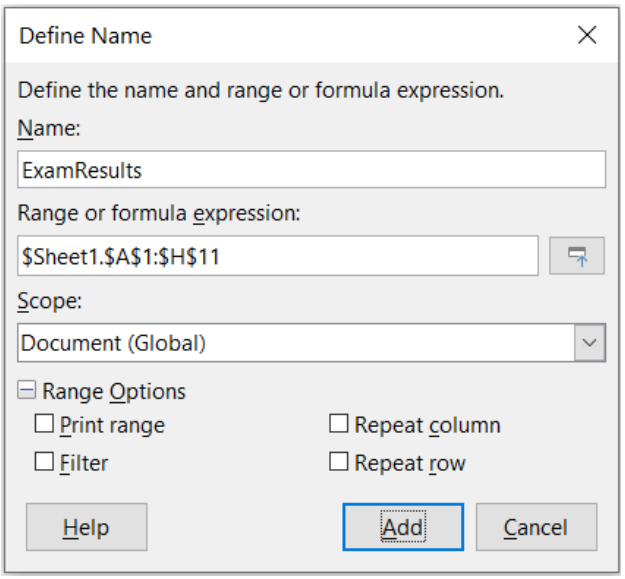


Figure 483: Define Name dialog

To create a named range, select a range of cells from a sheet, then open the Define Name dialog. Next, give the range a meaningful name, and click on **Add** to add it to the current document's list of named ranges. You can then access and modify these ranges using the Manage Names dialog (Figure 484), which is opened by selecting **Sheet > Named Ranges and Expressions > Manage** on the Menu bar, or pressing *Ctrl+F3*, or selecting **Manage Names** in the Name Box located at the left of the Formula bar.

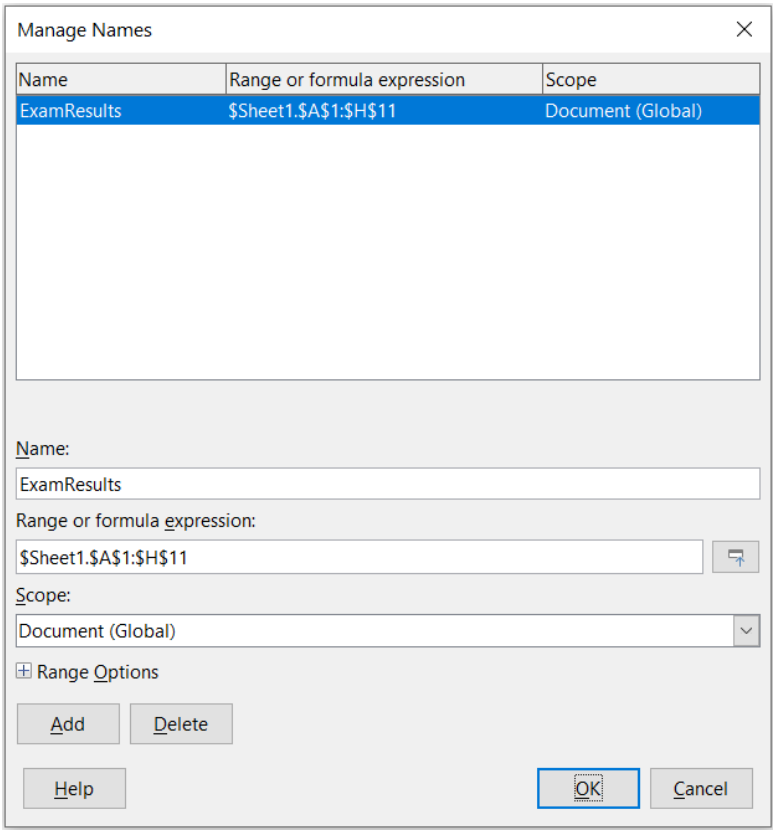


Figure 484: Manage Names dialog

To reduce the typing required when referencing a named range, a Paste Names dialog (Figure 485) can be accessed by selecting **Insert > Named Range or Expression** or **Sheet > Named Ranges and Expressions > Insert** on the Menu bar. Select the entry for the relevant named range and click the **Paste** button to insert the selected named range at the current cursor position.

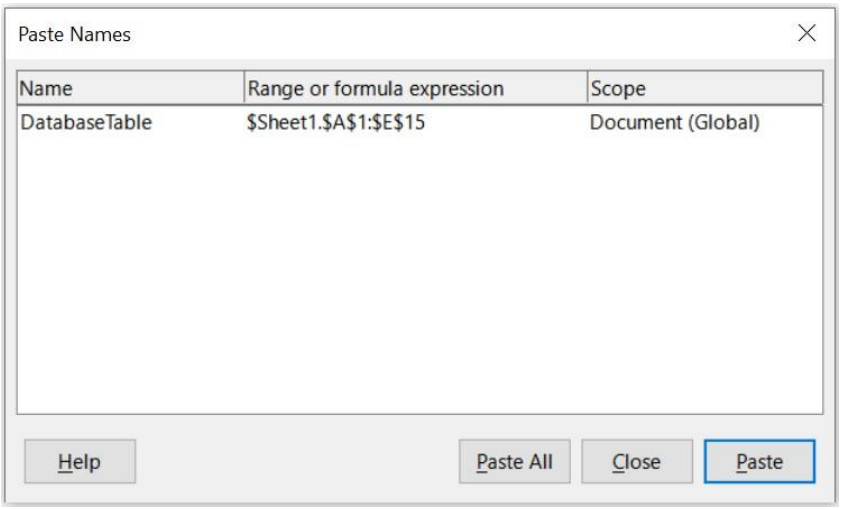


Figure 485: Paste Names dialog

For more detail about how to create and manage ranges, see Chapter 7, Printing, Exporting, Emailing, and Signing, and Chapter 8, Using Formulas and Functions.

Creating named ranges using row or column headers

With the Create Names tool, which is accessed by selecting **Sheet > Named Ranges and Expressions > Create** on the Menu bar (Figure 486), you can create multiple named ranges simultaneously from the headers of a table. These headers can be drawn from the table's borders – top and bottom rows, and left and right columns – and each row or column that corresponds to a header is used to create the named ranges themselves. For example, if you choose to create ranges from headers contained in the top row of a table, each range will be generated from the individual columns that correspond to each header label.

Note

Header cells are not included in the named ranges generated using the Create Names tool. This is because the labels in each of these cells are used to name the ranges.

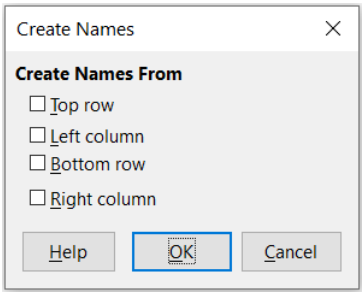


Figure 486: Create Names dialog

To use the Create Names tool:

1) In a sheet, select the table from which to create the named ranges. Be sure to include the header rows or columns as part of your selection.

2) Open the Create Names dialog by selecting **Sheet > Named Ranges and Expressions > Create** on the Menu bar.

3) Calc automatically identifies which rows or columns contain headers, and will mark the checkboxes – **Top row**, **Left column**, **Bottom row**, **Right column** – that apply. However, if you wish to change this selection, you can manually select or deselect any of the boxes at this point.

4) Click **OK** to close the dialog and create the new named ranges.

Tip

Avoid giving multiple rows or columns the same label, as the ranges generated from them will likewise share the same name, and can end up being overwritten by Calc.

Database ranges

Although it can be used like a regular named range, a database range is intended to be used like a database table, with each row representing a record and each cell a field within a record. Specifically, a database range differs from a named range in the following ways:

> A database range cannot be a formula expression, only a single rectangular cell range. This range can be formatted as a table, with the first row reserved for headings and the last row for subtotals. Cell formatting can also be preserved for each field in the table.

> Database ranges cannot be referenced relative to a base address within a sheet, which is possible with a named range.

> Database ranges store sorting, filtering, subtotaling, and data import settings in data structures called *descriptors*, which can be retrieved and accessed using macros. All descriptors of a database range are updated when a database operation is carried out on the cell range of the database range.

> Unlike a named range, a database range can be connected to an external data source, from where you can fetch data into the spreadsheet document.

Database ranges can be created, modified, and deleted using the Define Database Range dialog (Figure 487).

To create a database range:

1) If you want Calc to automatically determine the full extent of your database table, then select a single cell within its cell area. If you want to explicitly define the extent of the database table, then select all relevant cells.

2) Open the Define Database Range dialog by selecting **Data > Define Range** on the Menu bar.

3) Type a name for the range in the *Name* field. Only use letters, numbers, and underscores; spaces, hyphens, and other characters are not allowed.

4) Click on the expand symbol (usually a plus or a triangle) next to the *Options* label to expand this section and view and select the following options:

   – *Contains column labels* – Denotes whether the top row is reserved for field headings.

   – *Contains totals row* – Denotes whether the bottom row is reserved for totals.

– *Insert or delete cells* – If active, this option will insert new rows and columns into the database range when new records are added to its source. Only relevant if an external database source is linked to the range. To manually update the database range, use **Data > Refresh Range** on the Menu bar.

– *Keep formatting* – Applies the existing cell formats of the first data row to the whole database range.

– *Don't save imported data* – If selected, this option only saves a reference to the source database; the contents of the range's cells are not preserved.

– *Source* – Displays information about the current database source, if one exists. For example, "Bibliography/biblio".

– *Operations* – Denotes what operations (if any) have been applied to the database range. For example, "Sort", "Filter", or "Subtotals".

5) Click **Add** to add a range to the database range list under the *Name* field.

6) Click **OK** to close the dialog and save the database range.

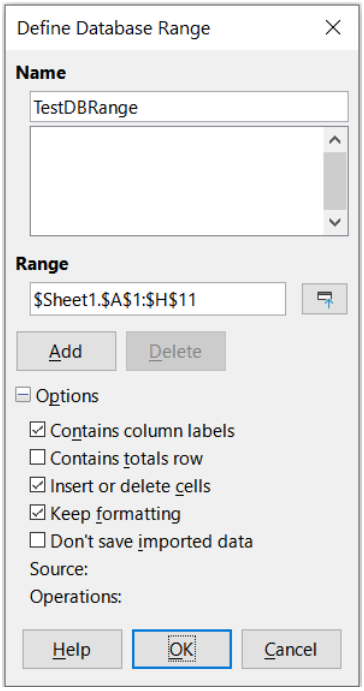


Figure 487: Define Database Range dialog

To modify an existing database range:

1) Open the Define Database Range dialog by selecting **Data > Define Range** on the Menu bar.

2) Select a range from the range list under the *Name* field or type its name into the *Name* field. The **Add** button will change to **Modify** at this point.

3) Make any modifications in the *Range* field and the *Options* section.

4) Click **Modify** to update the database range.

5) Click **OK** to close the dialog and save the modified database range.

To delete an existing database range:

1) Open the Define Database Range dialog by selecting **Data > Define Range** on the Menu bar.

2) Select the range to be deleted from the list in the upper section of the dialog.
3) Click **Delete** and then click the **Yes** button on the confirmation dialog that appears.
4) Click **OK** to close the Define Database Range dialog.

To select an existing database range from the current document, open the Select Database Range dialog by choosing **Data > Select Range** on the Menu bar (Figure 488). Next, select a range in the *Ranges* list and click **OK**. Another way to select an existing database range is using the Navigator deck on the Sidebar. Calc will automatically highlight the range's position in the sheet in which it is located.

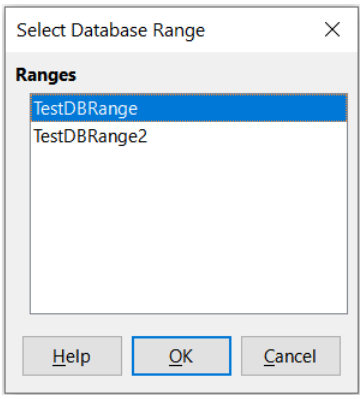


Figure 488: Select Database Range dialog

To fetch data from a data source to create a new database range, carry out the following steps:

1) Open the Data Sources Explorer by selecting **View > Data Sources** on the Menu bar or pressing *Ctrl*+*Shift*+*F4*.
2) In the left pane of the Data Sources Explorer, click the expand symbol at the left of the data source name of interest. This action opens the tree to display the tables or queries associated with the data source.
3) Click on the required table or query to display its constituent data in the right pane of the Data Sources Explorer.
4) Click on the blank rectangular area at the top left corner of the right pane of the Data Sources Explorer to select all the data in the displayed table or query.
5) Drag and drop the data to the cell that is to be at the top left corner of the data in your spreadsheet. Search for "drag and drop – data source view" in the Help system for more information about dragging and dropping data from the Data Sources Explorer.
6) Calc automatically creates a new database range with default parameters, encompassing the cell range of the imported data and with a default name of the form *Import1*, *Import2*, etc.
7) If required, access the Define Database Range dialog (Figure 487) to update settings of the new database range.

Select **Data > Refresh Range** on the Menu bar to refresh the contents of a database range once the data in the associated data source is updated. The data in the sheet is updated to match the data in the external database. Registering and linking to external database sources are explained in more detail in Chapter 11, Linking Data.

Sorting

Sorting is the process of rearranging data in a range or a sheet according to a specified sort order.

The simplest way to sort a database table based on the contents of a single column is to use the Sort Ascending and Sort Descending tools, as follows:

1) Select any cell in the column.
2) To sort in ascending order, select **Data > Sort Ascending** on the Menu bar or click the **Sort Ascending** icon on the Standard toolbar. If you have enabled AutoFilters (see next section), you can also select **Sort Ascending** on the relevant column's AutoFilter combo box.
3) To sort in descending order, select **Data > Sort Descending** on the Menu bar or click the **Sort Descending** icon on the Standard toolbar. If you have enabled AutoFilters, you can also select **Sort Descending** on the relevant column's AutoFilter combo box.

When using the Sort Ascending and Sort Descending tools, Calc automatically identifies the full cell range occupied by your table and sorts the entire area based only on the values in the indicated column. However, it also recognizes the first row as a header row and excludes it from the sort.

For more complex sorting, use the Sort dialog (Figure 489), which is accessed by selecting **Data > Sort** on the Menu bar or by clicking the **Sort** icon on the Standard toolbar. If you select just one cell within the database table before accessing the Sort dialog, then the entire table will be shown as selected when the dialog is displayed.

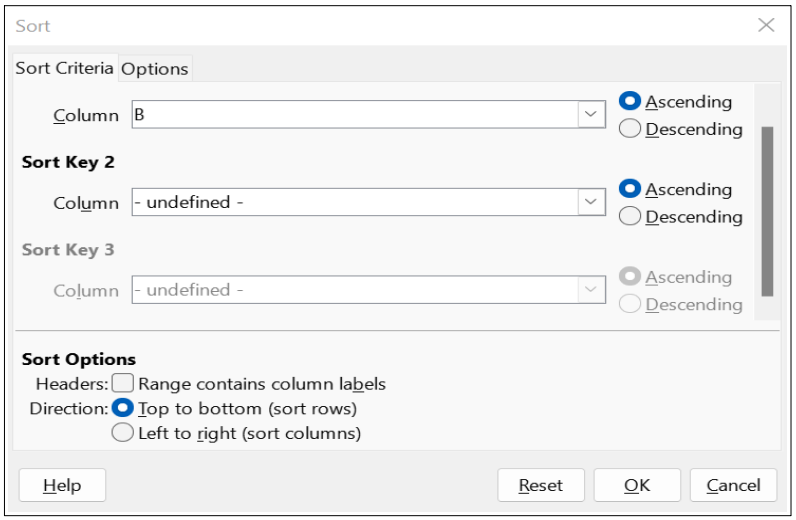


Figure 489: Sort dialog

On the `Sort Criteria` tab of the dialog, you can specify three levels of sorting. The data is sorted first by the values in the column selected in the *Sort Key 1* drop-down, second by the values in the column selected in the *Sort Key 2* drop-down, and third by the values in the column selected in the *Sort Key 3* drop-down. Checking the Headers option will exclude the first row (for column sorting) or column (for row sorting) from sorting with the rest of the data.

The *Options* tab of the Sort dialog provides additional sorting options. For more information about how to use this dialog and its options, see Chapter 2, Entering and Editing Data, and the Help system.

Filtering

A filter is a tool that hides or displays records within a sheet based on a set of filtering criteria. Similar to sorting, filters are useful for narrowing down long lists of data in order to find particular data items. In Calc, three types of filter exist:

- AutoFilters

- Standard filters
- Advanced filters

If you want to remove any filtering applied to your database table, simply select **Data > More Filters > Reset Filter** on the Menu bar.

Filters are also described in Chapter 2, Entering and Editing Data.

AutoFilter

AutoFilters are the most straightforward of the three filter types. They work by providing access to a combo box through a down-arrow button located at the top of one or more data columns (Figure 482). To add AutoFilters to all columns of a database table, click on a cell anywhere within the table area and then select **Data > AutoFilter** on the Menu bar, click the **AutoFilter** icon on the Standard toolbar, or press *Ctrl*+*Shift*+*L*. It is possible to add AutoFilters to individual columns by selecting those columns before choosing **Data > AutoFilter**, clicking the **AutoFilter** icon, or pressing *Ctrl*+*Shift*+*L*, but this is not normally necessary for a database table. To access the AutoFilter combo box for a column, click on the down-arrow button in the header cell of that column.

To remove AutoFilters from all columns of a database table, click on a cell anywhere within the table area and select **Data > AutoFilter** on the Menu bar, select **Data > More Filters > Hide AutoFilter** on the Menu bar, click the **AutoFilter** icon on the Standard toolbar, or press *Ctrl*+*Shift*+*L*. The down-arrow buttons at the tops of columns will disappear.

Tip

Selecting **Data > AutoFilter**, clicking the **AutoFilter** icon, and pressing *Ctrl*+*Shift*+*L* toggle AutoFilters on/off.

Each AutoFilter combo box provides the following options:

- A basic sort can be applied using the **Sort Ascending** and **Sort Descending** options.
- Filter by Color has **Text color** and **Background color** options to filter rows based on the text or background color applied to cells. Click on one of these options to open a sub-menu comprising an option for each color that is currently used and then select the color required for filtering. The example in Figure 490 corresponds to a case where column A contains cells that have colored backgrounds using either red, green, or yellow.
- Filter by Condition has options to filter by Empty or Not Empty rows.
- Filter by Condition also allows filtering on the **Top 10 or Bottom 10 results. The Top 10** filter causes the ten rows with the largest values to be displayed. More than ten rows may be displayed if there are multiple instances of large values in a column. For example, if there are eleven students with a perfect score of 100, then the filter will display all eleven instances. Similarly, if there are six students with a score of 100 and six other students with a score of 99, then the filter will display twelve instances. The Bottom 10 filter works the same way but with the lowest 10 values. Again if there are multiple values in the lowest values more than 10 rows will appear in the results.
- The **Standard Filter** option opens the Standard Filter dialog (Figure 491) and automatically sets the current field as the field for the first condition in the dialog.
- Check the **All** box to display or hide all values in the current column.

- **Show only the current item** and **Hide only the current item** shortcut buttons are provided, located adjacent to the **All** box. In the context of these buttons, the term “current” refers to the item highlighted in the set of check boxes below the buttons (for example the “1” in Figure 490).
- If any filter has been applied to a column, use the **Clear Filter** option to remove all filters defined for that column.
- The AutoFilter combo box includes check boxes for each unique value in the current column. If a check box is not ticked, rows of the database table that contain that value in this column are not displayed. Change the filtering status of a particular value by marking or removing the mark from the relevant check box.

Standard filters

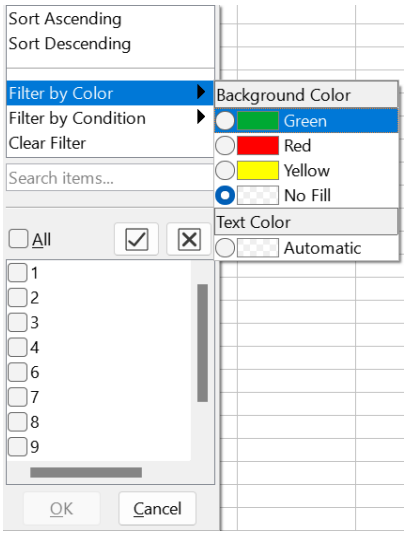


Figure 490: Autofilter combo box

Standard filters are more complex than AutoFilters, and allow for up to eight filter conditions. Powerful filters can be set up using regular expressions. Also, unlike AutoFilters, standard filters use a dialog (Figure 491), which is accessed by selecting **Data > More Filters > Standard Filter** on the Menu bar or the **Standard Filter** option on an AutoFilter combo box.

For more information on how to use this dialog and its options, see Chapter 2, Entering and Editing Data.

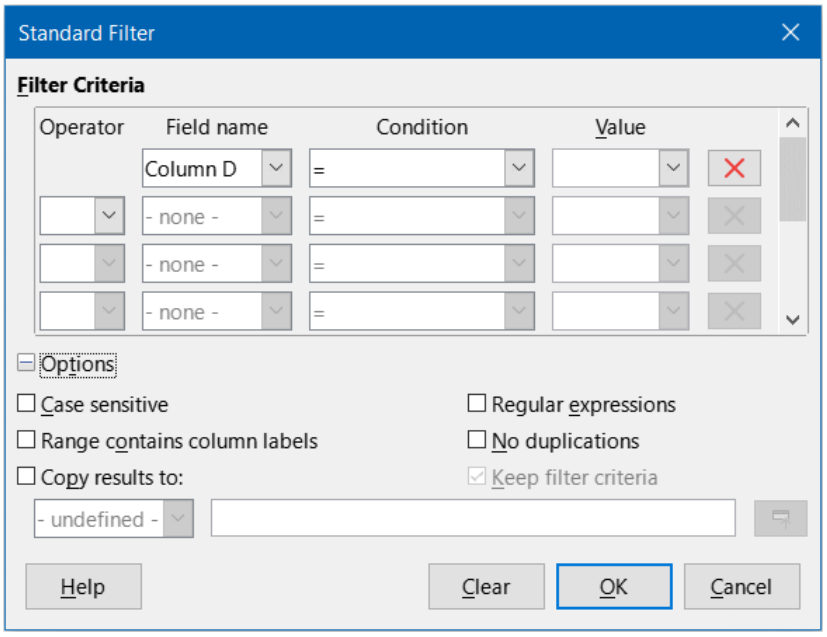


Figure 491: Standard Filter dialog

Advanced filters

The criteria for an advanced filter are stored in a sheet rather than entered into a dialog. As a result, you must first set up a cell range that contains the criteria before you use the Advanced Filter dialog (Figure 492).

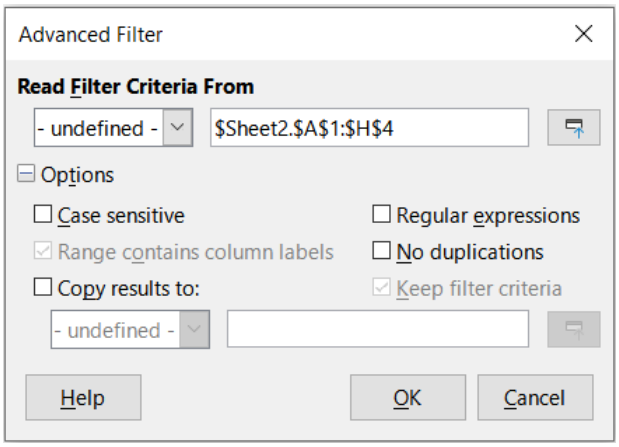


Figure 492: Advanced Filter dialog

To set up a criteria range:

1) Copy the column headings of the range to be filtered to an empty space in a sheet. It does not need to be the same sheet as the one with the source range.
2) Enter filter criteria underneath the column headings in the criteria range. Each individual criterion in the same row is connected with *AND*, while the criteria groups from each row are connected with *OR*. Empty cells are ignored. Up to eight criteria rows may be defined for a filter.

Tip

Although it is possible for the criteria area to contain only the headings for columns with defined filter criteria, for simplicity you may choose to copy all of your database table's headings to the criteria area.

After creating a criteria range, set up an advanced filter as follows:

1) Select the cell range that you wish to filter. For a database table you can simply click a cell within the table area and Calc will automatically select the whole table as it opens the dialog at step 2).
2) Go to **Data > More Filters > Advanced Filter** on the Menu bar to open the Advanced Filter dialog (Figure 492).
3) In the *Read Filter Criteria From* field, enter the address for the criteria range, either by selecting a named range from the drop-down box, typing in a reference, or selecting cells from a sheet. Remember to use the **Shrink / Expand** button if you need to temporarily minimize the dialog while selecting cells.
4) Click **OK** to apply the filter and close the dialog.

Note

For an individual named range, it is possible to tick a *Filter* checkbox on the Define Name and Manage Names dialogs (Figures 483 and 484 respectively). Only named ranges marked for filtering in this way can be selected in the drop-down box in the *Read Filter Criteria From* area of the Advanced Filter dialog. Database ranges cannot be selected in the drop-down box.

Advanced filter options are the same as standard filter options, and are described in further detail in Chapter 2, Entering and Editing Data.

Figure 493 demonstrates an example criteria range for the grading sheet example in Figure 482.

	A	B	C	D	E	F	G	H
1	**Student**	**HW #1**	**HW #2**	**HW #3**	**Quiz #1**	**Quiz #2**	**Test #1**	**Average**
2		>75	>75	>75				
3	Ferdinand							
4								

Figure 493: Advanced filter criteria range (in Sheet 2)

In this range, there are two criteria groups: the first displays the records of students who scored above a 75% in every homework, and the second displays records of any student named "Ferdinand". Figure 494 displays the result of this filter operation using these criteria.

	A	B	C	D	E	F	G	H
1	**Student**	**HW #1**	**HW #2**	**HW #3**	**Quiz #1**	**Quiz #2**	**Test #1**	**Average**
2	**Andrew**	90	100	82	90	88	92	90.33
3	**Bethany**	95	100	82	80	88	93	89.67
6	**Emily**	100	100	81	100	75	94	91.67
7	**Ferdinand**	85	93	73	60	50	72	72.17
9	**Haley**	85	93	82	70	75	76	80.17
10	**Ian**	100	100	91	90	100	96	96.17
12								

Figure 494: Grading sheet example filtered using an advanced filter

Useful database-like functions

Database category functions

Overview

The twelve functions in the Database category are intended to help you analyze a simple database that occupies a rectangular spreadsheet area comprising columns and rows, with the data organized as one row for each record. The header cell of each column displays the name of the column and that name usually reflects the contents of each cell in that column.

The functions in the Database category take three arguments as follows:

1) **Database**. The cell range of the database.
2) **DatabaseField**. The column containing the data to be used in the function's calculations.
3) **SearchCriteria**. The cell range of a separate area of the spreadsheet containing search criteria.

These arguments are described more fully below.

All functions have the same simple concept of operation. The first logical step is to use the specified **SearchCriteria** to identify the subset of records in the **Database** that are to be used during subsequent calculations. The second step is to extract the data values and perform the calculations associated with the specific function (average, sum, product, and so on). The values processed are those in the **DatabaseField** column of the selected records.

Database function arguments

The following argument definitions apply for all functions in the Database category:

Database argument

Database specifies the range of cells occupied by the database table. The first row of the range contains the field names, and subsequent rows are records with corresponding field values.

One way of defining the range of cells is to enter the cell reference for the upper left-hand cell, followed by a colon (:), and then the lower right-hand cell reference. An example might be `A1:E10`.

The **Database** argument may also be specified by passing the name of a named range or database range. Using a meaningful name to define the cell range can enhance formula readability and document maintenance. If the name does not match the name of a defined range, Calc reports a #NAME? error.

Other errors that might be reported as a result of an invalid **Database** argument are #VALUE! and Err:504 (error in parameter list).

DatabaseField argument

DatabaseField specifies the column which the function will use for its calculations after the search criteria have been applied and the data rows have been selected. It is not related to the search criteria.

Specify the **DatabaseField** argument in any of the following ways:

– By entering a reference to a header cell within the **Database** area. Alternatively, if the cell has been given a meaningful name as a named range or database range, enter that name. If the name does not match the name of a defined range, Calc reports a #NAME? error. If the name is valid but does not correspond to one cell only, Calc reports Err:504 (error in parameter list).

– By entering a number to specify the column within the **Database** area, starting with 1. For example, if a **Database** occupied the cell range D6:H123, then enter `3` to indicate the header cell at F6. Calc expects an integer value that lies between 1 and the number of columns defined within **Database** and ignores any digits after a decimal point. If the value is less than 1, Calc reports Err:504 (error in parameter list). If the value is greater than the number of columns in **Database**, Calc reports a #VALUE! error.

– By entering the literal column header name from the first row of the **Database** range, placing quotation marks around the header name; for example, “Distance to School”. If the string does not match one of the **Database** area’s column headings, Calc reports Err:504 (error in parameter list). You can also provide a reference to an arbitrary cell (not within the **Database** and **SearchCriteria** areas) that contains the required string.

The **DatabaseField** argument is optional for the DCOUNT and DCOUNTA functions but it is required for the other ten Database functions.

SearchCriteria argument

SearchCriteria specifies the range of cells containing search criteria. Like **Database**, its first row is also field names, and subsequent rows are conditions for related fields. The **Database** and **SearchCriteria** areas need not be adjacent, or even on the same sheet.

One way of defining the range of cells is to enter the cell reference for the upper left-hand cell, followed by a colon (:), and then the lower right-hand cell reference; for example, `A13:B14`. The cell range may also be specified by passing the name of a defined named range or database range. If the name does not match the name of a defined range, Calc reports a #NAME? error.

Err:504 (error in parameter list) may also be reported as a result of an invalid **SearchCriteria** argument.

The contents of the **SearchCriteria** area are described in more detail in the next section.

Defining search criteria

The number of columns occupied by the **SearchCriteria** area need not be the same as the width of the **Database** area. All headings that appear in the first row of **SearchCriteria** must be identical to headings in the first row of **Database**. However, not all headings in **Database** need appear in the first row of **SearchCriteria**, while a heading in **Database** can appear multiple times in the first row of **SearchCriteria**.

Search criteria are entered into the cells of the second and subsequent rows of the **SearchCriteria** area, below the row containing headings. Blank cells within the **SearchCriteria** area are ignored.

Create criteria in the cells of the **SearchCriteria** area using the comparison operators <, <=, =, <>, >=, and >. = is assumed if a cell is not empty but does not start with a comparison operator.

If you write several criteria in one row, they are connected by *AND*. If you write several criteria in different rows, they are connected by *OR*.

Criteria can be created using wildcards, providing that wildcards have been enabled via the **Enable wildcards in formulas** option on the **Tools > Options > LibreOffice Calc > Calculate** dialog. When interoperability with Microsoft Excel is important for your spreadsheet, this option should be enabled.

Even more powerful criteria can be created using regular expressions, providing that regular expressions have been enabled via the **Enable regular expressions in formulas** option on the **Tools > Options > LibreOffice Calc > Calculate** dialog.

Tip

When using functions where a search criterion string can be a regular expression, the first attempt is to convert the criterion string to numbers. For example, ".0" will convert to 0.0 and so on. If successful, the match will not be a regular expression match but a numeric match. However, switching to a locale where the decimal separator is not the dot makes the regular expression conversion work. To force the evaluation of the regular expression instead of a numeric expression, use some expression that can not be misread as numeric, such as ".[0]" or ".\0" or "(?i).0".

Another setting that affects how the search criteria are handled is the **Search criteria = and <> must apply to whole cells** option on the **Tools > Options > LibreOffice Calc > Calculate** dialog. This option controls whether the search criteria you set for the Database functions must match the whole cell exactly. When interoperability with Microsoft Excel is important for your spreadsheet, this option should be enabled.

Example of Database function use

E15 | =DCOUNT(A1:E10,,A12:E13)

	A	B	C	D	E
1	**Name**	**Grade**	**Age**	**Distance (meters)**	**Weight (kg)**
2	Andy	3	9	150	40
3	Betty	4	10	1000	42
4	Charles	3	10	300	51
5	Daniel	5	11	1200	48
6	Eva	2	8	650	33
7	Frank	2	7	300	42
8	Greta	1	7	200	36
9	Harry	3	9	1200	44
10	Irene	2	8	1000	42
11					
12	**Name**	**Grade**	**Age**	**Distance (meters)**	**Weight (kg)**
13				>600	
14					
15	How many travel further than 600 meters?				5

Figure 495 - Example usage of a Database function

Figure 495 provides a simple example demonstrating how to use one of the functions in the Database category. The formula in the selected cell E15 can be seen in the Formula bar and comprises a call to the DCOUNT function. The arguments of this function call are as follows:

- **Database argument**. The database table used for this example extends over the cell range A1:E10.
- **DatabaseField argument**. As the DCOUNT function counts the records that match the criteria without further calculation, it is not necessary to provide a value for this argument, although the relevant argument separators (commas in this case) must be provided.
- **SearchCriteria argument**. The search criteria area used in this example extends over the cell range A12:E13. The condition in cell D13 (“>600”) will cause DCOUNT to count all records which have a value greater than 600 meters in the *Distance (meters)* column. In many cases it may be convenient to replicate the column headings of the database table within the search criteria area as shown in Figure 495. However this is not essential and the formula `=DCOUNT(A1:E10,,D12:D13)` would give exactly the same value of 5.

Many more examples can be found by searching for “database functions” in the Help system, or by visiting the relevant page for each function within the Calc Functions Wiki at https://wiki.documentfoundation.org/Documentation/Calc_Functions.

List of Database functions

Note

Calc will treat dates and logical values (such as TRUE or FALSE) as numeric when calculating with these functions.

DAVERAGE

For all rows (database records) that match the specified search criteria, DAVERAGE calculates the average of the numeric values in the cells (fields) of the specified column. Non-numeric values in those cells are ignored.

Returns a #DIV/0! error if no records match the specified search criteria, or if there are no numeric values in the cells of the specified column for the matching records.

Syntax: DAVERAGE(Database; DatabaseField; SearchCriteria)

DCOUNT

For all rows (database records) that match the specified search criteria, DCOUNT counts the number of cells (fields) of the specified column that contain numeric values. However, if no column is specified, DCOUNT returns the count of all records that match the specified search criteria irrespective of their contents.

Syntax: DCOUNT(Database; [DatabaseField]; SearchCriteria)

DCOUNTA

For all rows (database records) that match the specified search criteria, DCOUNTA counts the number of cells (fields) of the specified column that are not blank. Blank cells of the specified column are not counted. However, if no column is specified, DCOUNTA returns the count of all records that match the specified search criteria irrespective of their contents.

Syntax: DCOUNTA(Database; [DatabaseField]; SearchCriteria)

DGET

For the single row (database record) that matches the specified search criteria, DGET returns the contents of the cell (field) of the specified column.

Calc reports Err:502 (invalid argument) if multiple matches are found, or a #VALUE! error (wrong data type) if no matches are found. A #VALUE! error is also reported if a single match is found but the relevant cell is empty.

Syntax: DGET(Database; DatabaseField; SearchCriteria)

DMAX

For all rows (database records) that match the specified search criteria, DMAX calculates the maximum value across the cells (fields) of the specified column that contain numeric values. Blank cells or cells containing non-numeric characters are not included.

Returns 0 if no matches are found, or if there are no non-zero numeric values in the cells of the specified column for the matching records.

Syntax: DMAX(Database; DatabaseField; SearchCriteria)

DMIN

For all rows (database records) that match the specified search criteria, DMIN calculates the minimum value across the cells (fields) of the specified column that contain numeric values. Blank cells or cells containing non-numeric characters are not included.

Returns 0 if no matches are found, or if there are no non-zero numeric values in the cells of the specified column for the matching records.

Syntax: DMIN(Database; DatabaseField; SearchCriteria)

DPRODUCT

For all rows (database records) that match the specified search criteria, DPRODUCT calculates the product of all numeric values in the cells (fields) of the specified column. Blank cells or cells containing non-numeric characters are not included.

Returns 0 if no matches are found, or if there are no numeric values in the cells of the specified column for the matching records.

Syntax: DPRODUCT(Database; DatabaseField; SearchCriteria)

DSTDEV

For all rows (database records) that match the specified search criteria, DSTDEV calculates the sample standard deviation based on the numeric values in the cells (fields) of the specified column. Non-numeric values are ignored.

Returns a #NUM! error if exactly one record matches the specified search criteria, or if there is only one numeric value in the cells of the specified column for the matching records.

Returns 0 if no matches are found, or if there are no numeric values in the cells of the specified column for the matching records.

Syntax: DSTDEV(Database; DatabaseField; SearchCriteria)

DSTDEVP

For all rows (database records) that match the specified search criteria, DSTDEVP calculates the population standard deviation based on the numeric values in the cells (fields) of the specified column. Non-numeric values are ignored.

Returns a #NUM! error if no records match the specified search criteria, or if there are no numeric values in the cells of the specified column for the matching records.

Syntax: DSTDEVP(Database; DatabaseField; SearchCriteria)

DSUM

For all rows (database records) that match the specified search criteria, DSUM calculates the sum of all numeric values in the cells (fields) of the specified column. Blank cells or cells containing non-numeric characters are not included.

Returns 0 if no matches are found, or if there are no numeric values in the cells of the specified column for the matching records.

Syntax: DSUM(Database; DatabaseField; SearchCriteria)

DVAR

For all rows (database records) that match the specified search criteria, DVAR calculates the sample variance based on the numeric values in the cells (fields) of the specified column. Non-numeric values are ignored.

Returns a #NUM! error if exactly one record matches the specified search criteria, or if there is only one numeric value in the cells of the specified column for the matching records.

Returns 0 if no matches are found, or if there are no numeric values in the cells of the specified column for the matching records.

Syntax: DVAR(Database; DatabaseField; SearchCriteria)

DVARP

For all rows (database records) that match the specified search criteria, DVARP calculates the population variation based on the numeric values in the cells (fields) of the specified column. Non-numeric values are ignored.

Returns a #NUM! error if no records match the specified search criteria, or if there are no numeric values in the cells of the specified column for the matching records.

Syntax: DVARP(Database; DatabaseField; SearchCriteria)

Other database-like functions

Calc includes over 500 functions to help you analyze and reference data. Some of these functions are intended for use with tabular data (such as HLOOKUP and VLOOKUP), while others can be used in any context. This section provides a list of some of the functions that may be useful if you intend to utilize tables in Calc for your database. Many will be familiar as typical spreadsheet functions used in other contexts, while some may be less frequently used but are particularly helpful with database tables.

Further reference material for all Calc's functions can be found in the Help system and in the Calc Functions area of the The Document Foundation's wiki, at https://wiki.documentfoundation.org/Documentation/Calc_Functions.

Function	*Category*	*Description*
AGGREGATE	Mathematical	Returns an overall result calculated by applying a selected aggregation function to the specified data. Nineteen selectable aggregation functions are available, including average, count, large, maximum, median, minimum, mode, percentile, product, quartile, small, standard deviation, sum, and variance.
AVERAGE	Statistical	Returns the arithmetic mean of the specified data, ignoring empty cells and cells that contain text.
AVERAGEA	Statistical	Returns the arithmetic mean of the specified data, ignoring empty cells but assigning the value 0 to any cell that contains text.
AVERAGEIF	Statistical	Returns the arithmetic mean of all cells in a range that satisfy a given criterion.
AVERAGEIFS	Statistical	Returns the arithmetic mean of all cells in a range that satisfy multiple criteria in multiple ranges.
CHOOSE	Spreadsheet	Returns one value from the specified data, selected according to the index passed as an argument.
COUNT	Statistical	Returns a count of the numeric values in the specified data, ignoring empty cells and cells that contain text.
COUNTA	Statistical	Returns a count of the numeric and text values in the specified data, ignoring empty cells.
COUNTBLANK	Statistical	Returns the number of empty cells in the specified data.
COUNTIF	Statistical	Returns the number of cells in a range that satisfy a given criterion.
COUNTIFS	Statistical	Returns the number of cells that satisfy multiple criteria in multiple ranges.

Function	*Category*	*Description*
HLOOKUP	Spreadsheet	Searches for a specified value in the first row of a table (often a column heading) and returns a value retrieved from the same column but a different row. HLOOKUP stands for horizontal lookup.
INDEX	Spreadsheet	Returns the contents of one cell in a table. The position of that cell is specified by row and column offsets. Can also be used in an array formula context to retrieve data from multiple cells.
INDIRECT	Spreadsheet	Returns a valid reference constructed from a supplied string representation of the reference. This function is powerful because it enables a user to create dynamic references.
LOOKUP	Spreadsheet	Searches for a specified value in a single row or column and returns a value from the same position in a second row or column. It is not necessary for the search and result areas to be adjacent.
MATCH	Spreadsheet	Returns the relative position of a search item in a single row or column range.
MAX	Statistical	Returns the maximum value in the specified data, ignoring empty cells and cells that contain text.
MAXA	Statistical	Returns the maximum value in the specified data, ignoring empty cells but assigning the value 0 to any cell that contains text.
MAXIFS	Statistical	Returns the maximum value of all cells in a range that satisfy multiple criteria in multiple ranges.
MEDIAN	Statistical	Returns the median value of the specified data. The median of a finite list of numbers is the "middle" number, when those numbers are listed in order from smallest to greatest.
MIN	Statistical	Returns the minimum value in the specified data, ignoring empty cells and cells that contain text.
MINA	Statistical	Returns the minimum value in the specified data, ignoring empty cells but assigning the value 0 to any cell that contains text.
MINIFS	Statistical	Returns the minimum value of all cells in a range that satisfy multiple criteria in multiple ranges.
MODE MODE.SNGL	Statistical	Returns the mode value of the specified data. The mode is the most common value in a list of values. If there are several values with the same frequency, the smallest value is returned.
MODE.MULT	Statistical	Returns a vertical array of the mode values of the specified data. The mode is the most common value in a list of values. The function returns more than one value when there are multiple modes sharing the same frequency of occurrence.
OFFSET	Spreadsheet	Returns a modified reference to a single cell or a range of cells, offset by a certain number of rows and columns from a given reference point.

Function	*Category*	*Description*
PRODUCT	Mathematical	Returns the product of the numeric values in the specified data, ignoring empty cells and cells that contain text.
STDEV STDEV.S	Statistical	Returns the sample standard deviation of the specified data, ignoring empty cells and cells that contain text.
STDEVA	Statistical	Returns the sample standard deviation of the specified data, ignoring empty cells but assigning the value 0 to any cell that contains text.
STDEVP STDEV.P	Statistical	Returns the population standard deviation of the specified data, ignoring empty cells and cells that contain text.
STDEVPA	Statistical	Returns the population standard deviation of the specified data, ignoring empty cells but assigning the value 0 to any cell that contains text.
SUBTOTAL	Mathematical	Returns an overall result calculated by applying a selected total function to the specified data. Eleven selectable total functions are available, including average, count, maximum, minimum, product, standard deviation, sum, and variance. Use this function with AutoFilter to take only the filtered records into account.
SUM	Mathematical	Returns the sum of the specified data, ignoring empty cells and cells that contain text.
SUMIF	Mathematical	Returns the sum of all cells in a range that satisfy a given criterion.
SUMIFS	Mathematical	Returns the sum of all cells in a range that satisfy multiple criteria in multiple ranges.
VAR VAR.S	Statistical	Returns the sample variation of the specified data, ignoring empty cells and cells that contain text.
VARA	Statistical	Returns the sample variation of the specified data, ignoring empty cells but assigning the value 0 to any cell that contains text.
VARP VAR.P	Statistical	Returns the population variation of the specified data, ignoring empty cells and cells that contain text.
VARPA	Statistical	Returns the population variation of the specified data, ignoring empty cells but assigning the value 0 to any cell that contains text.
VLOOKUP	Spreadsheet	Searches for a specified value in the first column of a table (often a row heading) and returns a value retrieved from the same row but a different column. VLOOKUP stands for vertical lookup.



Calc Guide 7.5

Chapter 15
Setting up and Customizing

Introduction

This chapter presents some of the setup options found under **Tools > Options** on the Menu bar (**LibreOffice > Preferences** on macOS). Additional options, and more details about those given here, are covered in the Help and in Chapters 2 (Setting up LibreOffice) and 14 (Customizing LibreOffice) in the *Getting Started Guide*.

This chapter also describes some common customizations to menus, toolbars, and keyboard shortcuts. Other customizations are made easy by extensions that you can install from the LibreOffice website or from other providers.

LibreOffice options

This section covers some of the settings that apply to all the components of LibreOffice and are of particular interest to users of Calc.

1) Choose **Tools > Options** to open the Options dialog. The list on the left-hand side varies depending on which LibreOffice component is open. The illustrations in this chapter show the list as it appears when Calc is open.
2) Click the expansion symbol (+ or triangle) next to *LibreOffice*. A list of subsections drops down.

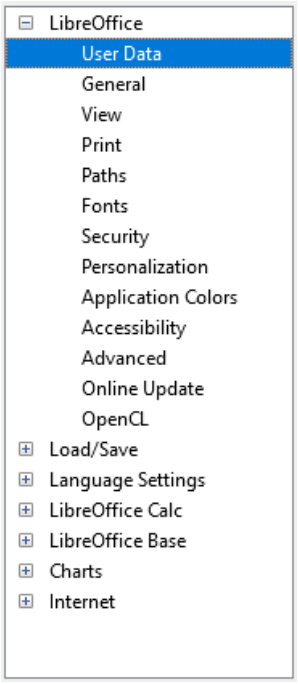


Figure 496: LibreOffice options

Note

The **Reset** button, located in the lower right of the full Options dialog, has the same effect on all pages of the dialog. It resets the options to the values that were in place when you opened the dialog.

User data

User data is used by templates and wizards in LibreOffice. For example, Calc uses the first and last name stored here to fill in the *Created* and *Modified* fields in the document properties. These fields may also be used in the footer of a printed spreadsheet or as the name associated with comments. If you want your name to appear, then fill in the form on the *LibreOffice – User Data* page.

View

The options on the *LibreOffice – View* page affect how the document window looks and behaves, including the size and style of toolbar and Sidebar icons. Set these options to suit your personal preferences.

Print

On the *LibreOffice – Print* page, you can 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 (through the Print dialog).

Calc-specific print options are described in “Print options” below.

See Chapter 7, Printing, Exporting, Emailing, and Signing, for more about these options.

Paths

On the *LibreOffice – Paths* page, you can change the location of files associated with, or used by, LibreOffice to suit your needs. For example, you might want to store spreadsheets by default on a shared server. Some items can have at least two paths listed: one to a shared folder (which might be on a network) and one to a user-specific folder (normally on the user’s personal computer).

Security

Use the *LibreOffice – Security* page to choose security options for saving documents and for opening documents that contain macros.

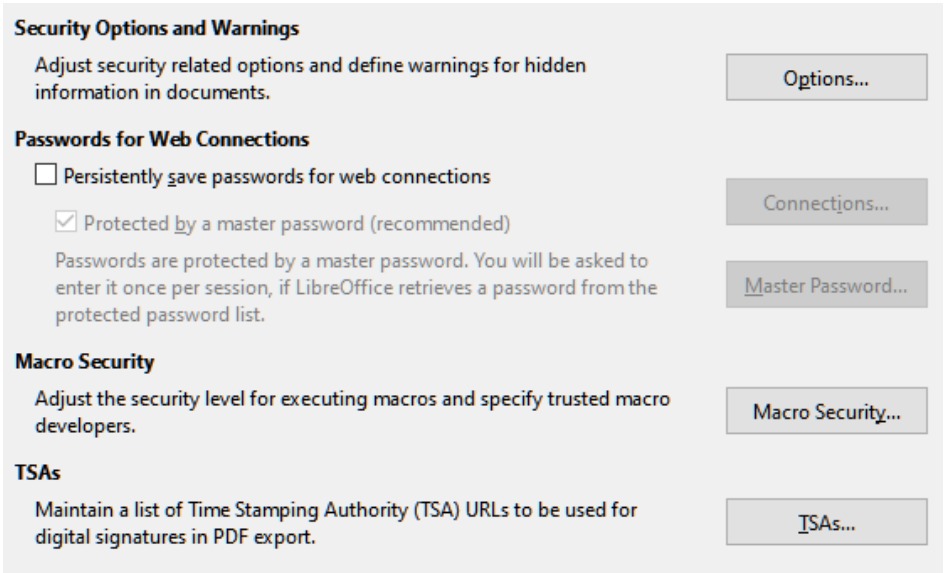


Figure 497: Choosing security options for opening and saving documents

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 (see Figure 498).

Passwords for Web Connections

You can enter a master password to enable easy access to websites that require a user name and password. If you select the **Persistently save passwords for web connections** option, the Set Master Password dialog opens. LibreOffice will securely store all passwords that you use to access files from web servers. You can retrieve the passwords from the list after you enter the master password.

Macro Security

Click the **Macro Security** button to open the Macro Security dialog, where you can adjust the security level for executing macros and specify trusted sources.

Certificate Path

Users can digitally sign documents using LibreOffice. A digital signature requires a personal signing certificate. Most operating systems can generate a self-signed certificate. However, a personal certificate issued by an outside agency (after verifying an individual's identity) has a higher degree of trust associated with it than a self-signed certificate. LibreOffice does not provide a secure method of storing these certificates, but it can access certificates that have been saved using other programs. Click the **Certificate** button and select which certificate store to use.

Note

The Certificate Path option appears only on Linux and macOS systems. On Windows, LibreOffice uses the default Windows location for storing and retrieving certificates.

TSAs –Time Stamping Authorities

Allows you to optionally select a Time Stamping Authority (TSA) URL for PDF documents created by LibreOffice. Adding a trusted timestamp to an electronic signature on a PDF provides a digital seal of data integrity and a trusted date and time of when the file was signed. Recipients of PDF documents with a trusted timestamp can verify when the document was digitally or electronically signed, as well as verify that the document was not altered after the date the timestamp vouches for.

Security Options and Warnings

The following options are on the Security Options and Warnings dialog (Figure 498).

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 **Reset Properties** button under **File > Properties > General** on the Menu bar.

Ctrl-click required to open 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.

The other options on this dialog should be self-explanatory.

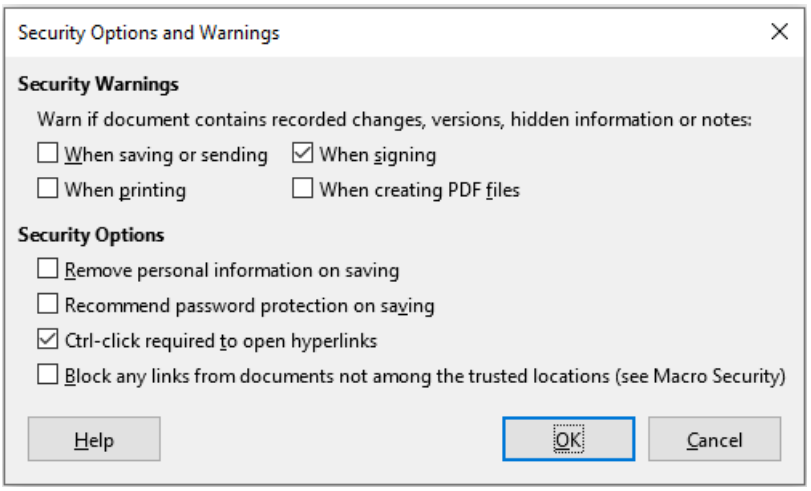


Figure 498: Security Options and Warnings dialog

Application colors

On the *LibreOffice – Application Colors* page (Figure 499), you can specify which user interface elements are visible and the colors used to display them. Scroll down the list until you find the section headed *Spreadsheet*. To change the default color for *Grid lines* or other on-screen indicators, click the down-arrow by the color and select a new color in the drop-down list.

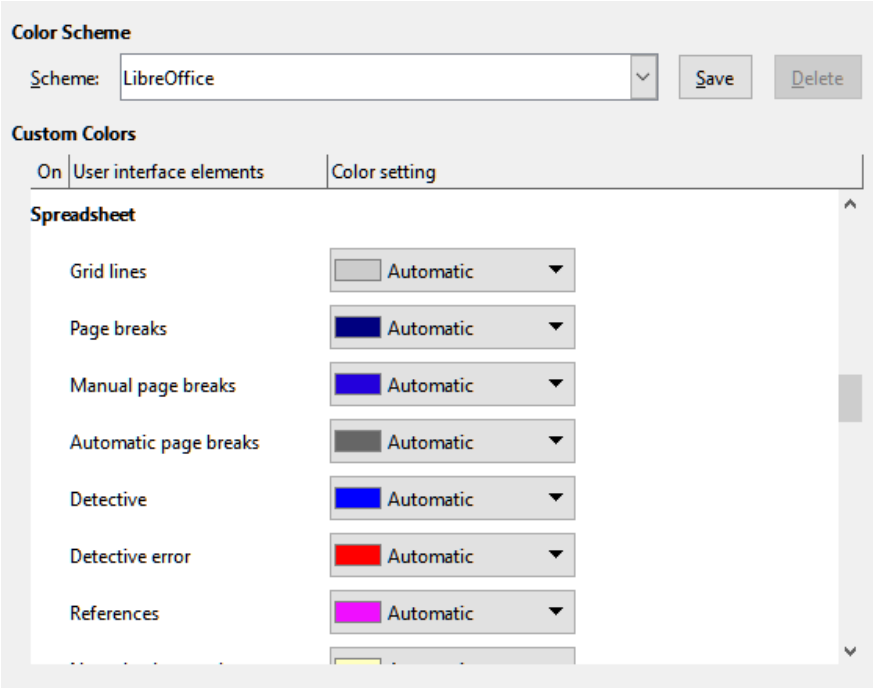


Figure 499: Changing the color of elements in Calc

If you wish to save your color changes as a color scheme, click **Save**, type a name in the *Name of color scheme* box in the pop-up dialog, and then click **OK**.

LibreOffice is supplied with a default color scheme (entitled “LibreOffice”) and an alternative preset color scheme (entitled “LibreOffice Dark”). The latter may be preferable in some working environments where a reduction in the amount of bright white light on the screen could be beneficial. Use the *Scheme* drop-down menu to select one of these schemes, or some alternative scheme that you have already created and saved. As you make selections in this menu, the *Custom Colors* area on the dialog is updated to show the settings for the chosen scheme and the underlying Calc window is also updated accordingly – if you subsequently press the **Cancel** button, the previously selected color scheme is re-applied.

Advanced options

Two items of interest on this page are found under *Optional Features*:

Enable experimental features (may be unstable)
Selecting this option enables features that are not yet complete or contain known bugs. The list of these features is different version by version.

Enable macro recording (may be limited)
This option enables macro recording, with some limitations. For more about macro recording, see Chapter 13, Getting Started with Macros, in the *Getting Started Guide*, and Chapter 13, Macros, in this book.

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 most 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** on the Menu bar. Click the expansion symbol (+ or triangle) by Load/Save on the left-hand side to display the list of load/save options pages.

General

Many of the choices on the *Load/Save – General* page (Figure 500) are familiar to users of other office suites. Those of most interest to Calc users are in the *Default File Format and ODF Settings* section.

Default File Format and ODF Settings

ODF format version: LibreOffice by default saves documents in OpenDocument Format (ODF) version 1.3 Extended. You will rarely need to change this for compatibility when exchanging files with other people.

Document type: If you routinely share documents with users of Microsoft Excel, you might want to change the **Always save as** option to one of the Excel formats, including XLSX. However, you can choose an Excel format when you save any individual file.

We recommend that you always save a working copy in ODS format and only create an Excel version if necessary for sharing. Also, note that recent versions of Microsoft Excel can open ODS files, so this may no longer be needed.

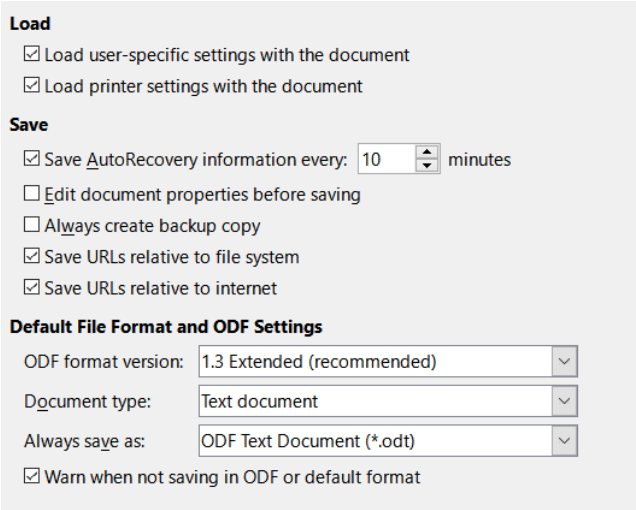


Figure 500: Choosing Load and Save general options

VBA Properties

On the *Load/Save – VBA Properties* page (Figure 501), you can choose whether to keep any VBA (Visual Basic for Applications) macros in Microsoft Office documents that are opened in LibreOffice.

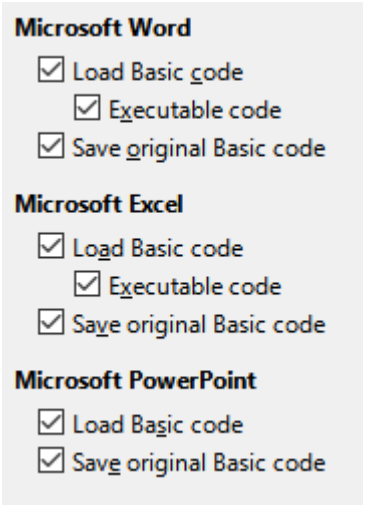


Figure 501: Choosing Load/Save VBA Properties

If you choose **Load Basic code**, you can edit the macros in LibreOffice. The changed code is saved in an ODF document but is not retained if you save into a Microsoft Office format.

If you choose **Save original Basic code**, the macros will not work in LibreOffice but are retained unchanged if you save the file into Microsoft Office format.

If you are importing a Microsoft Word or 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 LibreOffice Basic IDE you will notice that it is all commented), with this option the code is ready to be executed.

Save original Basic code takes precedence over **Load Basic code**. If both options are selected and you edit the disabled code in LibreOffice, the original Microsoft Basic code will be saved when saving in a Microsoft Office format.

To remove any possible macro viruses from the Microsoft Office document, deselect **Save original Basic code**. The document will be saved without the Microsoft Basic code.

Microsoft Office

On the *Load/Save – Microsoft Office* page (Figure 502), you can choose what to do when importing or exporting Microsoft Office OLE objects (linked or embedded objects or documents such as spreadsheets or equations): convert them into or from the corresponding LibreOffice OLE object or load and save them in their original format.

Select the [L] options to convert Microsoft OLE objects into the corresponding LibreOffice OLE objects when a Microsoft document is loaded into LibreOffice.

Select the [S] options to convert LibreOffice OLE objects into the corresponding Microsoft OLE objects when a document is saved in a Microsoft format.

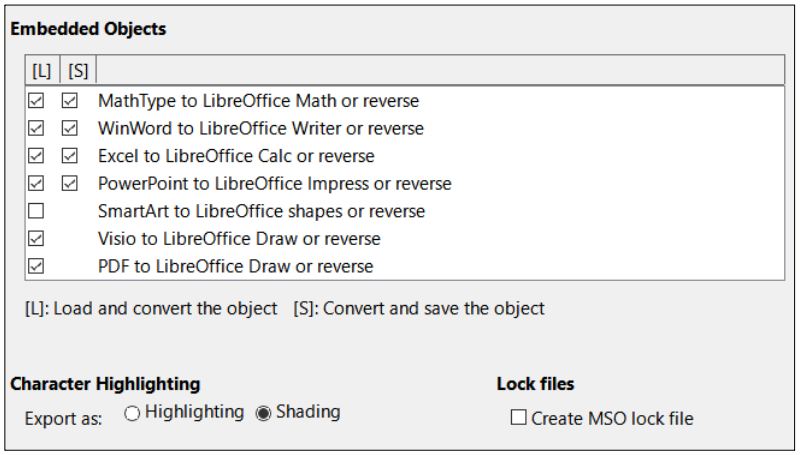


Figure 502: Choosing Load/Save Microsoft Office options

The *Character Highlighting* options enable you to select between the two text highlighting (character background) attributes that Microsoft Office provides, **Highlighting** or **Shading**. **Shading** is the initial default.

The **Create MSO lock file** option improves interoperability with Microsoft Office for shared spreadsheets. When enabled, Calc writes two lock files when opening a Microsoft Office format file, one LibreOffice lock file and one Microsoft Office lock file. This enables users of both suites to be made aware that the file is in use. The option is initially disabled by default.

HTML Compatibility

Choices made on the *Load/Save – HTML Compatibility* page (Figure 503) affect how LibreOffice imports or exports HTML pages. See Chapter 2, Setting up LibreOffice, in the *Getting Started Guide*, and "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

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 13, Macros, for more information.

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.

Print layout

Select this option to export the print layout of the current document as well. The HTML filter supports CSS2 (Cascading Style Sheets Level 2) for printing documents. These capabilities are only effective if print layout export is activated.

Copy local images to Internet

Select this option to automatically upload the embedded pictures to an Internet server when uploading using FTP.

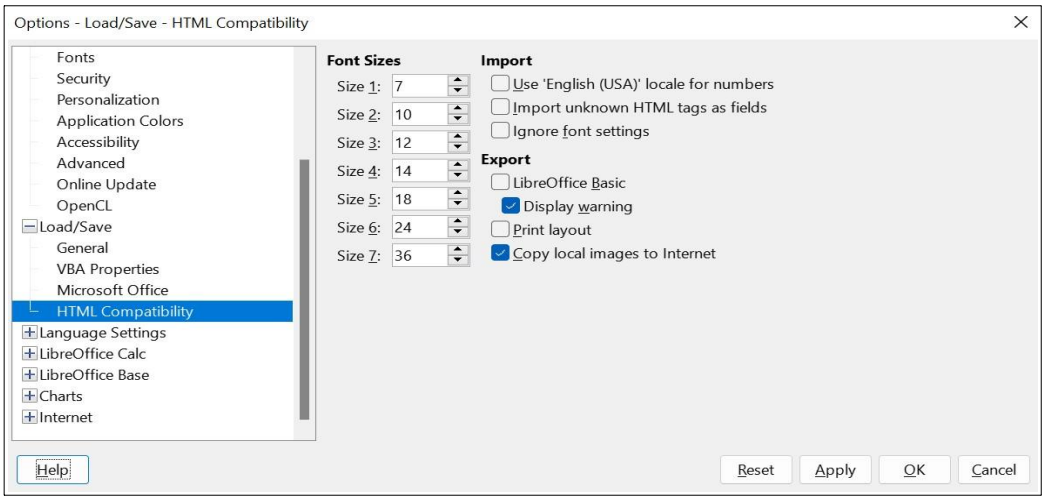


Figure 503: Choosing HTML compatibility options

Calc-specific options

Calc must be open in order for the LibreOffice Calc options to be displayed in the Options dialog. Click the expansion symbol (+ or triangle) by *LibreOffice Calc*. A list of subsections drops down (Figure 504).

General

The choices on the *LibreOffice Calc – General* page (Figure 505) affect the units used for rulers and other measurements, the default tab stop positions, the updating of links and fields, and various input settings.

Metrics section

Choose the unit of measurement used in spreadsheets and the default tab stops distance.

Update links when opening section

Choose whether to update links when opening a document: **Always**, **On request**, or **Never**. Spreadsheets that include many or large charts or graphics may load slowly if this option is set to **Always**.

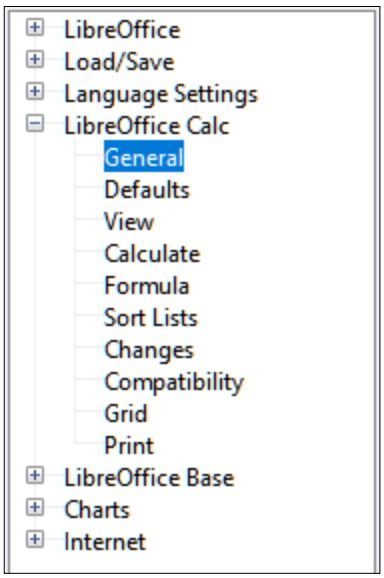


Figure 504: Calc options

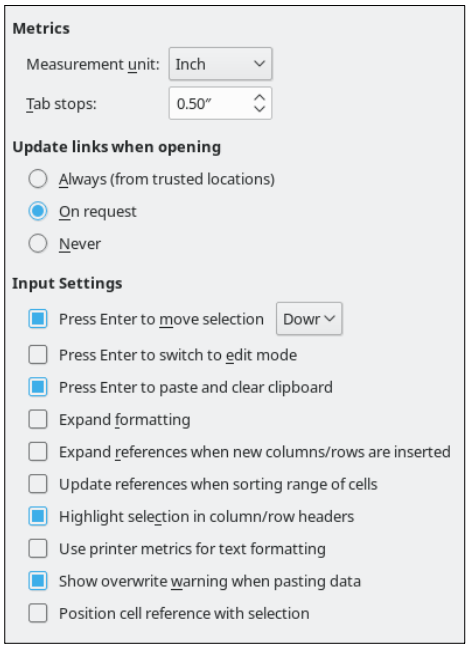


Figure 505: Selecting general options for Calc

Input Settings

Press Enter to move selection

Specifies that pressing *Enter* moves the cursor to another cell. You can also choose the direction the cursor moves: **Up**, **Down**, **Left**, or **Right**. If this option is not selected, pressing *Enter* places the data into the 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. To end edit mode and move the cursor in the desired direction, press *Enter* again.

Press Enter to paste and clear clipboard

When the content of a cell is copied to the clipboard, you can paste the information in another cell by pressing the *Enter* key. After pasting occurs, the clipboard is cleared. Here you can enable/disable this feature.

Expand formatting

Specifies whether to automatically apply the formatting attributes of the selected cell to empty adjacent cells. If, for example, a selected 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. This feature works only while you are inserting data in adjacent cells with the previous formatting style; if you insert some data in a non-adjacent cell, Expand formatting will no longer work. In order to get it to work again, you will need to format a cell again (it could be the same one if you like) and insert data into its adjacent cells.

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.

Update references when sorting range of cells

When selected, references to cells are updated when a range of cells is sorted. If not selected, the references are unchanged.

Highlight selection in column/row headers

Specifies whether to highlight column and row headers in the selected columns or rows.

Use printer metrics for text formatting

Select this option to use the properties of the default printer to format the display of a spreadsheet. Those properties can be found by choosing **File > Printer Settings** and then selecting the **Properties** button for the default printer. If the printer has options for page setup, those settings will be applied to Calc documents. If this option is not selected, pages will be configured for a generic printer.

Show overwrite warning when pasting data

Pasting contents of the clipboard into a cell will replace the contents of that cell with what is in the clipboard. Select this option to be alerted to a possible loss of data when pasting.

Position cell reference with selection

With this option set, expanding a selection (with *Ctrl+Shift+Down/Up*) jumps to the end of the range in the column that was added as last to the initial selection. When the option is not set, expanding a selection (with *Ctrl+Shift+Down/Up*) jumps to the end of the range in the column where selecting the cell range was started. The same applies when extending a selection on rows, with *Ctrl*+*Shift+Left/Right*.

Defaults

On the *LibreOffice Calc – Defaults* page you can enter the number of sheets to be opened by default when you start a new spreadsheet, and either accept the default sheet prefix or type a new one. After a spreadsheet has been created, you can add new sheets and change the label of any tab; see Chapter 1, Introduction, for more information.

View

The options on the *LibreOffice Calc – View* page (Figure 506) affect the way the document window looks and behaves when viewed onscreen.

Display section
Select various options for the display.

Formulas
Display the content of a cell either as a formula or as the result of that formula.

Zero values
Display a zero in a cell when the cell has a value of zero, or display an empty cell.

Comment indicator
Select this option to show a small symbol in the top right corner of a cell that contains a comment.

To always display a comment, right-click on the cell and select **Show comment** in the context menu.

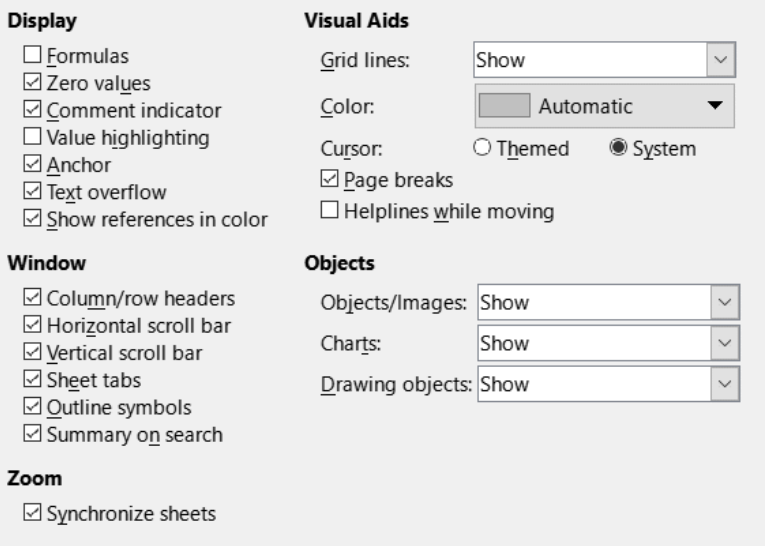


Figure 506: Selecting view options for Calc

Value highlighting
Select this option to highlight all values, or results of formulas, in the sheet. Text is highlighted in black; numbers, dates and logical values in blue, since they are all handled as numbers by Calc; formulas are displayed in green. When this option is active, any colors assigned in the document are not displayed.

Anchor
If an inserted object, such as a picture, is anchored to a cell, an image of an anchor will appear in the cell to which the object is anchored.

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. If this option is selected, text will wrap inside the cell and the height of the row will expand to accommodate the hight of the expanded cell.

Show references in color

Select this option to provide a visual aid to assist the editing of a formula. Each reference is then highlighted in color in the formula, and the referenced cell range is enclosed by a colored border as soon as the cell containing the reference is selected for editing.

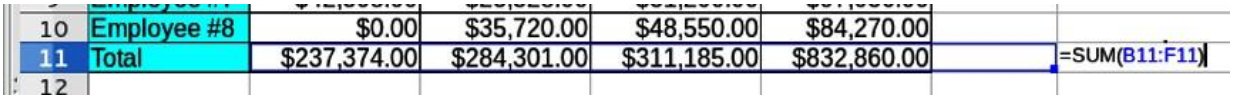


Figure 507: Formula references – visual aids

Window section

The following elements of the spreadsheet window can be made visible or invisible: column and row headers, horizontal and vertical scroll bars, sheet tabs, and, if an outline has been defined, outline symbols.

If the **Sheet tabs** option is not selected, you can only switch between the sheets by using the Navigator.

The **Summary on search** option controls the display of the Search Results dialog, which is described in detail in Chapter 2, Entering and Editing Data.

Visual Aids section

Grid lines

Grid lines are the borders around the cells of a spreadsheet when viewed onscreen. The options are: **Show**, **Show on colored cells**, or **Hide**. If grid lines are hidden, tables will be displayed on a solid background with no grid around cells. The color choice overrides the selection made in **Tools > Options > LibreOffice > Application Colors > Spreadsheet > Grid lines**.

Note

To print grid lines, choose **Format > Page Style > Sheet > Print > Grid**.

Color

Specifies the color for the gridlines. A color can be chosen from different pallettes or can be set to Automatic for the default gray.

Pointer

When the mouse pointer lies over the grid of cells on a Calc spreadsheet, the default pointer (“System”) is normally shown, typically as an arrow pointer. However, an alternative pointer (“Themed”) is available to allow you to switch to using the pointer shape defined in the icon theme (typically a “fat” cross, Figure 508).

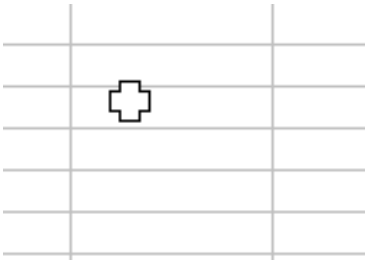


Figure 508: Themed cursor

Page breaks

Specifies whether to view the page breaks within a defined print area.

Helplines while moving

Specifies whether to view helplines when moving drawings, frames, graphics, and other objects. These lines help you align objects.

In Figure 509, the graph with the dark background represents the image in its original location. The lighter area represents the position of the image as it is being moved. Helplines are the horizontal and vertical dotted lines at the corners of the lighter object.

Objects section

Choose whether to show or hide graphics, charts, and drawing objects.

Zoom section

Select the **Synchronize sheets** option to apply any selected zoom (magnification) factor to all sheets in the spreadsheet. If this option is not selected, separate zoom factors can be applied to individual sheets.

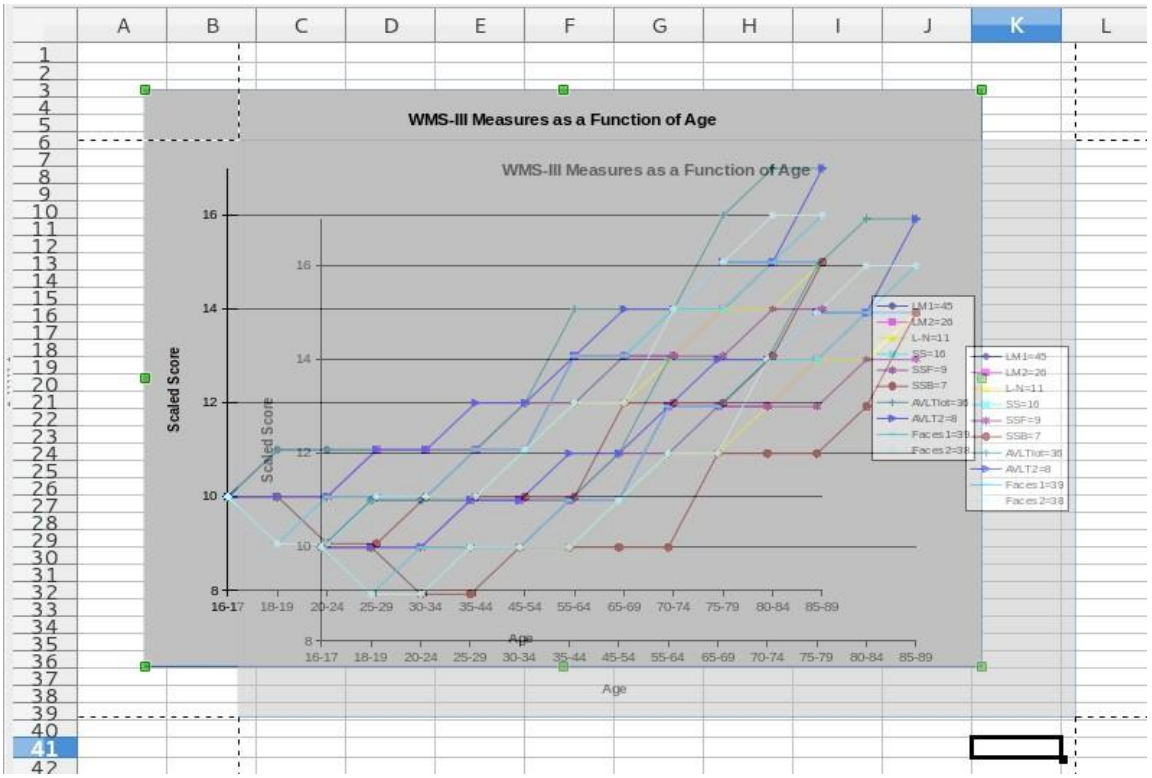


Figure 509: Helplines visible when moving a graphic

Calculate

Use the *LibreOffice Calc – Calculate* page (Figure 510) to define the calculation settings for spreadsheets.

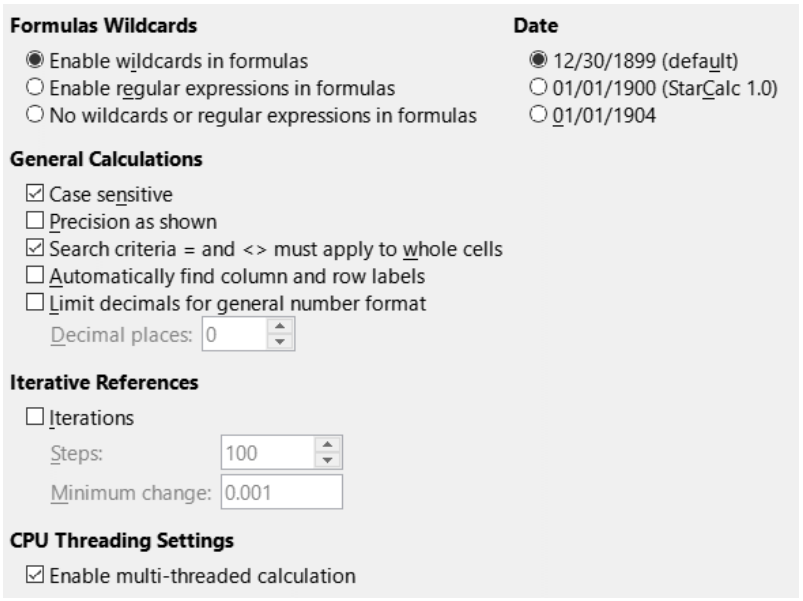


Figure 510: Calc calculation options

Formulas Wildcards section

Enable wildcards in formulas

Specifies that wildcards are enabled when searching and also for character string comparisons. Select this option for spreadsheets that need to be interoperable with Microsoft Excel.

Enable regular expressions in formulas

Specifies that regular expressions instead of simple wildcards are enabled when searching and also for character string comparisons. Do not enable regular expressions in formulas for spreadsheets that need to be interoperable with Microsoft Excel.

No wildcards or regular expressions in formulas

Specifies that only literal strings are used when searching and also for character string comparisons. Do not disable wildcards in formulas for spreadsheets that need to be interoperable with Microsoft Excel.

The options listed above are mutually exclusive. For more information about them, see Chapter 8, Using Formulas and Functions.

Date section

Select the start date for the internal conversion from days to numbers.

12/30/1899 (default) – Sets December 30, 1899 as day zero.

01/01/1900 (StarCalc 1.0) – Sets January 1, 1900 as day zero. Use this setting for StarCalc 1.0 spreadsheets containing date entries.

01/01/1904 – Sets January 1, 1904 as day zero. Use this setting for spreadsheets that are imported from foreign formats.

General Calculations section

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. For example: type 'Test' in cell A1; and 'test' in B1. Then type the formula `=A1=B1` in cell C1. If the **Case sensitive** option is checked, FALSE will appear in the cell; if the analysis was case insensitive, TRUE will appear in the cell. This option is not applied to the EXACT text function, which is always case-sensitive.

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 the **Precision as shown** option is not marked, the displayed numbers are rounded, but they are calculated internally using the non-rounded number.

Search criteria = and <> must apply to whole cells

The default search method in Calc is to search for any instance of the target regardless of the position of the target within a word. For example, when searching for day, Calc will match Friday, Sunday, and days. Select this option to search an exact occurrence of the target. Wildcard symbols can be used to expand the search to match the default condition.

Automatically find column and row labels

Calc will name the range of data, under a column heading or to the right of a row heading, using the text in those headings.

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)`.

Limit decimals for general number format

Limits the number of decimals to be displayed for numbers with the general number format. This overrides the setting applied in the General option of the Format section inside the Number Category in **Format > Cells > Numbers**. This setting refers to how numbers are displayed. When decimal places are limited, calculations are not affected because of rounding.

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.

CPU Threading Settings section

Enable multi-threaded calculation

Controls the use of multi-threading / parallelism, which can be used to speed up LibreOffice Calc calculations on computers with multiple processing cores. See Chapter 8, Using Formulas and Functions for more information.

Caution

When calculations involve a range that includes an empty cell, take note of the setting for **Zero values** in the **LibreOffice Calc > View** options. If this option is not selected, a value of zero will display as an empty cell. Empty cells and the value zero are treated differently by many functions. For example, COUNT will not include an empty cell as an item to be counted. The average of eight cells, one of which contains the value zero, is not the same as the average of eight cells, one of which is empty (an empty cell is not included in determining the average).

Formula

Use the *LibreOffice Calc – Formula* page (Figure 511) to specify the following formula options.

Formula syntax

Syntax is the format in which formulas are written. Choose the syntax most appropriate for your work. If you regularly open or save to Microsoft Excel formats, you may wish to use one of the Excel syntaxes.

To illustrate the differences between syntaxes, assume a spreadsheet contains two sheets.

The cell C4 can be referenced in three ways:

Calc A1 =$Sheet2.C4 - the default syntax for Calc.

Excel A1 =Sheet2!C4 - the default of Microsoft Excel.

Excel R1C1 =Sheet2!R[3]C[2] - the relative row and column addressing used in Excel.

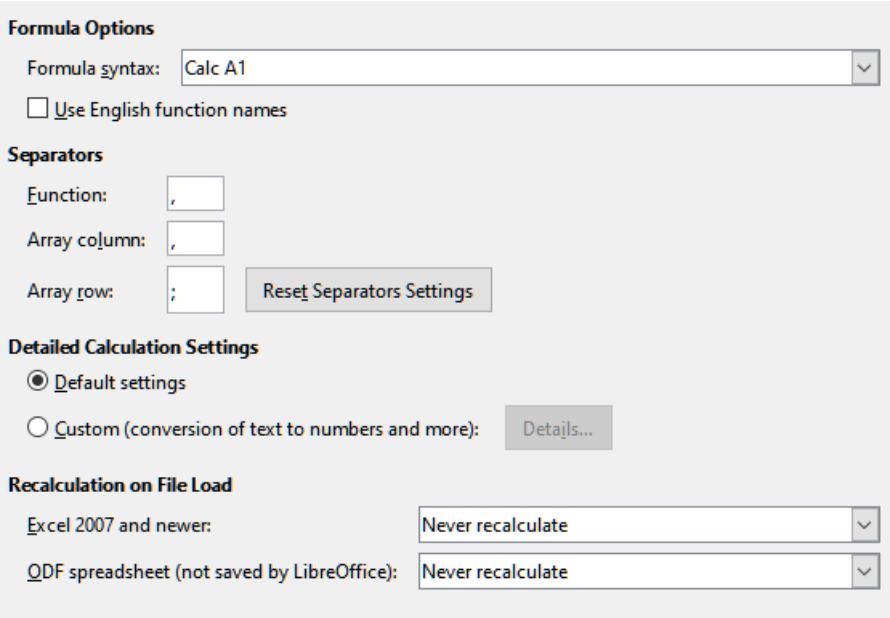


Figure 511: Formula options

Use English function names

The default names for functions in Calc are those for the user's locale. For English users, the localized names are the same as the English names. When the language set by locale is not English, you may wish to express functions in English; if so, select this option to change formula input and display, Function Wizard, and formula tips.

Separators

Separators are used in functions to distinguish points in the range used in the function: the symbols used between elements. Enter the separator character to be used for functions, row arrays, and column arrays. For example, a comma can be used as a separator in functions and instead of writing `=SUM(A1;B1;C1)` the function would be expressed as `=SUM(A1,B1,C1)`.

Detailed Calculation Settings

Most users will not need to change the default setting. For custom settings, select **Custom** and click **Details** to choose reference syntax and whether to treat empty strings as zero.

Recalculation on File Load

Recalculating formulas can take significant time while loading very large files.

Excel 2007 and newer. Loading a large spreadsheet file can take a long time. If you do not need to update your large spreadsheet data immediately, you can postpone the recalculation to a better time. Calc allows you to defer recalculation of Excel 2007 (and more recent) spreadsheets to speed up loading time.

ODF spreadsheet (not saved by LibreOffice). Recent versions of Calc cache spreadsheet formula results in its ODF file. This feature helps Calc to recalculate a large ODF spreadsheet saved by Calc faster. For ODF spreadsheets saved by other programs, where such cached formula results may not exist, recalculation can be deferred to speed up file loading as with Excel 2007 files.

For each of these two options, the following choices are possible: *Never recalculate* (no formulas will be recalculated on loading the file), *Always recalculate* (all formulas will be recalculated on file load), and *Prompt user* (prompt user for action).

Calc saved ODF spreadsheets will honor *Never recalculate* and *Always recalculate* options.

Sort lists

View, define, delete, and edit sort lists on the *LibreOffice Calc – Sort Lists* page. Sort lists are used for more than sorting, for example filling a series of cells during data entry. They are lists that are sorted in a particular order but not alphabetically or numerically; for example, days of the week. In addition to the supplied lists, you can define and edit your own lists, as described in Chapter 2, Entering and Editing Data.

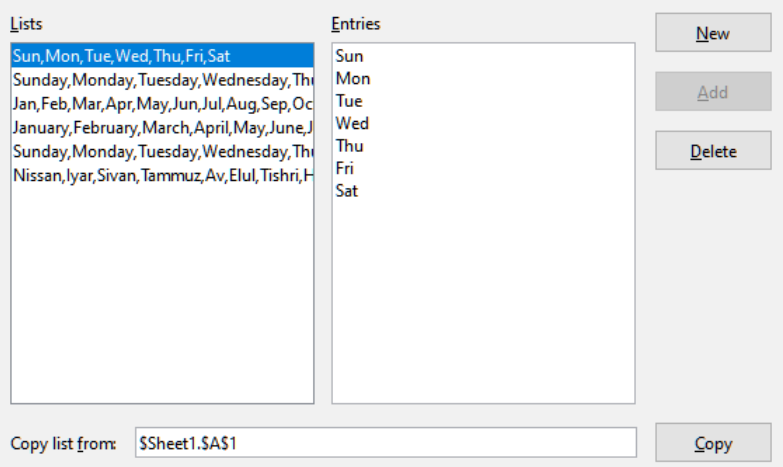


Figure 512: Defining sort lists in Calc

Changes

On the *LibreOffice Calc – Changes* page 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. The selections made here are applied when change recording is enabled by **Edit > Track Changes > Record** on the Menu bar.

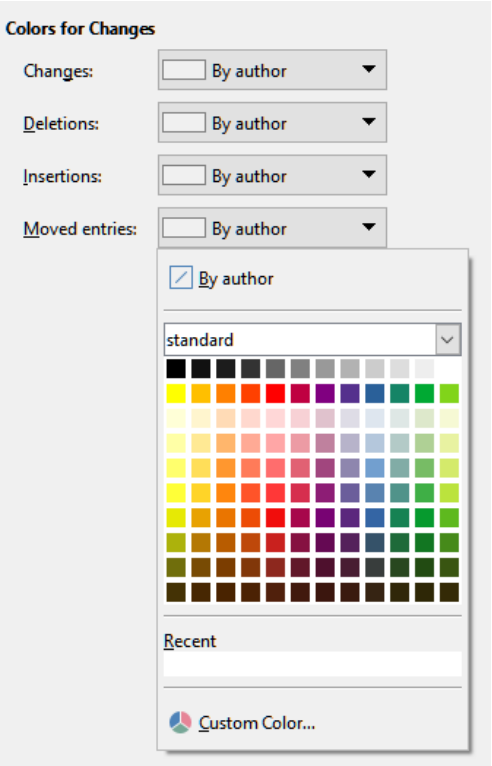


Figure 513: Calc options for highlighting changes

Compatibility

The *LibreOffice Calc – Compatibility* page provides a quick way to switch between LibreOffice's default key bindings and OpenOffice.org's legacy default key bindings for Calc. Most of the defaults are identical, but there are some differences.

The actions associated with the two key binding choices are shown in the table below.

Key Binding	*Default*	*OpenOffice.org legacy*
Backspace	Opens Delete Contents dialog	Immediately deletes contents
Delete	Immediately deletes contents	Opens Delete Contents dialog
Control+D (*Command+D* on macOS)	Fills cell content down within selection	Opens the Selection List dialog
Alt+DownArrow (*Option+DownArrow* on macOS)	Select header of range; no action in empty cell	Increases row height

Grid options

The *LibreOffice Calc – 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.

Grid section

Snap to grid activates the snap function.

Visible grid displays grid points on the screen. These points are not printed.

Resolution and Subdivision sections

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.

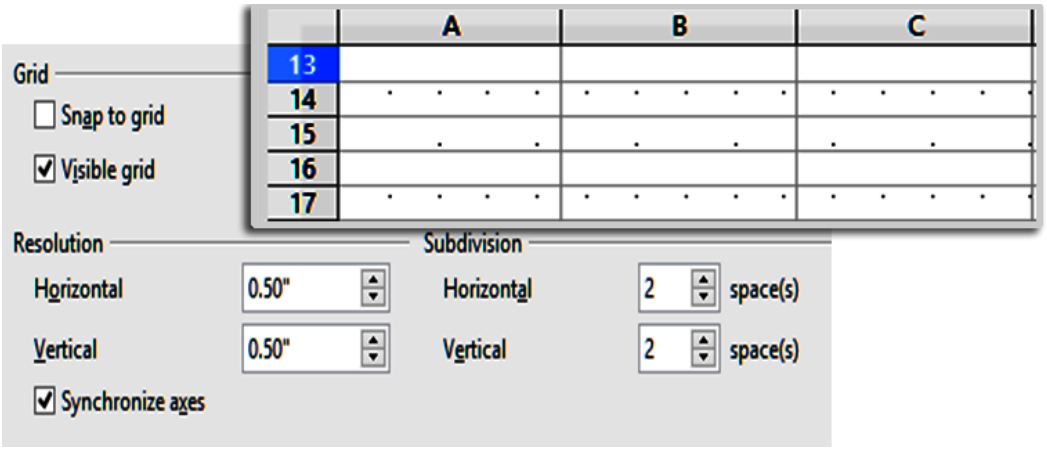


Figure 514: Calc grid options

Print options

Use the *LibreOffice Calc – Print* page to choose defaults for printing spreadsheets. You can override these for individual print jobs.

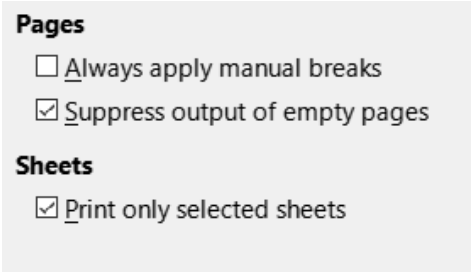


Figure 515: Calc Print options

Default colors for charts

Use **Tools > Options > Charts > Default Colors** to change the default colors used for charts or to add new data series to the list provided.

To add new colors to the choices, see “Adding custom colors” below.

To change the default color for a data series, select it in the left-hand column and then click on the required color in the color table.

To add another data series, click **Add**, then select the new series and click on the required color.

Click **Default** to restore the color settings that were defined when the program was installed.

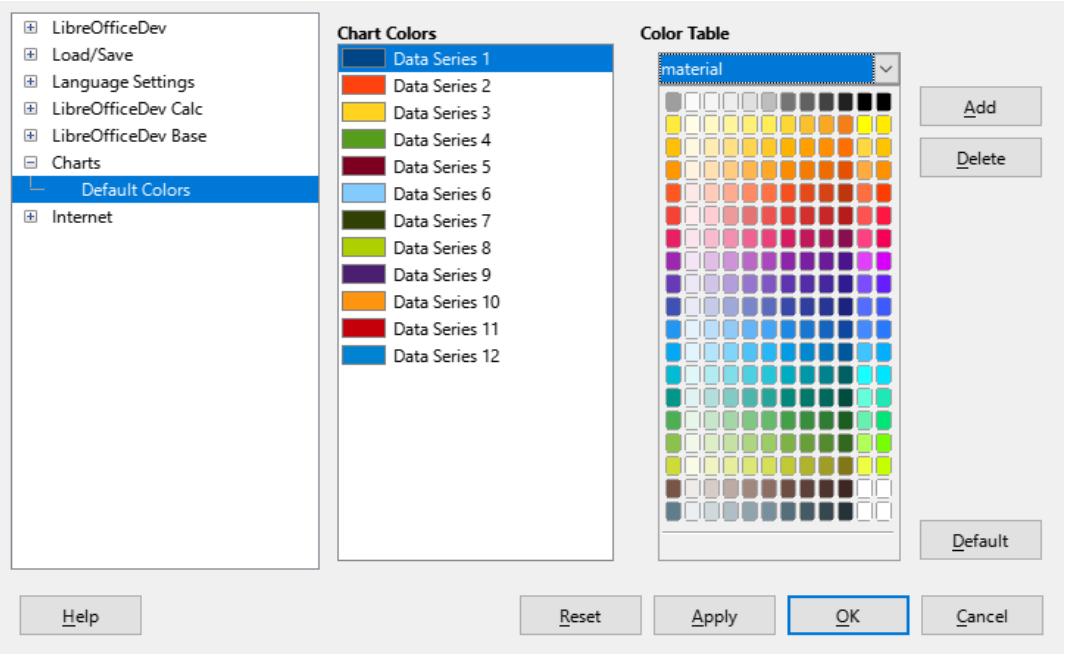


Figure 516: Defining chart colors

Customizing the user interface

You can customize menus, toolbars, keyboard shortcuts, and the tabbed interface; add new menus and toolbars; and assign macros to events.

Tip

Changes to menus and toolbars can be saved in a template. First, save them in a document; then, save that document as a template, as described in Chapter 5, Using Styles and Templates.

Menu content

You can add and rearrange menus on the Menu bar or context (right-click) menus; add, rearrange, and remove commands on menus; and make other changes.

To customize menus, choose **Tools > Customize** on the Menu bar. On the Customize dialog, go to the *Menus* tab (Figure 517) or the *Context Menus* tab. The following examples focus on the *Menus* tab but the *Context Menus* tab is similar in appearance and behavior.

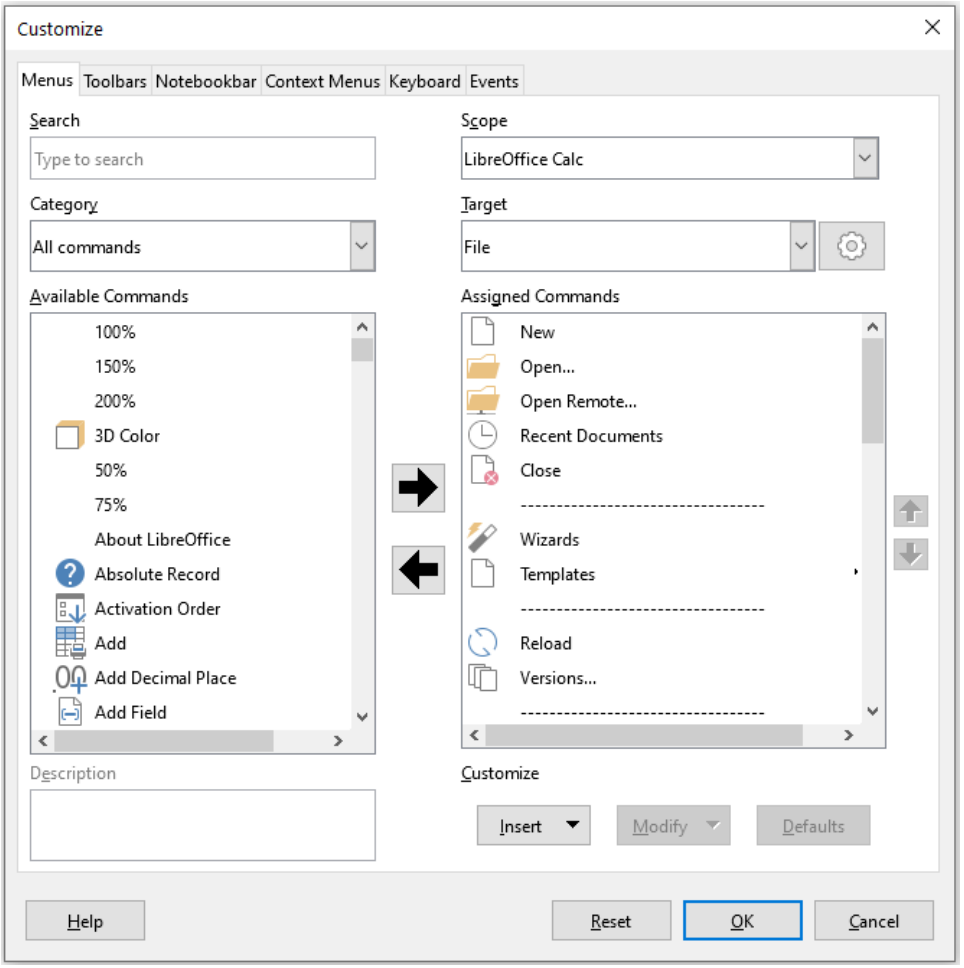


Figure 517: The Menus tab of the Customize dialog

Modifying an existing menu

1) In the *Scope* drop-down list in the upper right of the Customize dialog, choose whether to save this changed menu for Calc or for a selected document.
2) In the *Target* drop-down list, select the menu that you want to customize. The list includes all the sub-menus as well as the main menus. The commands on the selected menu are shown in the *Assigned Commands* list below.
3) To add a command to the selected menu, click on a command in the *Available Commands* list and then click the right arrow. You can narrow the search by using the *Search* box on the top left or selecting the *Category* in the drop-down list. Use the up and down arrows on the far right-hand side to move the command into the place where you want it in the *Assigned Commands* list.
4) To remove a command from the selected menu, click on it in the *Assigned Commands* list and then click the left arrow.
5) To insert a separator or submenu, use the commands in the *Insert* drop-down under *Customize* at the bottom right.

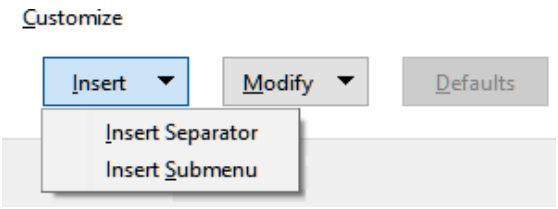


Figure 518: Customize dialog, Menus tab, Insert drop-down

6) To rename a menu item, select it in the *Assigned Commands* list and choose **Rename** in the *Modify* drop-down below.

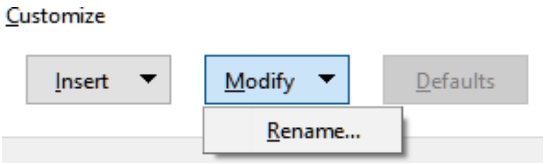


Figure 519: Customize dialog, Menus tab, Modify drop-down

7) Use the **Reset** button to reset Calc's menu configuration to the default settings.

8) When you have finished making all your changes, click **OK** to save them.

Creating a new menu

1) On the *Menus* tab of the Customize dialog, click the button next to the *Target* field (Figure 520) and select **Add** in the drop-down list, to display the New Menu dialog (Figure 521).



Figure 520: Location of command to add a new menu

2) In the New Menu dialog, type a name for the new menu in the *Menu name* box.

3) Use the up and down arrow buttons to move the new menu into the required position on the Menu bar. Click **OK** to save and return to the Customize dialog.

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 above for modifying a menu.

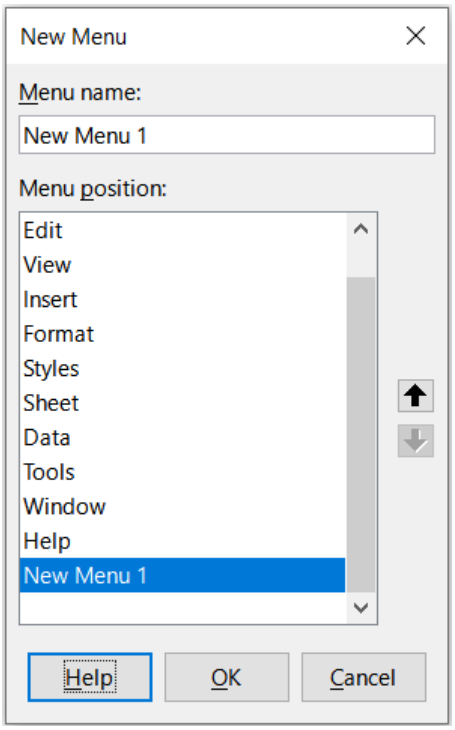


Figure 521: Adding a new menu

Creating an accelerator

You can allocate a letter in a custom menu's name to be used as a keyboard shortcut. (That letter will become underlined.) When you press `Alt+that letter`, that menu or command will be invoked. Existing submenus can also be edited to change the letter which is used to select them using the keyboard when the menu is open.

To create an accelerator:

1) On the Customize dialog, select a menu item in the *Assigned Commands* list.
2) Click the **Modify** button and select **Rename**.
3) Add a tilde (~) in front of the letter to use as an accelerator.
4) Click **OK** to save the change.

For example. if you enter "~Art", the "A" in the menu item **Art** is now underlined. Press *Alt+A* and the **Art** menu will open.

Caution

When assigning an accelerator, be careful not to use a letter that is already assigned to a menu or command associated with a menu item. The same letter-key combinations can be used for commands associated with different menu items but not for those associated with the same menu or menu item.

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 or delete icons (commands) on a toolbar.

To get to the toolbar customization dialog (Figure 522), do any of the following:

- On the toolbar, right-click in the toolbar and choose **Customize Toolbar**.
- Choose **View > Toolbars > Customize** on the Menu bar and go to the *Toolbars* tab.
- Choose **Tools > Customize** on the Menu bar and go to the *Toolbars* tab.

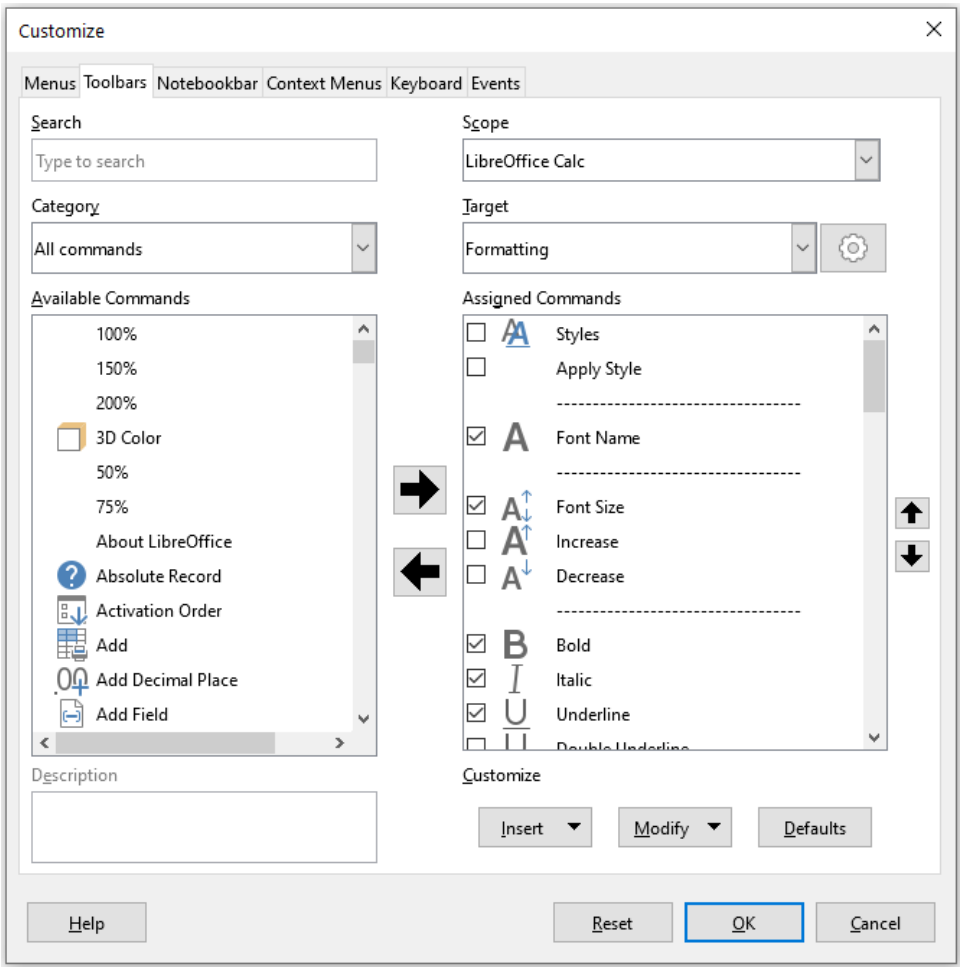


Figure 522: The Toolbars tab of the Customize dialog

To customize a toolbar:

1) In the *Scope* drop-down list on the upper right of the Customize dialog, choose whether to save this changed toolbar for Calc or for a selected document.
2) In the *Target* drop-down list, select the toolbar that you want to customize. The current toolbar content is displayed in the *Assigned Commands* list.
3) Select the command to be added in the *Available Commands* list. You can narrow your search by using the *Search* box on the top left or choosing a category in the drop-down list just below.
4) Click on the large right arrow to add the command to the *Assigned Commands* list for the toolbar. Use the up and down arrows in the far right to position the command in the toolbar.
5) To remove a command from a toolbar, select it in the *Assigned Commands* list and click the large left arrow.
6) To show or hide a command assigned to a toolbar, mark or clear the checkbox next to its icon in the *Assigned Commands* list.

7) To insert a separator, use the command in the *Insert* drop-down under *Customize* at the bottom right.

8) To rename a toolbar item, select it in the *Assigned Commands* list and choose **Rename** in the *Modify* drop-down.

9) Use the **Reset** button to reset Calc's toolbar configuration to the default settings.

10) 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** on the Menu bar.

2) On the *Toolbars* tab of the Customize dialog, click the button next to the *Target* field and select **Add** in the drop-down list, to display the Name dialog.

3) On the Name dialog, type the new toolbar's name and choose in the *Save In* drop-down list where to save this new toolbar – for Calc or for the open document.

The new toolbar now appears on the list of toolbars in the Customize dialog.

To add commands to the new toolbar, follow the instructions earlier for modifying a toolbar.

Choosing icons for toolbar commands

Toolbar buttons can be displayed with **Icon only**, **Text only**, or **Icon and text**. This selection is made through the menu that drops down from the button to the right of the *Target* field. However, 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 523), scroll through the available icons, select one, and click **OK** to assign it to the command.

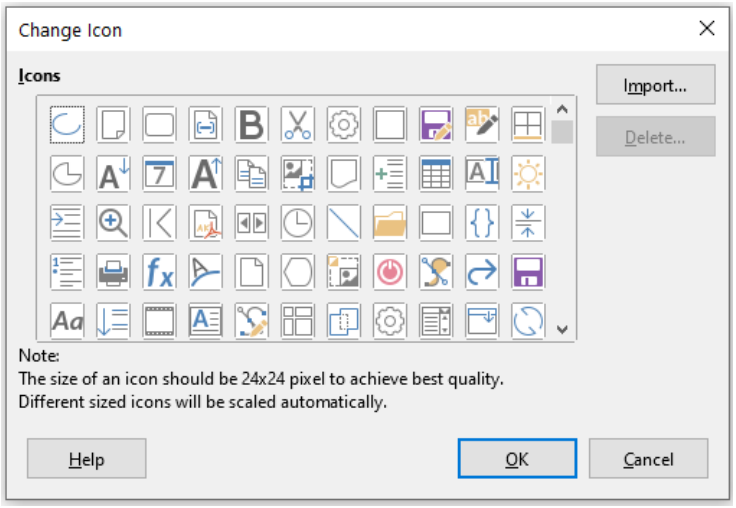


Figure 523: Change Icon dialog

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. For best quality, custom icons should be 24 x 24 pixels in size; other sizes will be scaled automatically.

Select **Modify > Reset Icon** to revert to the option's default icon.

Tabbed interface

By default, Calc's commands are grouped in cascading menus and in toolbars filled with icons. In addition, LibreOffice provides other user interface variants, displaying contextual groups of commands and contents. You can find more information about these variants and how to switch between them in Chapter 16, User Interface Variants.

Three of LibreOffice's user interface variants utilize a notebook bar and these are the *Tabbed*, *Tabbed Compact*, and *Groupedbar Compact* options. In these variants, the area at the top of the workspace is divided into tabs, where each tab displays a set of icons grouped by context. The context can change depending on the object selected in the document, for example a table or an image.

Use the checkboxes on the *Notebookbar* tab of the Customize dialog (Figure 524) to show and hide the individual options on the various tabs that are provided in the most recently selected of the three tabbed user interfaces (with *Tabbed* being the initial default).

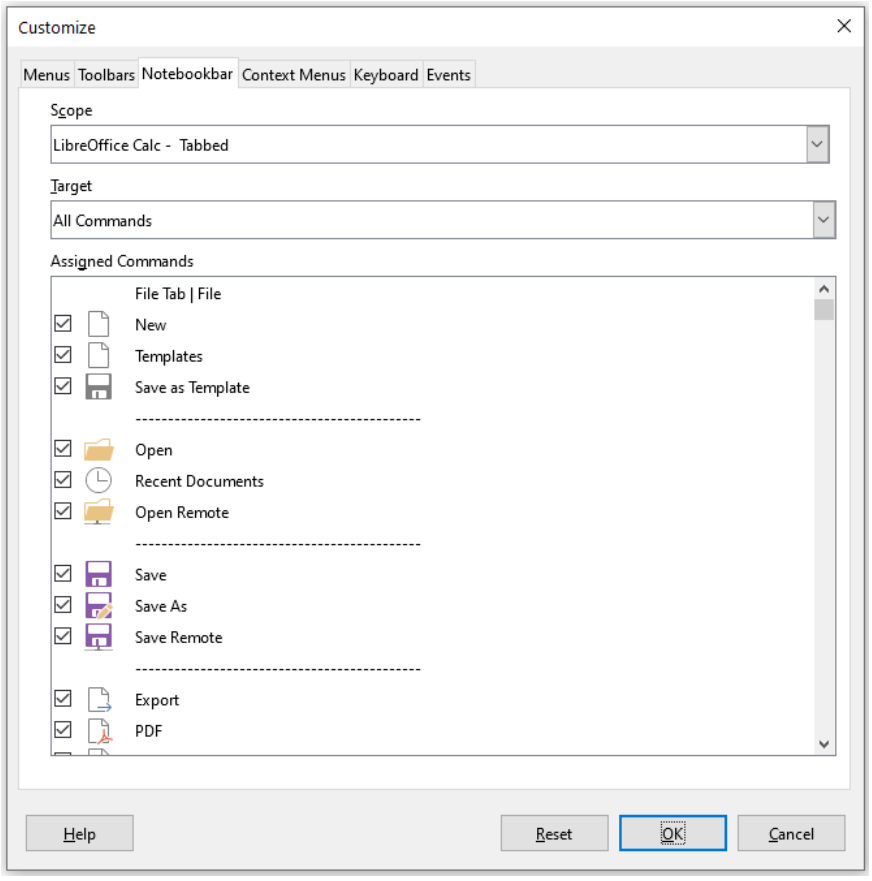


Figure 524: The Notebookbar tab of the Customize dialog

Use the **Reset** button to reset the displayed configuration to the default settings.

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

Avoid reassigning your operating system's predefined shortcut keys.

Note

Shortcut keys that are grayed 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** on the Menu bar and select the *Keyboard* tab. (Figure 525).

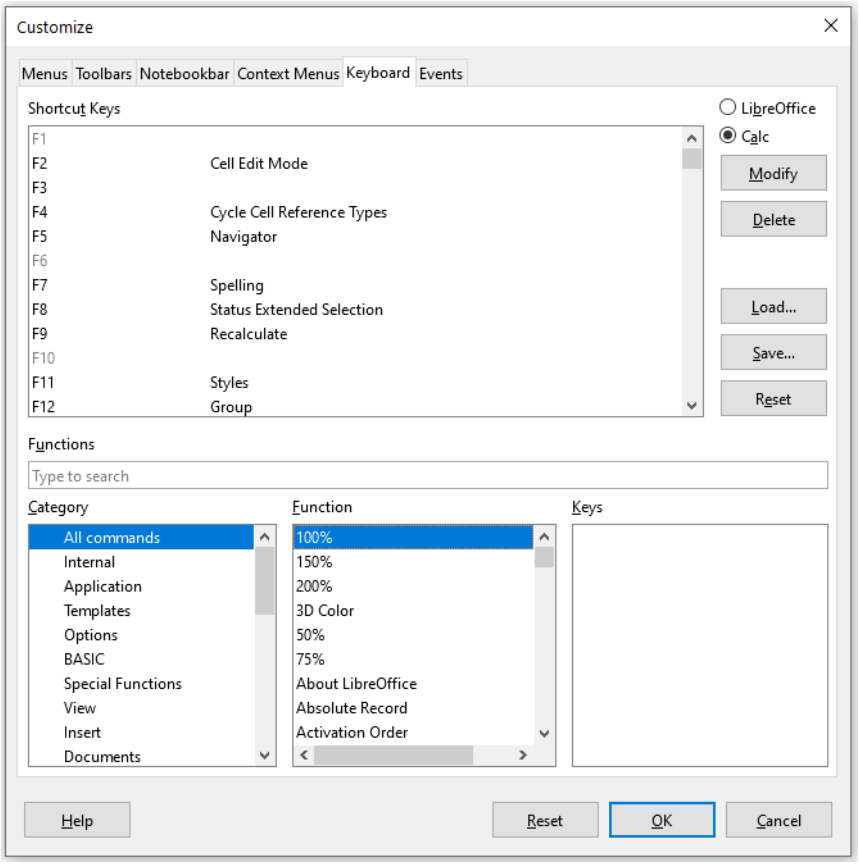


Figure 525: Customizing a keyboard shortcut

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 in 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.

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, or to create a standard keyboard configuration file to be distributed among many users. To save keyboard shortcuts to a file:

1) After making your keyboard shortcut assignments, click the **Save** button on the right of the Customize dialog (Figure 525).
2) In the Save Keyboard Configuration dialog, enter a name for the keyboard configuration file in the *File name* box, or select an existing file (the file extension is .cfg for Configuration).
3) 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 on the 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 on the right of the Customize dialog (adjacent to the **Load** and **Save** buttons). 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 13, Macros.

Assigning macros to events

In LibreOffice, when something happens, we say that an event occurred. For example, a document was opened, a key was pressed, or the mouse moved. You can associate a macro with an event, so the macro is run when the event occurs. A common use is to assign the “open document” event to run a macro that performs certain setup tasks for the document.

To associate a macro with an event, use the *Events* tab of the Customize dialog. For more information, see Chapter 13, Getting Started with Macros, in the *Getting Started Guide*.

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 https://extensions.libreoffice.org/. These extensions are free of charge. Extensions from other sources may be free or may be 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 that is listed in the repository, follow these steps:

1) In LibreOffice, select **Tools > Extension Manager** on the Menu bar, or press *Ctrl*+*Alt*+*E*. In the Extension Manager dialog, click the **Get more extensions online** link.

2) A browser window will open. Find the extension you want and download it to your computer.

3) After the extension is downloaded and saved, return to the Extension Manager dialog and click **Add**. 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.

To install an extension that is not listed in the repository, download the extension, then continue with step 3)) above.

Updating extensions

Click the **Check for Updates** button on the Extension Manager dialog to check for updates to installed extensions.

Removing and disabling extensions

To remove (uninstall) an extension that you installed, select the extension in the main window of the Extension Manager dialog and click the **Remove** button.

To disable an extension without removing (uninstalling) it, select the extension in the main window of the Extension Manager dialog and click the **Disable** button, which then changes to **Enable**.

Tip

Extensions can be installed from some other places in Calc, such as the Gallery on the Sidebar, the Templates dialog, the *Language Settings* > *Writing Aids* page of the **Tools > Options** dialog and the *Icon Style* section in the *View* page of the **Tools > Options** dialog. In each of these places you will find a small button leading to a filtered view of the items in the Extensions dialog.

Note

In some cases, the **Remove** and **Disable** buttons may be unavailable, for example when you have selected one of the extensions that was bundled with your LibreOffice installation.

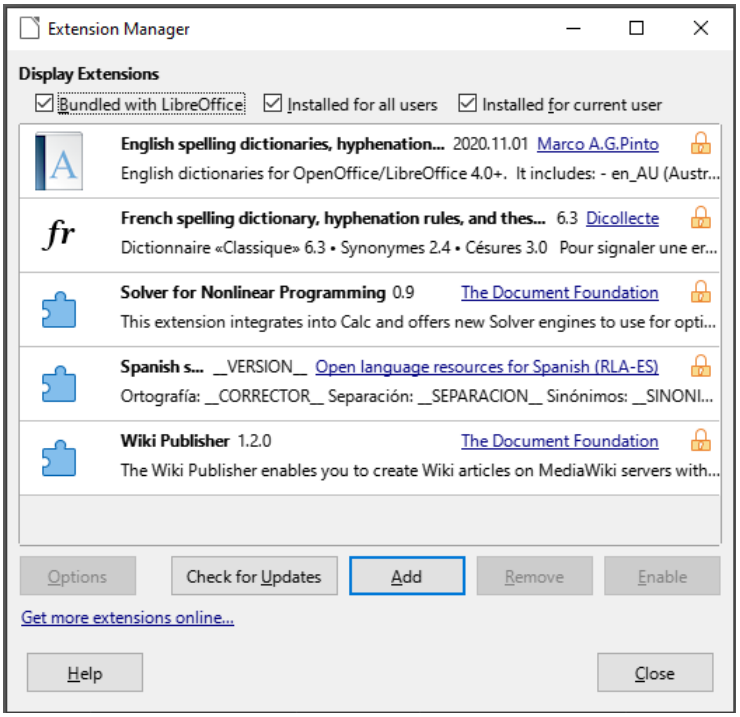


Figure 526: The Extension Manager dialog

Adding custom colors

The method for defining a custom color is as follows:

1) Insert any drawing object, such as a square, into any document.
2) Right-click on the object and choose **Area** in the context menu.
3) Click on the **Color** button on the Area tab (Figure 527). In the *Palette* drop-down in the *Colors* area, choose which palette you wish to add the new color to. Under *New*, define the new color using RGB or Hex notation, or click the **Pick** button to select the color on the Pick a Color dialog (Figure 528).
4) Click **Add** in the lower left corner, enter a name for the new color in the pop-up dialog, and click **OK** to save.
5) Delete the drawing object from the document, if it is not needed.

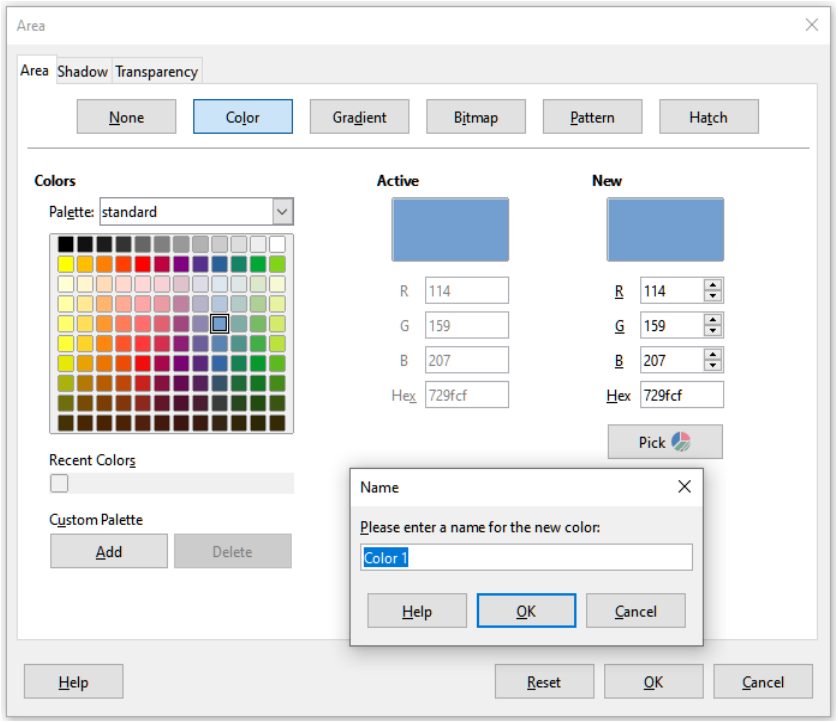


Figure 527: Defining a new color

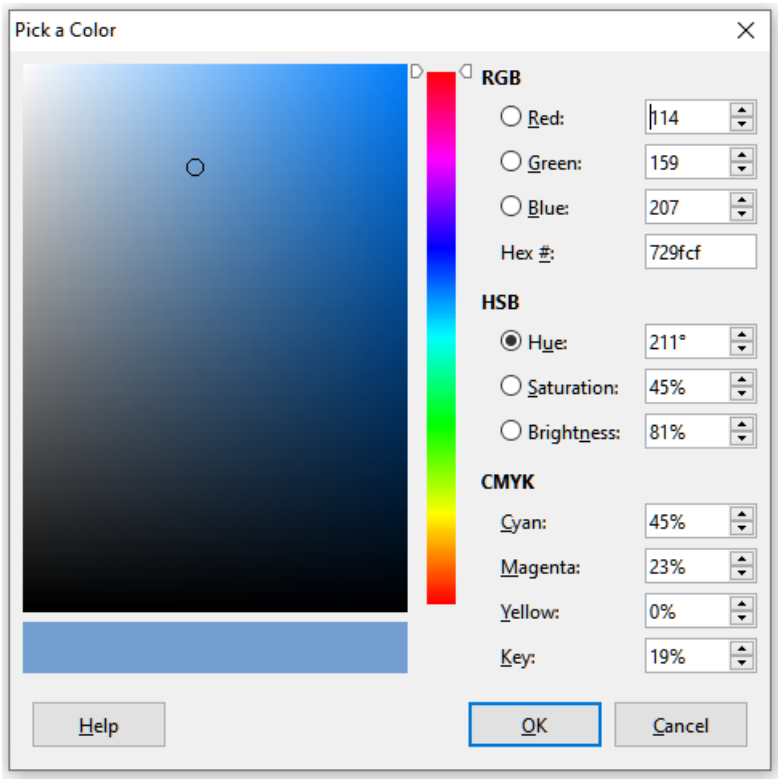


Figure 528: Defining a color by picking it from a color chart



Calc Guide 7.5

Chapter 16
User Interface Variants

Introduction

By default, LibreOffice's commands are grouped in cascading menus and in toolbars filled with icons and this is the classic user interface described in Chapter 1, Introduction and assumed in the task descriptions contained in many other chapters throughout this guide.

The classic interface is very flexible, allowing the user to: show, hide, or reposition many of the user interface components; redefine the commands assigned to toolbars, menus, and context menus; create new menus and toolbars; redefine the functions assigned to individual shortcuts; and so on.

A further level of flexibility is provided through six alternative user interface variants which can be selected to match an individual user's work flows and preferences. The seven available variants are:

Standard Toolbar
: Standard user interface with menus, toolbars, and collapsed Sidebar. Intended for users who are familiar with the classic LibreOffice interface.

Tabbed
: The Tabbed user interface is the most similar to the ribbons used in Microsoft Office. It organizes functions in tabs and makes the Menu bar obsolete.

Single Toolbar
: Similar to the Standard Toolbar user interface but with a single-line toolbar, intended for use on smaller screens.

Sidebar
: Similar to the Standard Toolbar user interface but with an expanded Sidebar. Expert users who want to quickly change many different properties are advised to use this variant.

Tabbed Compact
: The Tabbed Compact user interface is intended for those with are familiar with the Microsoft Office user interface, and occupies less space for smaller screens.

Groupedbar Compact
: The Groupedbar Compact user interface provides access to functions in groups, with icons for the most-frequently used features, and drop-down menus for others. This variant favors vertical space.

Contextual Single
: The Contextual Single interface shows functions in a single-line toolbar with context-dependent content.

Four of these options (Standard Toolbar, Single Toolbar, Sidebar, and Contextual Single) can be considered as alternative configurations of the components used in the classic interface. However the other three options (Tabbed, Tabbed Compact, and Groupedbar Compact) are based on using the notebook bar. The notebook bar uses a different way to organize controls and icons, displaying contextual groups of commands and contents for quicker use and improved user experience.

It should be noted that the brief description of each variant above refers to the default setup for that variant. There are many ways to adjust the configuration of any variant, and even create a user interface that utilizes different aspects of multiple variants.

Selecting the user interface

When you set up Calc the default user interface is the Standard Toolbar, but you can choose one of these user interfaces, and you can switch between them at any time.

1) Choose **View > User Interface** on the Menu bar.
2) On the Select Your Preferred User Interface dialog (Figure 529), choose one of the variants on the left. An example of the variant is shown in the *Preview* box on the right, along with a short description.
3) Choose the relevant button to apply your selection to all components of LibreOffice, or only to Calc. The Calc window changes to match your selection.
4) Click **Close** to close the dialog.

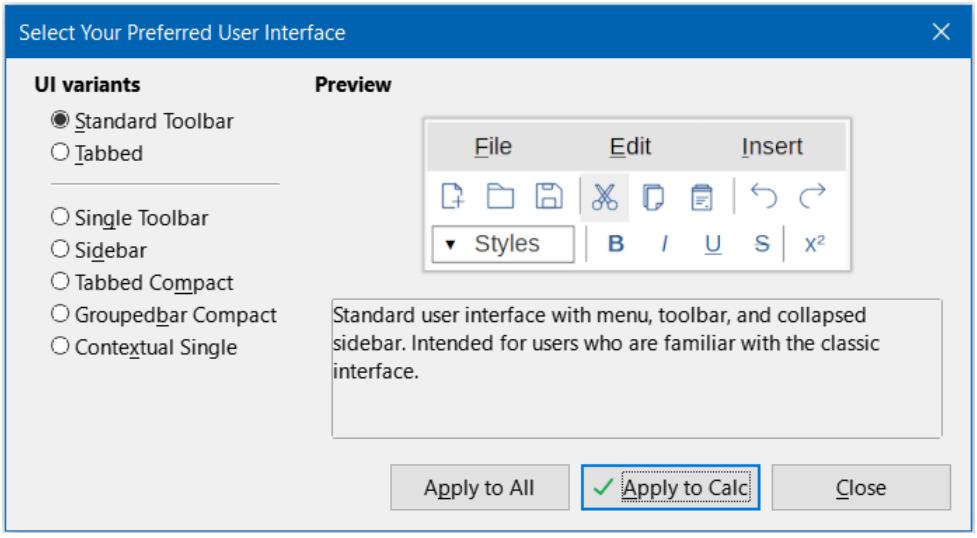


Figure 529: Select Your Preferred User Interface dialog

If you have activated experimental features (**Tools > Options > LibreOffice > Advanced > Enable experimental features (may be unstable)**), several more choices appear on the left-hand side. These choices are not described here.

Standard interfaces

The Standard Toolbar, Single Toolbar, and Sidebar interfaces are closely related. The following notes describe the initial default configuration for these options.

Standard Toolbar
This is the classic user interface, selected by default when LibreOffice is installed. It provides two visible toolbars (Standard and Formatting) and the Sidebar is open, showing its five tabs on the tab panel.

Single Toolbar
Provides one visible toolbar (Standard (Single Mode)) containing frequently used features. The Sidebar shows only its **Show/Hide** button.

Sidebar
Provides one visible toolbar (Standard). The Sidebar is fully opened.

The visibility of elements on each of these three variants can be modified using the **View** menu on the Menu bar. The configuration of menus, toolbars, and keyboard shortcuts can be modified through the tabs on the **Tools > Customize** dialog. Because these variants are not based on the notebook bar, there are no configuration options available in the *Notebookbar* tab of the **Tools > Customize** dialog.

Contextual Single

The initial configuration for the Contextual Single interface variant is for the Menu bar to be visible but for no toolbars to be displayed. Toolbars are automatically shown and hidden, dependent on the user's current context. For example, if an image is selected then the Image toolbar is displayed, or if a drawing object is selected then the Drawing Object Properties toolbar is displayed.

Figure 530 shows an example of the default Contextual Single interface when an image is selected, with the context-sensitive Image toolbar shown and hidden automatically.

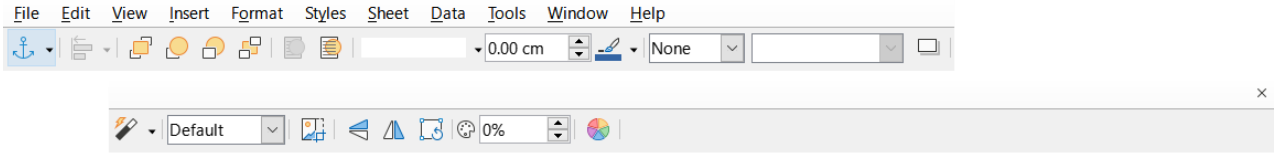


Figure 530: Contextual Single interface

The "x" symbol at the right end of the Menu bar is an icon for the **Close Document** command.

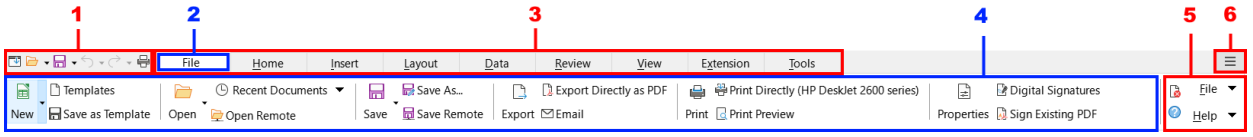
When switching to this user interface variant, Calc automatically opens the Sidebar if it is not already open.

The visibility of elements on this variant can be modified using the **View** menu on the Menu bar. The configuration of menus, toolbars, and keyboard shortcuts can be modified through the tabs on the **Tools > Customize** dialog. Because this variant is not based on the notebook bar, there are no configuration options available in the *Notebookbar* tab of the **Tools > Customize** dialog.

Tabbed interface

Introduction

The Tabbed interface (Figure 531) provides a familiar interface for users coming from proprietary office suites such as Microsoft Office. It includes a Menu bar, an Icon bar, a Tab bar, icons for the active tab, one or more tab-specific menus, and a Quick menu. On Windows and Linux, the Menu bar can be hidden or displayed by clicking on the Menu Bar icon in the Icon bar (Figure 532).



1 Icon bar **2** Active tab **3** Tab bar **4** Icons on active tab **5** Tab menus **6** Quick menu

Figure 531: Tabbed interface with Menu bar hidden

In Calc, this user interface variant includes nine fixed tabs that are always visible, and six additional tabs that are sometimes displayed. Each tab displays a set of icons grouped by context. The context can change depending on the location of the cursor or the item selected. Each tab also includes one or more tab-specific drop-down menus at the right-hand end. The Quick menu is the same for all tabs.

The Tabbed interface can be customized using the *Notebookbar* tab of the **Tools > Customize** dialog to show and hide the individual icons on the various tabs. See Chapter 15, Setting up and Customizing, for more information. In addition, the size of icons used can be adjusted through **Tools > Options > LibreOffice > View > Icon Size > Notebookbar**.

If the icons on a tab do not fit into the width of the Calc window, two right-pointing angle brackets (**>>**) appear at the right end of the row. Press the **>>** button to view additional options that are not currently visible (see, for example, Figure 535).

Icon bar

The Icon bar (Figure 532) is located at the top left of the tabs.



Figure 532: Icon bar

1 Menubar − Show / hide the Menu bar.

2 Open (*Ctrl*+*O*) − Open a file browser, where you can select the file to be opened.

3 Save (*Ctrl*+*S*) − Save the open file.

4 Undo (*Ctrl*+*Z*) − Undo the last action performed.

5 Redo (*Ctrl*+*Y*) − Redo the last undone action.

6 Print (*Ctrl*+*P*) − Open the Print dialog.

Quick menu

To the right of the tabs is a Quick menu (Figure 533) containing some commonly used commands and links. Some of the Quick menu items have submenus, indicated by arrows on the right.

Fixed tabs

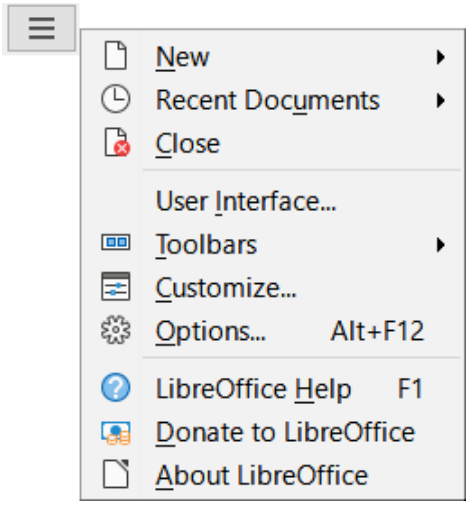


Figure 533: Quick menu

The fixed tabs in Calc are *File*, *Home*, *Insert*, *Layout*, *Data*, *Review*, *View*, *Extension*, and *Tools*. The nine fixed tabs are shown individually in the following subsections.

Each fixed tab has an associated menu, accessed through a button located at the right end of the tab. This button is labeled with the same name as the tab. Some options available in the tab menu may replicate options that are available on the tab; others may be extra options.

The appearance of a tab depends on both the configuration of your computer system and the setup of your Calc installation. The following points should be noted about the illustrations that follow:

- To increase readability of this chapter, the screen shots of tabs have been taken using a relatively small Calc window. This means that the **>>** icon appears on most of the tabs, indicating that some options are not visible.
- Left and right ends of the tabs are shown separately, making the illustrations large enough to see the commands more easily.
- For each tab that shows a **>>** icon, a separate figure is included to show the additional options that appear when the **>>** icon is pressed.
- A further figure is included to show the content of the menus at the right end of the tab.

File tab

Figure 534 shows the *File* tab and Figure 535 shows the additional options that are presented when the **>>** icon is pressed.

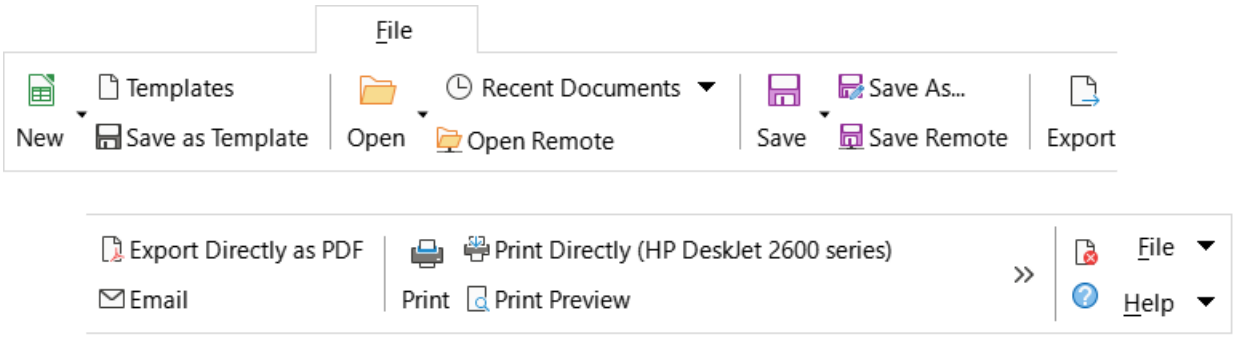


Figure 534: File tab

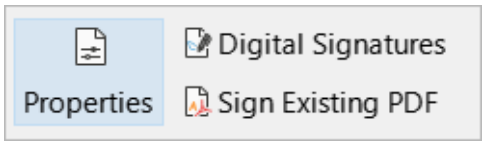


Figure 535: File tab - additional options

The *File* tab has two menus, **File** and **Help**, and these are shown in Figure 536. **Close** and **LibreOffice Help** icons are located adjacent to the **File** and **Help** menu buttons.

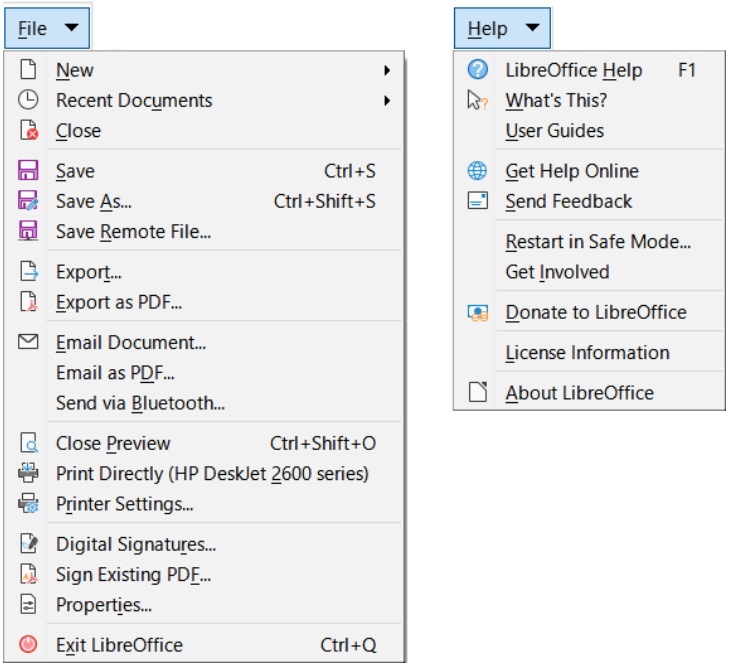


Figure 536: File tab menus

Home tab

Figure 537 shows the *Home* tab and Figure 538 shows the additional options that are presented when the **>>** icon is pressed.

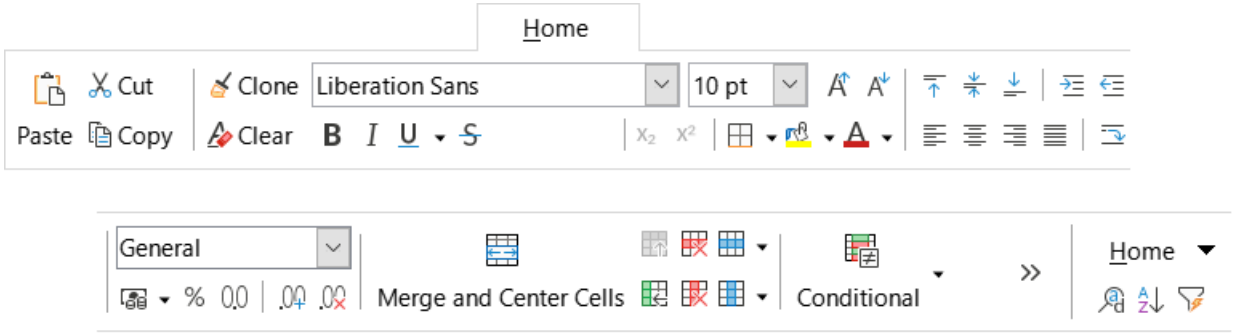


Figure 537: Home tab

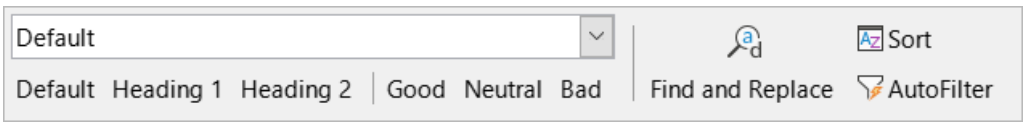


Figure 538: Home tab - additional options

The *Home* tab has one menu, **Home**, and this is shown in Figure 539. **Find and Replace (Ctrl+H)**, **Sort Ascending** and **AutoFilter (Ctrl+Shift+L)** icons are located adjacent to the **Home** menu button.

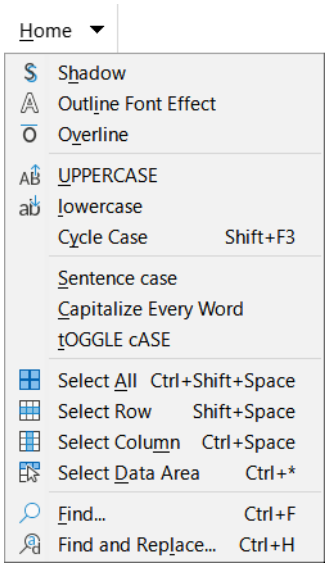


Figure 539: Home tab menu

Insert tab

Figure 540 shows the *Insert* tab and Figure 541 shows the additional options that are presented when the **>>** icon is pressed.

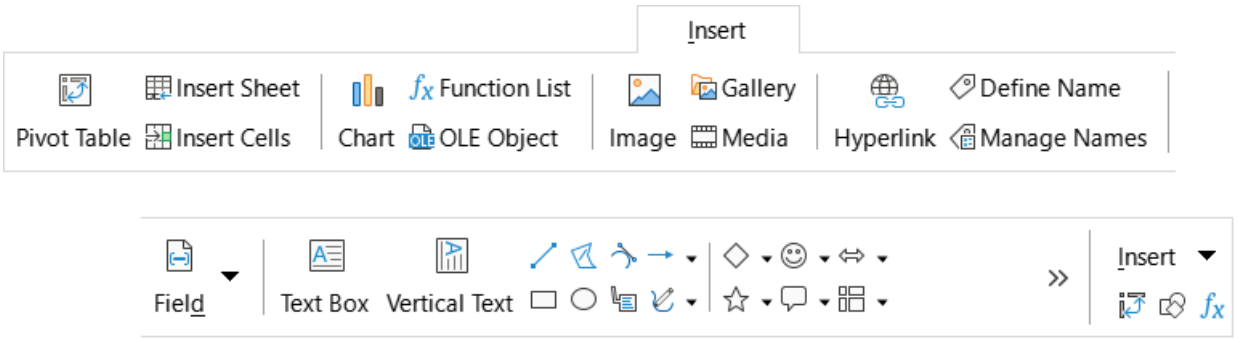


Figure 540: Insert tab

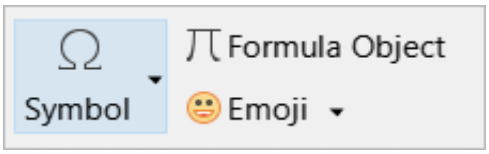


Figure 541: Insert tab - additional options

The *Insert* tab has one menu, **Insert**, and this is shown in Figure 542. **Insert or Edit Pivot Table**, **Show Draw Functions**, and **Function List** icons are located adjacent to the **Insert** menu button.

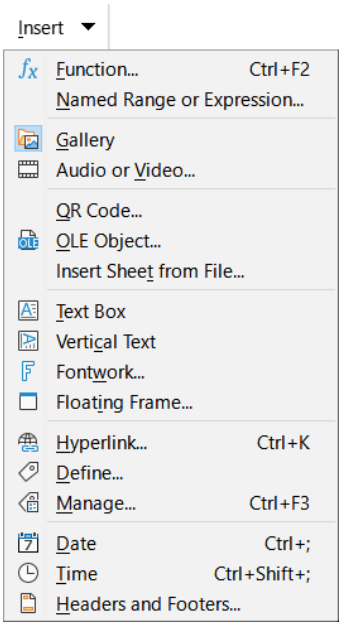


Figure 542: Insert tab menu

Layout tab

Figure 543 shows the *Layout* tab and Figure 544 shows the additional options that are presented when the **>>** icon is pressed.

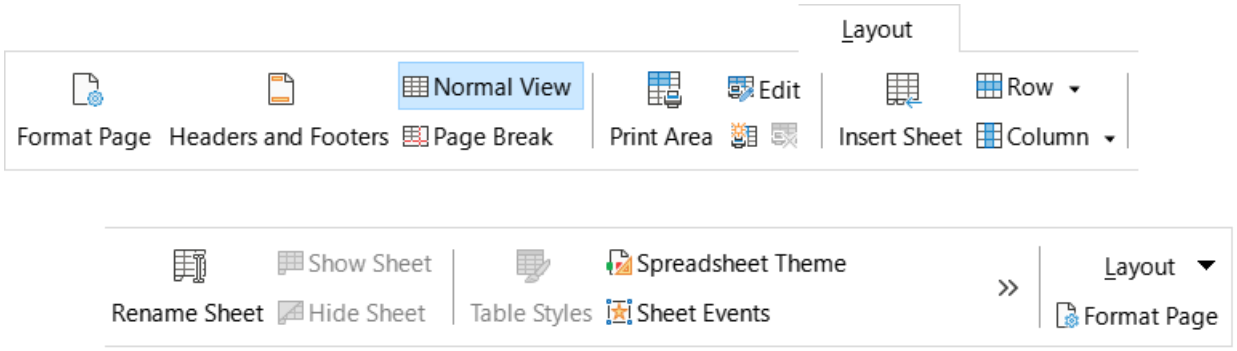


Figure 543: Layout tab

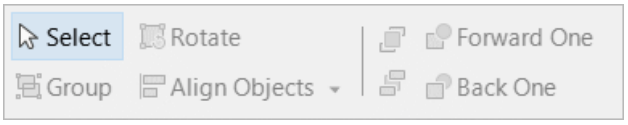


Figure 544: Layout tab - additional options

The *Layout* tab has one menu, **Layout**, and this is shown in Figure 545. A **Format Page** icon is located adjacent to the **Layout** menu button.

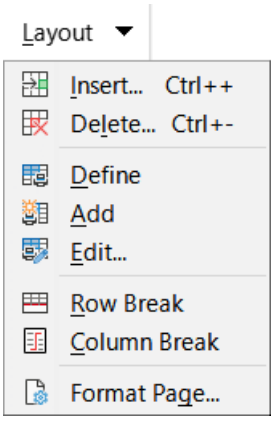


Figure 545: Layout tab menu

Data tab

Figure 546 shows the *Data* tab and Figure 547 shows the additional options that are presented when the **>>** icon is pressed.

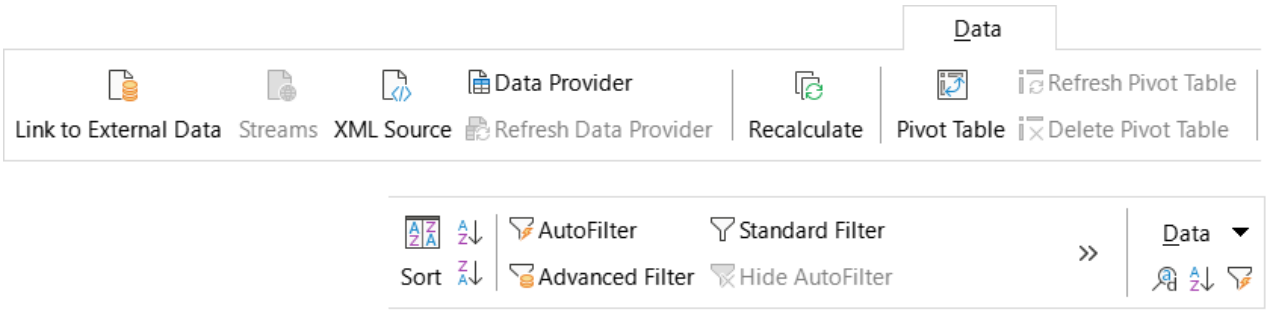


Figure 546: Data tab

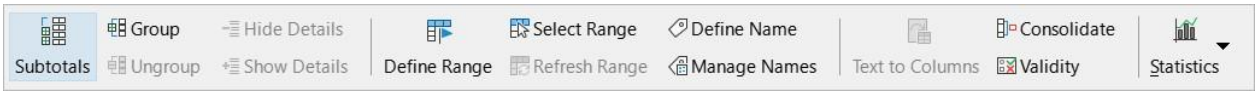


Figure 547: Data tab - additional options

The *Data* tab has one menu, **Data**, and this is shown in (Figure 548). **Find and Replace (Ctrl+H), Sort Ascending, and AutoFilter (Ctrl+Shift+L)** icons are located adjacent to the **Data** menu button.

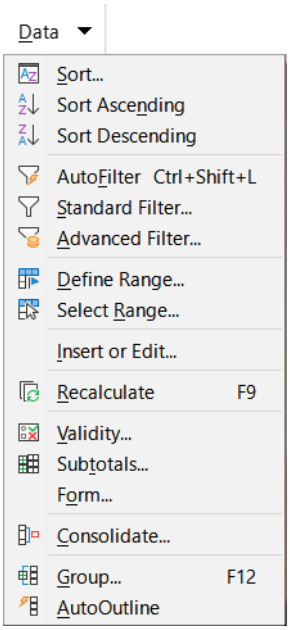


Figure 548: Data tab menu

Review tab

Figure 549 shows the *Review* tab and Figure 550 shows the additional options that are presented when the **>>** icon is pressed.

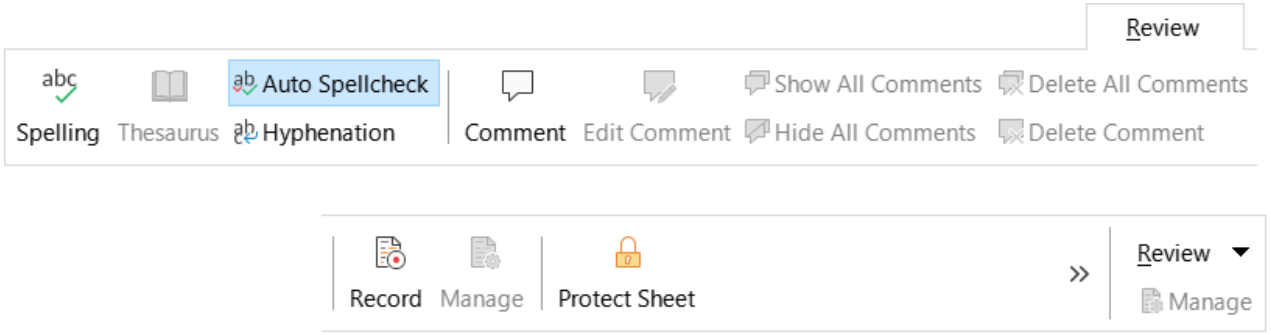


Figure 549: Review tab

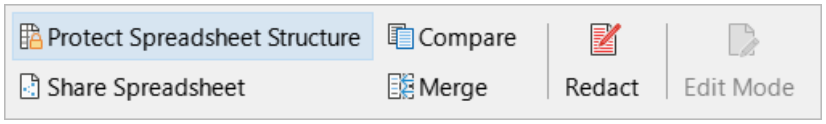


Figure 550: Review tab - additional options

The *Review* tab has one menu, **Review**, and this is shown in Figure 551. A **Manage Track Changes** icon is located adjacent to the **Review** menu button.

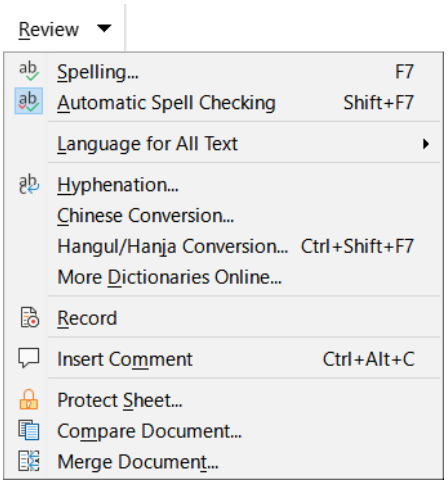


Figure 551: Review tab menu

View tab

Figure 552 shows the *View* tab and Figure 553 shows the additional options that are presented when the **>>** icon is pressed.

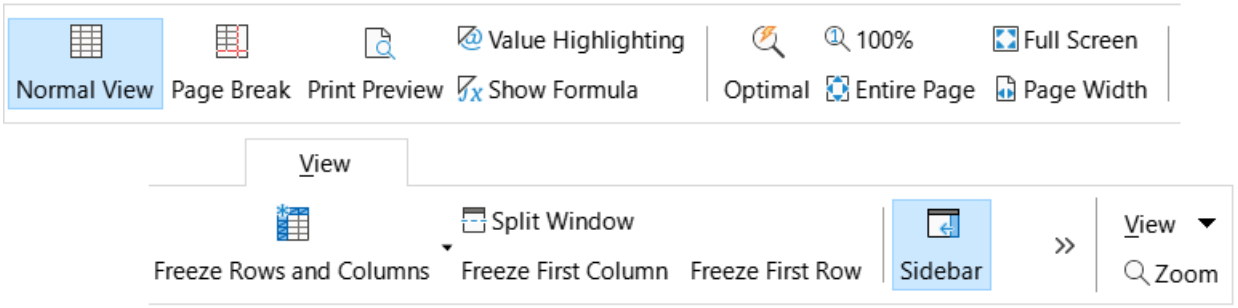


Figure 552: View tab

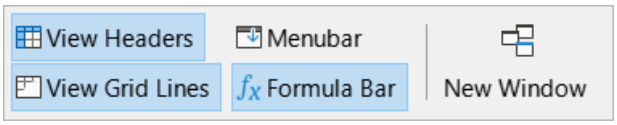


Figure 553: View tab - additional options

The *View* tab has one menu, **View**, and this is shown in Figure 554. A **Zoom** icon is located adjacent to the **View** menu button.

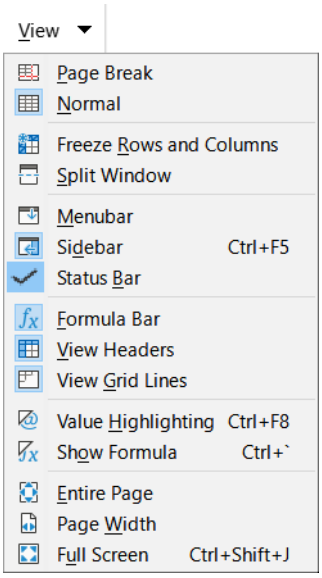


Figure 554: View tab menu

Extension tab

The *Extension* tab contains only the **Extension** tab menu, which contains the **Extension Manager (Ctrl+Alt+E)** option (Figure 555).

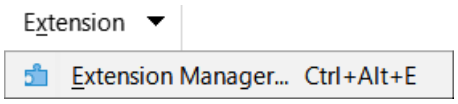


Figure 555: Extension tab menu

Tools tab

Figure 556 shows the *Tools* tab and Figure 557 shows the additional options that are presented when the **>>** icon is pressed.

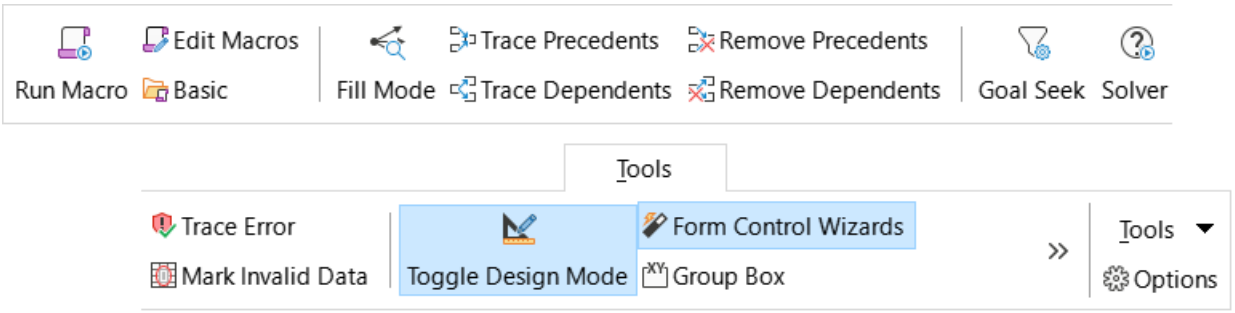


Figure 556: Tools tab



Figure 557: Tools tab - additional options

The *Tools* tab has one menu, **Tools**, and this is shown in Figure 558. An **Options** icon is located adjacent to the **Tools** menu button.

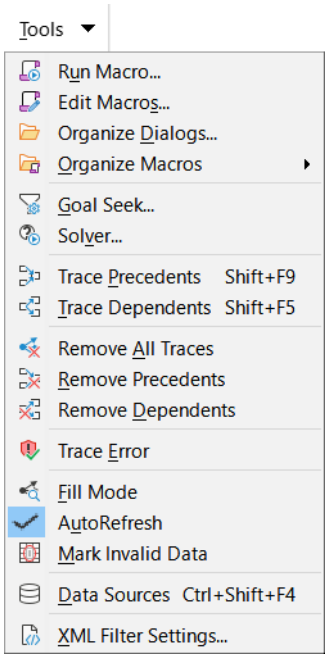


Figure 558: Tools tab menu

Additional tabs

Additional tabs appear when an item is selected; they are displayed between the *View* and *Extension* tabs. The additional tabs in Calc are *Draw*, *Form*, *Image*, *Media*, *Object*, and *Print.*

Draw tab

Figure 559 shows the *Draw* tab and Figure 560 shows the additional options that are presented when the **>>** icon is pressed. The *Draw* tab is displayed when a drawing object is selected.

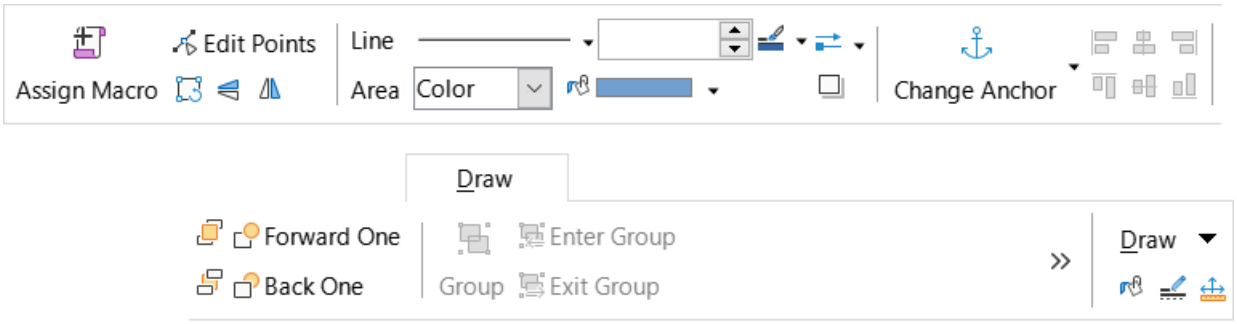


Figure 559: Draw tab

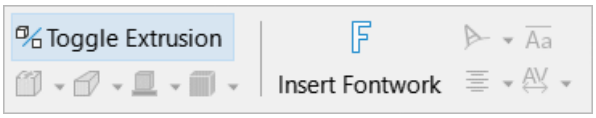


Figure 560: Draw tab - additional options

The *Draw* tab has one menu, **Draw**, and this is shown in Figure 561. **Area**, **Line**, and **Position and Size** icons are located adjacent to the **Draw** menu button.

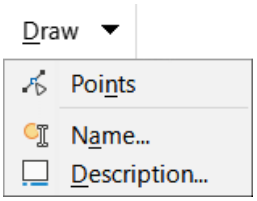


Figure 561: Draw tab menu

Form tab

Figure 562 shows the *Form* tab, which is displayed when a form component is selected in design mode.

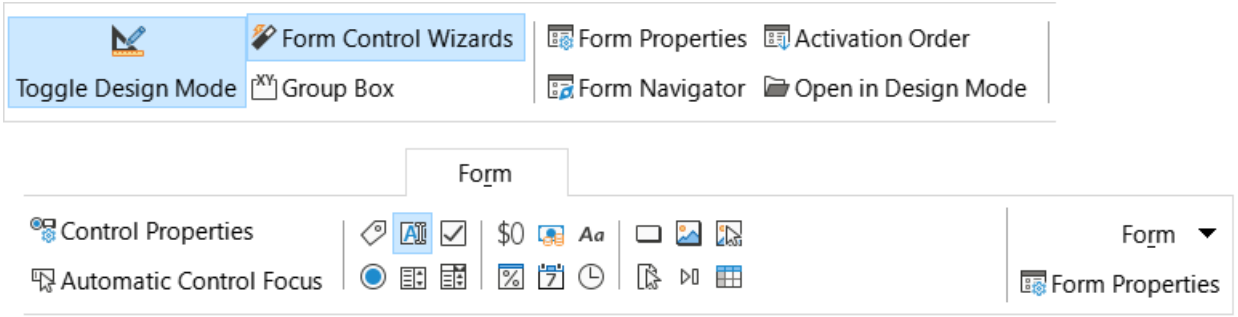


Figure 562: Form tab

The *Form* tab has one menu, **Form**, and this is shown in Figure 563. A **Form Properties** icon is located adjacent to the **Form** menu button.

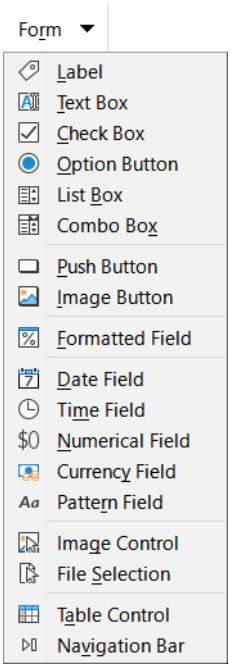


Figure 563: Form tab menu

Image tab

Figure 564 shows the *Image* tab and Figure 565 shows the additional options that are presented when the **>>** icon is pressed. The *Image* tab is displayed when an image is selected.

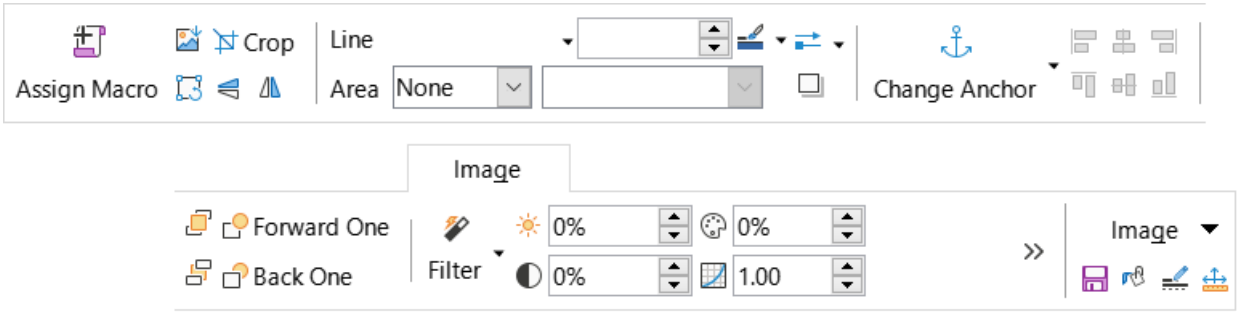


Figure 564: Image tab

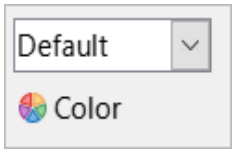


Figure 565: Image tab - additional options

The *Image* tab has one menu, **Image**, and this is shown in Figure 566. **Save**, **Area**, **Line**, and **Position and Size** icons are located adjacent to the **Image** menu button.

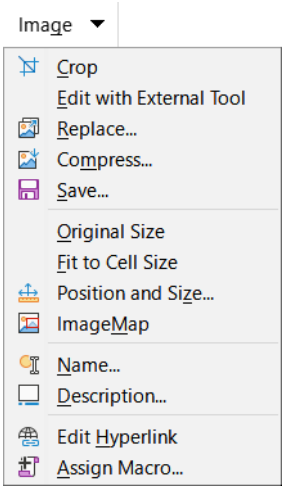


Figure 566: Image tab menu

Media tab

Figure 567 shows the *Media* tab, which is displayed a media object is selected.

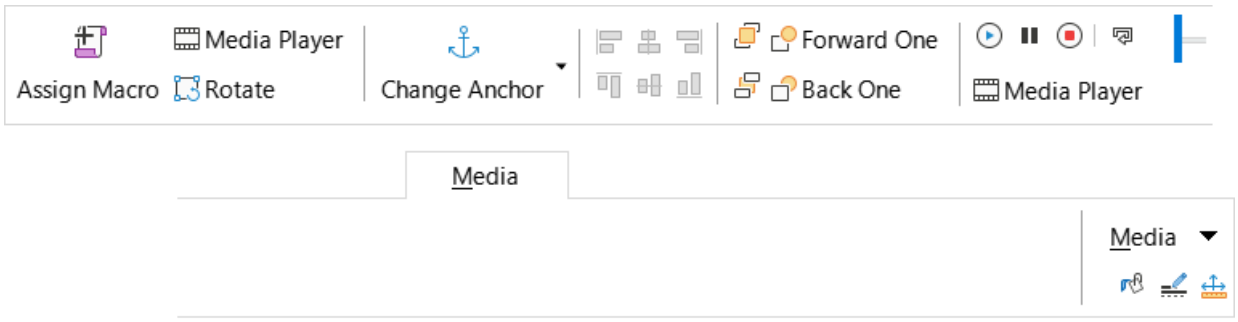


Figure 567: Media tab

The *Media* tab has one menu, **Media**, and this is shown in Figure 568. **Area**, **Line**, and **Position and Size** icons are located adjacent to the **Media** menu button.

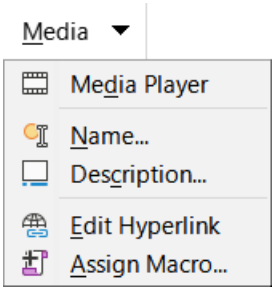


Figure 568: Media tab menu

Object tab

Figure 569 shows the *Object* tab, which is displayed when an object (for example, an OLE object) is selected.

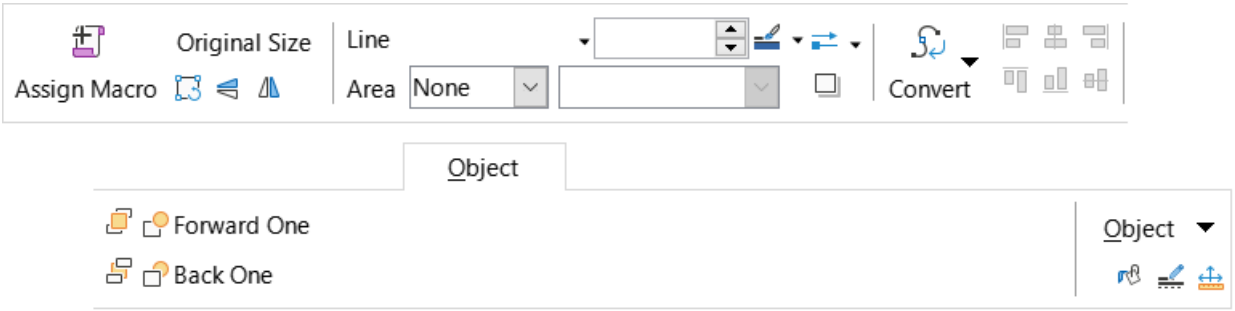


Figure 569: Object tab

The *Object* tab has one menu, **Object**, and this is shown in Figure 570. **Area**, **Line**, and **Position and Size** icons are located adjacent to the **Object** menu button.

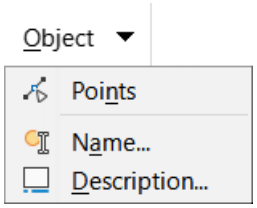


Figure 570: Object tab menu

Print tab

Figure 571 shows the *Print* tab, which is displayed when a print preview is selected.

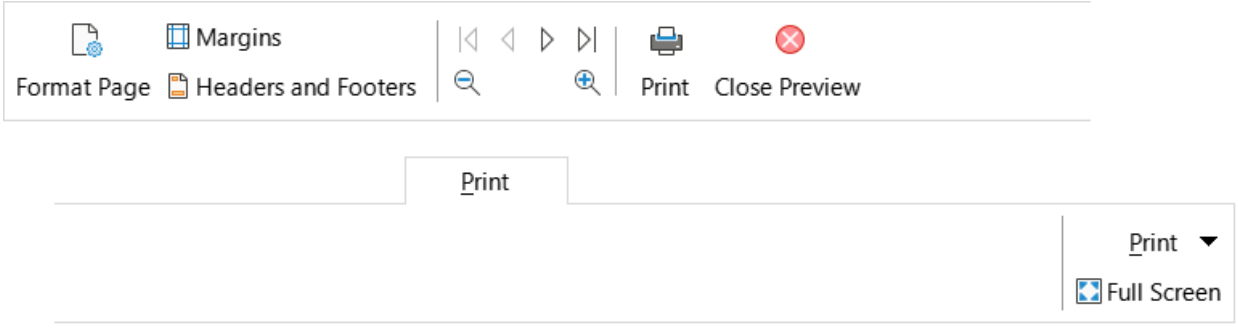


Figure 571: Print tab

The *Print* tab has one menu, **Print**, and this is shown in Figure 572. A **Full Screen** icon is located adjacent to the **Print** menu button.

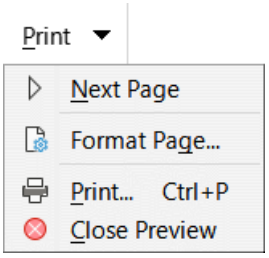


Figure 572: Print tab menu

Tabbed Compact interface

As its name suggests, the Tabbed Compact interface is a more compact version of the Tabbed interface described in the previous section. The Tabbed Compact interface provides the same nine fixed tabs (*File*, *Home*, *Insert*, *Layout*, *Data*, *Review*, *View*, *Extension*, and *Tools*) and six additional tabs (*Draw*, *Form*, *Image*, *Media*, *Object*, and *Print*). However, in this case the commands on each tab are displayed in a single row, using less vertical screen space.

Figure 573 shows an example of the Tabbed Compact interface for the *File* tab. Similar to the behavior of the Tabbed interface, pressing the **>>** button provides access to additional options, as shown in Figure 574 for this tab.



Figure 573: Tabbed Compact interface, File tab

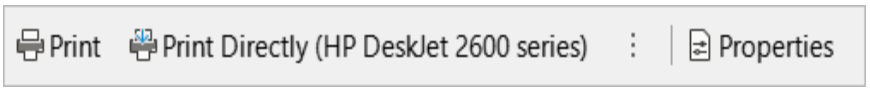


Figure 574: Tabbed Compact interface, File tab, additional options

The content of individual tabs and tab menus is similar to the corresponding components of the Tabbed interface and is not described further in this guide.

The Tabbed Compact interface can be customized using the *Notebookbar* tab of the **Tools > Customize** dialog to show and hide the individual icons on the various tabs. See Chapter 15, Setting up and Customizing, for more information. In addition, the size of icons used can be adjusted through **Tools > Options > LibreOffice > View > Icon Size > Notebookbar**.

Groupedbar Compact interface

The Groupedbar Compact interface is a different type of user interface which does not utilize toolbars or tabs to partition the available commands. Instead the commands are organized into context-sensitive groups, visually separated by vertical lines. Each group contains icons, menus, and other controls as appropriate. Figure 575 shows the default configuration of the Groupedbar Compact commands (displayed, for example, when an empty cell is selected).

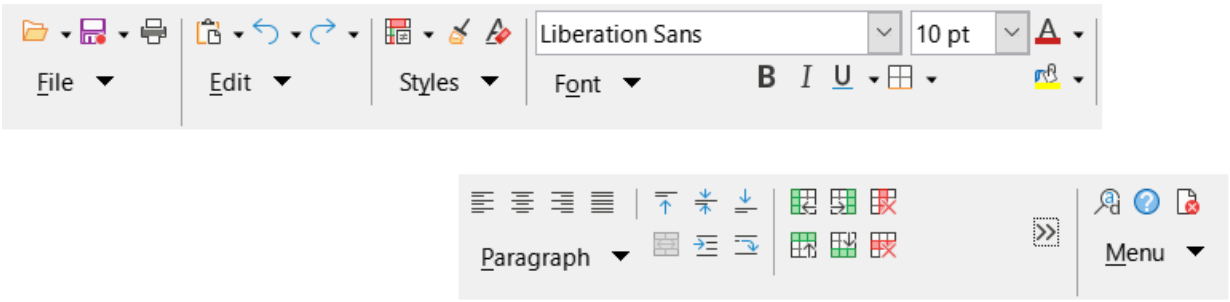


Figure 575: Groupedbar Compact interface

Similar to the behavior of the Tabbed interface, if the groups do not all fit into the width of the Calc window, two right-pointing angle brackets (**>>**) appear toward the right (see Figure 575). Press the **>>** button to access the additional groups that are not currently visible–see, for example, Figure 576 which shows the hidden groups corresponding to Figure 575.

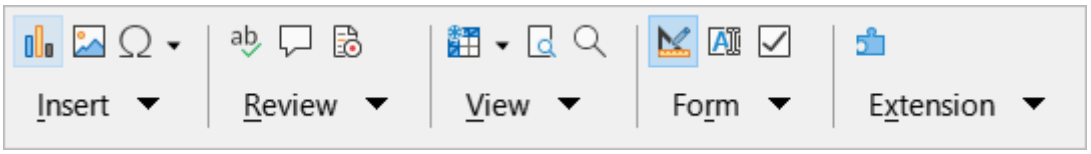


Figure 576: Groupedbar Compact - additional groups

As is evident from Figures 575 and 576, many groups provide several icons located above a menu button. Press the menu button to access a menu of commands relating to the group, as shown in Figure 577 for example.

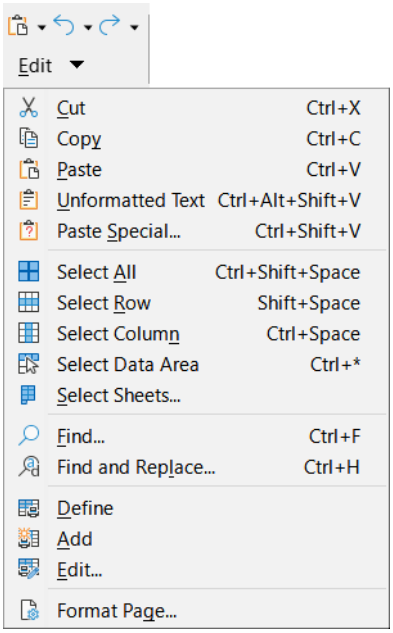


Figure 577: Groupedbar Compact interface - Edit group and menu

The groups displayed in the Groupedbar Compact interface vary depending on context. For example, if an image is currently selected then the groups shown in Figure 578 are displayed.

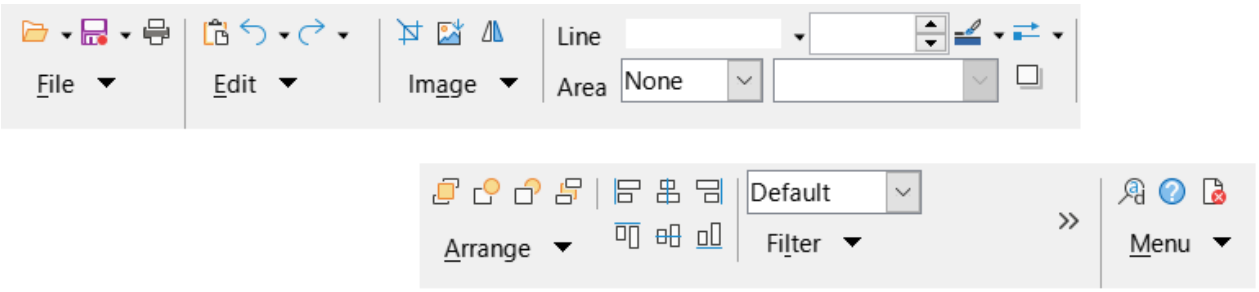


Figure 578: Groupedbar Compact interface with image selected

At the right end of the Groupedbar Compact interface is a small area containing **Find and Replace (Ctrl+H)**, **LibreOffice Help**, and **Close** icons, above a button labeled **Menu**. The content of this menu is not context-sensitive and always contains the commands shown in Figure 579.

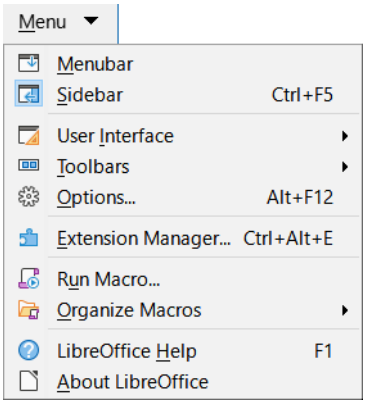


Figure 579: Groupedbar Compact menu

The Groupedbar Compact interface can be customized using the *Notebookbar* tab of the **Tools > Customize** dialog to show and hide the individual icons on the various groups. See Chapter 15, Setting up and Customizing, for more information. In addition, the size of icons used can be adjusted through **Tools > Options > LibreOffice > View > Icon Size > Notebookbar**.



Calc Guide 7.5

Appendix A
Keyboard Shortcuts

Introduction

You can use Calc without a pointing device, such as a mouse or touchpad, by using keyboard shortcuts. This appendix provides a comprehensive reference list of the available built-in shortcuts, which you can browse to find ones that may be useful in your daily work.

When you first install LibreOffice, a default set of Calc keyboard shortcuts is available. These are described in this chapter, assuming no customization. When using Calc, you can discover shortcuts for common interactions by observing the key sequences identified on the menu options and in the tooltips of toolbar icons. You can also explore a more comprehensive list of shortcuts by viewing the *Keyboard* tab of the Customize dialog (**Tools > Customize)**.

Further information about many individual key combinations can be found throughout the chapters of this guide and in the Help system.

You can define your own shortcuts or change existing shortcuts by going to **Tools > Customize > Keyboard** on the Menu bar. See Chapter 15, Setting up and Customizing, for further instructions. Some shortcuts cannot be re-assigned; these are identified in the “Keyboard shortcuts that cannot be modified” sections on pages 607 (Windows / Linux) and 615 (macOS).

Caution

Be careful when reassigning predefined shortcuts. Although you can reset shortcut keys back to LibreOffice defaults, changing common hotkeys, such as *F1* for Help, can cause confusion and frustration, especially if other users share your computer.

Note

Different operating systems may allocate particular keys to operating system functions and, in such cases, those keys may not perform the Calc functions described in this appendix.

For example, the *F1* function key may be used to put your Windows computer into a sleep / hibernation mode and so cannot be used to access the Calc Help system. For some macOS versions, the *Cmd*+*F5* key sequence is used by macOS to display its VoiceOver dialog and so cannot be used to control the display of Calc’s Sidebar. Similarly the *Shift*+*F11* key sequence may be used by macOS to show its desktop and so cannot be used to access Calc’s Save as Template dialog.

Check your computer system’s documentation to determine which key presses are used by the operating system and hence cannot carry out Calc functions.

The remainder of this chapter is in two main sections, one listing the keyboard shortcuts available in the Windows and Linux environments, and the other listing the macOS keyboard shortcuts.

Windows / Linux keyboard shortcuts

Note

Many of the keyboard shortcuts in this section use the *Ctrl* key. Some keyboards have two *Ctrl* keys and in that case you may need to experiment to identify which of the two keys to use.

Keyboard shortcuts for Menu bar options and toolbars

Tables 23 to 26 list Calc keyboard shortcuts that can be used instead of the options on the Menu bar, the Standard toolbar, or the Formatting toolbar. The toolbars are assumed to contain the initial default set of icons, without any user customization.

Table 23: Function key shortcuts for menu and toolbar options

Windows / Linux	*Equivalent Menu bar / toolbar option*
F1	**Help > LibreOffice Help.**
F2	**Edit > Cell Edit Mode.**
Ctrl+F2	**Insert > Function.**
Ctrl+F3	**Sheet > Named Ranges and Expressions > Manage.**
Shift+F3	**Format > Text > Cycle Case.**
F4	**Sheet > Cycle Cell Reference Types.**
Ctrl+Shift+F4	**View > Data Sources.**
F5	**View > Navigator.**
Ctrl+F5	**View > Sidebar.**
Shift+F5	**Tools > Detective > Trace Dependents.**
F7	**Tools > Spelling.** **Spelling** icon on the Standard toolbar.
Ctrl+F7	**Tools > Thesaurus.**
Ctrl+Shift+F7	**Tools > Language > Hangul/Hanja Conversion**. The availability of this menu option depends on selections on **Tools > Options > Language Setting > Languages.**
Shift+F7	**Tools > Automatic Spell Checking.**
Ctrl+F8	**View > Value Highlighting.**
F9	**Data > Calculate > Recalculate.**
Shift+F9	**Tools > Detective > Trace Precedents.**
Ctrl+Shift+F9	**Data > Calculate > Recalculate Hard.**
F11	**View > Styles.** **Styles > Manage Styles.**
Shift+F11	**File > Templates > Save as Template.** Via drop-down menu on **Save** icon on the Standard toolbar.
F12	**Data > Group and Outline > Group.**
Ctrl+F12	**Data > Group and Outline > Ungroup.**
Alt+F12	**Tools > Options.**

Table 24: Number key shortcuts for menu and toolbar options

Windows / Linux	*Equivalent Menu bar / toolbar option*
Ctrl+1	**Format > Cells.**

Windows / Linux	*Equivalent Menu bar / toolbar option*
Ctrl+Shift+1	**Format > Number Format > Number** (use the “1” key on the main keyboard). **Format as Number** icon on the Formatting toolbar.
Ctrl+Shift+2	**Format > Number Format > Scientific** (use the “2” key on the main keyboard).
Ctrl+Shift+3	**Format > Number Format > Date** (use the “3” key on the main keyboard). **Format as Date** icon on the Formatting toolbar.
Ctrl+Shift+4	**Format > Number Format > Currency** (use the “4” key on the main keyboard). **Format as Currency** icon on the Formatting toolbar.
Ctrl+Shift+5	**Format > Number Format > Percent** (use the “5” key on the main keyboard). **Format as Percent** icon on the Formatting toolbar.
Ctrl+Shift+6	**Format > Number Format > General** (use the “6” key on the main keyboard).

Table 25: Letter key shortcuts for menu and toolbar options

Windows / Linux	*Equivalent Menu bar / toolbar option*
Ctrl+B	**Format > Text > Bold.** **Bold** icon on the Formatting toolbar.
Ctrl+Shift+B	**Format > Text > Subscript.**
Ctrl+C	**Edit > Copy.** **Copy** icon on the Standard toolbar.
Ctrl+Alt+C	**Insert > Comment.** **Sheet > Cell Comments > Edit Comment.** **Insert Comment** icon on the Standard toolbar.
Ctrl+D	**Sheet > Fill Cells > Fill Down.** Via drop-down menus on **Row** or **Column** icons on the Standard toolbar.
Ctrl+E	**Format > Align > Centered.** **Align Center** icon on the Formatting toolbar.
Ctrl+Alt+E	**Tools > Extension Manager.**
Ctrl+F	**Edit > Find.**
Ctrl+H	**Edit > Find and Replace.** **Find and Replace** icon on the Standard toolbar.
Ctrl+I	**Format > Text > Italic.** **Italic** icon on the Formatting toolbar.
Ctrl+J	**Format > Align > Justified.**
Ctrl+Shift+J	**View > Full Screen.**
Ctrl+K	**Insert > Hyperlink.** **Insert Hyperlink** icon on the Standard toolbar.

Windows / Linux	*Equivalent Menu bar / toolbar option*
Ctrl+*L*	**Format > Align > Left.** **Align Left** icon on the Formatting toolbar.
Ctrl+*Shift*+*L*	**Data > AutoFilter.** **AutoFilter** icon on the Standard toolbar.
Ctrl+*M*	**Format > Clear Direct Formatting.** **Clear Direct Formatting** icon on the Standard toolbar.
Ctrl+*Shift*+*M*	**Edit > Edit Mode.**
Ctrl+*N*	**File > New > Spreadsheet.** **New** icon on the Standard toolbar.
Ctrl+*Shift*+*N*	**File > New > Templates.** **File > Templates > Manage Templates.** Via drop-down menu on **New** icon on the Standard toolbar.
Ctrl+*O*	**File > Open.** **Open** icon on the Standard toolbar.
Ctrl+*Shift*+*O*	**File > Print Preview.** **Toggle Print Preview** icon on the Standard toolbar.
Ctrl+*P*	**File > Print.** **Print** icon on the Standard toolbar.
Ctrl+*Shift*+*P*	**Format > Text > Superscript.**
Ctrl+*Q*	**File > Exit LibreOffice.**
Ctrl+*R*	**Format > Align > Right.** **Align Right** icon on the Formatting toolbar.
Ctrl+*S*	**File > Save.** **Save** icon on the Standard toolbar.
Ctrl+*Shift*+*S*	**File > Save As.** Via drop-down menu on **Save** icon on the Standard toolbar.
Ctrl+*U*	**Underline** icon on the Formatting toolbar.
Ctrl+*V*	**Edit > Paste.** **Paste** icon on the Standard toolbar.
Ctrl+*Shift*+*V*	**Edit > Paste Special > Paste Special.**
Ctrl+*Alt*+*Shift*+*V*	**Edit > Paste Special > Paste Unformatted Text.**
Ctrl+*W*	**Window > Close Window.**
Ctrl+*X*	**Edit > Cut.** **Cut** icon on the Standard toolbar.
Ctrl+*Y*	**Edit > Redo.** **Redo** icon on the Standard toolbar.
Ctrl+*Shift*+*Y*	**Edit > Repeat.**
Ctrl+*Z*	**Edit > Undo.** **Undo** icon on the Standard toolbar.

Table 26: Other shortcuts for menu and toolbar options

Windows / Linux	Equivalent Menu bar / toolbar option
Ctrl+Shift+Pg up	**Edit > Select > Select to Previous Sheet.**
Ctrl+Shift+Pg down	**Edit > Select > Select to Next Sheet.**
Backspace	**Sheet > Clear Cells.**
Ctrl+Tab	**Sheet > Navigate > To Next Sheet.**
Ctrl+Shift+Tab	**Sheet > Navigate > To Previous Sheet.**
Ctrl+Space	**Edit > Select > Select Column.**
Shift+Space	**Edit > Select > Select Row.**
Ctrl+Shift+Space	**Edit > Select All.**
Ctrl++	**Sheet > Insert Cells** (use the + key on the numeric keypad).
Ctrl+-	**Sheet > Delete Cells.**
Ctrl+*	**Edit > Select > Select Data Area** (use the * key on the numeric keypad).
Ctrl+;	**Insert > Date.**
Ctrl+Shift+;	**Insert > Time.**
Ctrl+Alt+=	**Insert > Object > Formula Object.**
Ctrl+`	**View > Show Formula.** The grave (`) character can be found to the left of the “1” key on many English keyboards.
Shift+Esc	**Help > Search Commands.**

Other Calc keyboard shortcuts

Tables 27 to 32 provide lists of additional Calc keyboard shortcuts that may be less obvious to users because they are not indicated on Menu bar items or in tooltips associated with icons on the Standard and Formatting toolbars.

Table 27: Other function key shortcuts

Windows / Linux	Description
Shift+F1	Display context sensitive help.
Ctrl+F1	Display the comment attached to the current cell.
Ctrl+Shift+F2	Moves the cursor to the Input line where you can enter a formula for the current cell.
Ctrl+Shift+F5 Ctrl+Shift+T	Moves the cursor to the Name Box field on the Formula bar.

Table 28: Other letter key shortcuts

Windows / Linux	Description
Ctrl+A	Selects all cells in the current sheet.
Ctrl+Shift+R	Redraws the document view.
Ctrl+Shift+Z	Reverses the action of the last undo command.

Table 29: Arrow key shortcuts

Windows / Linux	***Description***
↑	Moves the cell focus up.
Ctrl+↑	Moves the cursor in the up direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Shift+↑	Selects the adjacent cell or cells located in the up direction.
Ctrl+*Shift*+↑	Selects in the up direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Alt+Shift+↑	Optimizes the row height based on the current cell.
→	Moves the cell focus right.
Ctrl+→	Moves the cursor in the right direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Shift+→	Selects the adjacent cell or cells located in the right direction.
Ctrl+*Shift*+→	Selects in the right direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Alt+→	Increases the width of the current column.
Alt+*Shift*+→	Optimizes the column width based on the current cell.
↓	Moves the cell focus down.
Ctrl+↓	Moves the cursor in the down direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Alt+↓	Opens a drop-down selection list of text items that have been previously typed into other cells in the same column.
Shift+↓	Selects the adjacent cell or cells located in the down direction.
Ctrl+*Shift*+↓	Selects in the down direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Alt+*Shift*+↓	Optimizes the row height based on the current cell.
←	Moves the cell focus left.
Ctrl+←	Moves the cursor in the left direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Shift+←	Selects the adjacent cell or cells located in the left direction.
Ctrl+*Shift*+←	Selects in the left direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Alt+←	Decreases the width of the current column.
Alt+*Shift*+←	Optimizes the column width based on the current cell.

Table 30: Home and End key shortcuts

Windows / Linux	Description
Home	Moves the cursor to the first cell of the current row.
Ctrl+*Home*	Moves the cursor to the first cell (A1) in the current sheet.
Shift+*Home*	Selects cells from the cursor to the first cell of the current row.
Ctrl+*Shift*+*Home*	Selects all cells from the cursor to the first cell (A1) in the current sheet.
End	Moves the cursor along the current row to the cell in the last column containing data in the sheet.
Ctrl+*End*	Moves the cursor to the cell in the last column and row that contain data in the current sheet.
Shift+*End*	Selects cells along the current row from the cursor to the cell in the last column containing data in the sheet.
Ctrl+*Shift*+*End*	Selects all cells from the cursor to the cell in the last column and row that contain data in the current sheet.

Table 31: Other Page Up and Down key shortcuts

Windows / Linux	Description
Pg up	Moves up one screen page.
Ctrl+*Pg up*	Moves to the previous sheet.
Shift+*Pg up*	Selects cells from the cursor to the row one page up.
Alt+*Pg up*	Moves one screen page to the left.
Alt+*Shift*+*Pg up*	Selects cells from the cursor to the column one page to the left.
Pg down	Moves down one screen page.
Ctrl+*Pg down*	Moves to the next sheet.
Shift+*Pg down*	Selects cells from the cursor to the row one page down.
Alt+*Pg down*	Moves one screen page to the right.
Alt+*Shift*+*Pg down*	Selects cells from the cursor to the column one page to the right.

Table 32: Other miscellaneous key shortcuts

Windows / Linux	Description
Escape	Cancels the current cell edit.
Insert	After making a selection, opens the Paste Special dialog.
Ctrl+*Insert*	Copies the selected cell or cell range to the clipboard in preparation for a later paste operation.
Shift+*Insert*	Pastes the contents of the clipboard into the selected cells.
Delete	Deletes cell contents without a dialog (does not remove formatting).
Shift+*Delete*	Removes and copies the selection to the clipboard.
Ctrl+*Backspace*	Refocuses the view back on the cursor if it is not currently in view.
Shift+*Backspace*	Deselects the current cell selection without deleting contents.
Alt+*Backspace*	Reverses the last command or the last entry you typed.

Windows / Linux	Description
Ctrl+[	Selects the cells on which the current cell is dependent.
Ctrl+]	Selects the cells that are dependent on the current cell.
Ctrl+/	Selects the cells in the matrix formula range that contains the cursor.
Ctrl+'	Copies the contents of the cell above the cursor into the current cell, but remains in cell edit mode so that you can make further changes. Use the single apostrophe key.
Enter	Moves the cursor to the next cell in the selected range, from top to bottom, then left to right. To specify in which direction the cursor moves, go to **Tools > Options > LibreOffice Calc > General** on the Menu bar.
Ctrl+Enter	Inserts a manual line break in the current cell while editing a cell.
Ctrl+Shift+Enter	Creates a matrix in the current range using the information entered on the input line.
Alt+Enter	Fills the selected cell range with the formula that you entered on the input line.
Alt+=	Equivalent to selecting **Select Function > Sum** on the Formula bar.

Chart keyboard shortcuts

Table 33 lists some shortcuts that are available within a Calc chart.

Tip

You can use the Alt key with the arrow keys and plus (+) and minus (−) keys to move elements with a finer degree of movement for more accuracy.

Table 33: Chart shortcuts

Windows / Linux	Effect
Tab	Selects the next chart element.
Shift+Tab	Selects the previous chart element.
Home	Selects the first chart element.
End	Selects the last chart element.
Esc	Cancels selection.
Arrow keys	Moves the element in the direction of the arrow.
Arrow keys in pie charts	Moves the selected pie segment in the direction of the arrow.
F2 in titles	Enters text input mode.
F3 in legends and data series	Opens groups so that you can edit the individual components.
Ctrl+F3 in legends and data series	Exits groups.
+/−	Enlarges or shrinks the chart (use the + / − keys in the numeric keypad).
+/− in pie charts	Moves the selected pie segment off or into the pie chart (use the + / − keys in the numeric keypad).

Outline keyboard shortcuts

Table 34 lists shortcuts that are available in an outline window. To use these shortcuts, press *F6* or *Shift+F6* until the vertical or horizontal outline window has the focus.

Table 34: Outline shortcuts

Windows / Linux	Effect
Tab	Cycles through each outline indicator from top to bottom or left to right.
Shift+Tab	Cycles through each outline indicator in the opposite direction.
Ctrl+1 to *Ctrl+8*	Show all levels up to the specified number while hiding all higher-numbered levels in the outline.
+/-	Shows (*+*) or hides (*–*) the focused outline group (use the *+* / *–* keys in the numeric keypad).
Enter	Activates the focused indicator button.
Arrow keys	Cycles through indicator buttons in the direction of the arrow.

Keyboard shortcuts that cannot be modified

Table 35 identifies the key combinations that are grayed out (not available for modification) in the *Shortcut Keys* list on the Keyboard tab of the **Tools > Customize** dialog with **Calc** selected.

Table 35: Grayed key combinations in Tools > Customize > Keyboard

Operating system	Key combinations grayed in Customize dialog
Windows 10	*F1*, *Ctrl+F1*, *Shift+F1* *Shift+F2* *Ctrl+F4*, *Alt+F4*, *Ctrl+Alt+F4* *F6*, *Ctrl+F6*, *Shift+F6*, *Ctrl+Shift+F6* *F10*
Linux	*F1*, *Ctrl+F1*, *Shift+F1* *Shift+F2* *Ctrl+F4*, *Alt+F4*, *Ctrl+Alt+F4* *F6*, *Ctrl+F6*, *Shift+F6*, *Ctrl+Shift+F6* *F10* *Ctrl+Shift+0*, *Ctrl+Shift+1*, *Ctrl+Shift+2*, *Ctrl+Shift+3*, *Ctrl+Shift+4*, *Ctrl+Shift+5*, *Ctrl+Shift+6*, *Ctrl+Shift+7*, *Ctrl+Shift+8*, *Ctrl+Shift+9*

macOS keyboard shortcuts

macOS keyboard symbols

Keys on many macOS keyboards use symbols rather than text labels. Table 36 identifies some common macOS keyboard symbols with their meanings. In the tables that follow, the key names are used rather than symbols, since the latter may not appear on all macOS keyboards.

Table 36: Common macOS keyboard symbols

Key name	Symbol
Command (shortened to “Cmd” in the tables that follow)	⌘
Control (shorted to “Ctrl” in the tables that follow)	^
Option	⌥
Shift	⇧
Page Up (shortened to “Pg Up” in the tables that follow)	⇞
Page Down (shortened to “Pg Dn” in the tables that follow)	⇟
Home	↖
End	↘
Delete	⌫
Forward Delete (shortened to “Fwd Del” in the tables that follow)	⌦

Keyboard shortcuts for Menu bar options and toolbars

Tables 37 to 40 list Calc keyboard shortcuts that can be used instead of the options on the Menu bar, the Standard toolbar, or the Formatting toolbar. The toolbars are assumed to contain the initial default set of icons, without any user customizations.

Table 37: Function key shortcuts for menu and toolbar options

macOS	Equivalent Menu bar / toolbar option
F1	**Help > LibreOffice Help.**
F2	**Edit > Cell Edit Mode.**
Cmd+F2	**Insert > Function.**
Cmd+F3	**Sheet > Named Ranges and Expressions > Manage.**
Shift+F3	**Format > Text > Cycle Case.**
F4	**Sheet > Cycle Cell Reference Types.**
Shift+Cmd+F4	**View > Data Sources.**
F5	**View > Navigator.**
Cmd+F5	**View > Sidebar.**
Shift+F5	**Tools > Detective > Trace Dependents.**
Cmd+F7	**Tools > Thesaurus.**
Shift+Cmd+F7	**Tools > Language > Hangul/Hanja Conversion**. The availability of this menu option depends on selections in **LibreOffice > Preferences > Language Setting > Languages.**
Shift+F7	**Tools > Automatic Spell Checking.**
Cmd+F8	**View > Value Highlighting.**
F9	**Data > Calculate > Recalculate.**
Shift+F9	**Tools > Detective > Trace Precedents.**

macOS	*Equivalent Menu bar / toolbar option*
Shift+Cmd+F9	**Data > Calculate > Recalculate Hard.**
Shift+F11	**File > Templates > Save as Template.** Via drop-down menu on **Save** icon on Standard toolbar.
F12	**Data > Group and Outline > Group.**
Cmd+F12	**Data > Group and Outline > Ungroup.**

Table 38: Number key shortcuts for menu and toolbar options

macOS	*Equivalent Menu bar / toolbar option*
Cmd+1	**Format > Cells.**
Ctrl+Shift+1	**Format > Number Format > Number** (use the “1” key on the main keyboard). **Format as Number** icon on Formatting toolbar.
Ctrl+Shift+2	**Format > Number Format > Scientific** (use the “2” key on the main keyboard).
Ctrl+Shift+3	**Format > Number Format > Date** (use the “3” key on the main keyboard). **Format as Date** icon on Formatting toolbar.
Ctrl+Shift+4	**Format > Number Format > Currency** (use the “4” key on the main keyboard). **Format as Currency** icon on Formatting toolbar.
Ctrl+Shift+5	**Format > Number Format > Percent** (use the “5” key on the main keyboard). **Format as Percent** icon on Formatting toolbar.
Ctrl+Shift+6	**Format > Number Format > General** (use the “6” key on the main keyboard).

Table 39: Letter key shortcuts for menu and toolbar options

macOS	*Equivalent Menu bar / toolbar option*
Cmd+B	**Format > Text > Bold.** **Bold** icon on the Formatting toolbar.
Shift+Cmd+B	**Format > Text > Subscript.**
Cmd+C	**Edit > Copy.** **Copy** icon on the Standard toolbar.
Option+Cmd+C	**Insert > Comment.** **Sheets > Cell Comments > Edit Comment.** **Insert Comment** icon on the Standard toolbar.
Cmd+D	**Sheet > Fill Cells > Fill Down.**
Cmd+E	**Format > Align > Centered.** **Align Center** icon on the Formatting toolbar.
Option+Cmd+E	**Tools > Extension Manager.**
Cmd+F	**Edit > Find.**
Option+Cmd+F	**Edit > Find and Replace.** **Find and Replace** icon on the Standard toolbar.

macOS	*Equivalent Menu bar / toolbar option*
Ctrl+*Cmd*+*F*	**View > Full Screen.**
Cmd+*H*	**LibreOffice > Hide LibreOffice.**
Cmd+*I*	**Format > Text > Italic.** **Italic** icon on the Formatting toolbar.
Cmd+*J*	**Format > Align > Justified.**
Cmd+*K*	**Insert > Hyperlink.** **Insert Hyperlink** icon on the Standard toolbar.
Cmd+*L*	**Format > Align > Left.** **Align Left** icon on the Formatting toolbar.
Shift+*Cmd*+*L*	**Data > AutoFilter.** **AutoFilter** icon on the Standard toolbar.
Ctrl+*M*	**Format > Clear Direct Formatting.** **Clear Direct Formatting** icon on the Standard toolbar.
Shift+*Cmd*+*M*	**Edit > Edit Mode.**
Cmd+*N*	**File > New > Spreadsheet.** **New** icon on the Standard toolbar.
Shift+*Cmd*+*N*	**File > New > Templates.** **File > Templates > Manage Templates.** Via drop-down menu on **New** icon on the Standard toolbar.
Cmd+*O*	**File > Open.** **Open** icon on the Standard toolbar.
Shift+*Cmd*+*O*	**File > Print Preview.** **Toggle Print Preview** icon on the Standard toolbar.
Cmd+*P*	**File > Print.** **Print** icon on the Standard toolbar.
Shift+*Cmd*+*P*	**Format > Text > Superscript.**
Cmd+*Q*	**LibreOffice > Quit LibreOffice.**
Cmd+*R*	**Format > Align > Right.** **Align Right** icon on the Formatting toolbar.
Cmd+*S*	**File > Save.** **Save** icon on the Standard toolbar.
Shift+*Cmd*+*S*	**File > Save As.**
Cmd+*T*	**View > Styles.** **Styles > Manage Styles.**
Cmd+*U*	**Underline** icon on the Formatting toolbar.
Cmd+*V*	**Edit > Paste.** **Paste** icon on the Standard toolbar.
Shift+*Cmd*+*V*	**Edit > Paste Special > Paste Special.**
Option+*Shift*+*Cmd*+*V*	**Edit > Paste Special > Paste Unformatted Text.**
Cmd+*W*	**Window > Close Window.**

macOS	Equivalent Menu bar / toolbar option
Cmd+X	**Edit > Cut.** **Cut** icon on the Standard toolbar.
Cmd+Y	**Edit > Redo.** **Redo** icon on the Standard toolbar.
Shift+Cmd+Y	**Edit > Repeat.**
Cmd+Z	**Edit > Undo.** **Undo** icon on the Standard toolbar.

Table 40: Other shortcuts for menu and toolbar options

macOS	Equivalent Menu bar / toolbar option
Shift+Cmd+Pg Up	**Edit > Select > Select to Previous Sheet.**
Shift+Cmd+Pg Dn	**Edit > Select > Select to Next Sheet.**
Delete	**Sheet > Clear Cells.**
Ctrl+Space	**Edit > Select > Select Column.**
Shift+Space	**Edit > Select > Select Row.**
Ctrl+Shift+Space Cmd+A	**Edit > Select All.**
Cmd++	**Sheet > Insert Cells** (use the + key on the numeric keypad).
Cmd+-	**Sheet > Delete Cells.**
Cmd+*	**Edit > Select > Select Data Area**.
Cmd+;	**Insert > Date.**
Option+Cmd+=	**Insert > Object > Formula Object.**
Shift+Cmd+;	**Tools > Spelling.** **Spelling** icon on the Standard toolbar.
Cmd+,	**LibreOffice > Preferences.**

Other Calc keyboard shortcuts

Tables 41 to 46 provide lists of additional Calc keyboard shortcuts that may be less obvious to users because they are not indicated on Menu bar items or in tooltips associated with icons on the Standard and Formatting toolbars.

Table 41: Other function key shortcuts

macOS	Description
Shift+F1	Display context sensitive help.
Cmd+F1	Display the comment attached to the current cell.
Shift+Cmd+F2	Moves the cursor to the Input line where you can enter a formula for the current cell.
Shift+Cmd+F5 Shift+Cmd+T	Moves the cursor to the Name Box field on the Formula bar.
F8	Toggles between the standard and extending selection modes.

macOS	Description
Shift+*F8*	Toggles between the standard and adding selection modes.

Table 42: Other letter key shortcuts

macOS	Description
Cmd+*G*	Repeat search forwards.
Shift+*Cmd*+*R*	Redraws the document view.
Shift+*Cmd*+*Z*	Reverses the action of the last undo command.

Table 43: Arrow key shortcuts

macOS	Description
↑	Moves the cell focus up.
Cmd+↑	Moves the cursor in the up direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Shift+↑	Selects the adjacent cell or cells located in the up direction.
Shift+*Cmd*+↑	Selects in the up direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Option+*Shift*+↑	Optimizes the row height based on the current cell.
→	Moves the cell focus right.
Cmd+→	Moves the cursor in the right direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Shift+→	Selects the adjacent cell or cells located in the right direction.
Shift+*Cmd*+→	Selects in the right direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Option+→	Increases the width of the current column.
Option+*Shift*+→	Optimizes the column width based on the current cell.
↓	Moves the cell focus down.
Cmd+↓	Moves the cursor in the down direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Option+↓	Opens a drop-down selection list of text items that have been previously typed into other cells in the same column.
Shift+↓	Selects the adjacent cell or cells located in the down direction.
Shift+*Cmd*+↓	Selects in the down direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Option+*Shift*+↓	Optimizes the row height based on the current cell.
←	Moves the cell focus left.

macOS	Description
Cmd+←	Moves the cursor in the left direction the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Shift+←	Selects the adjacent cell or cells located in the left direction.
Shift+*Cmd*+←	Selects in the left direction to the edge of the current data range (if the cell adjacent to the cursor is empty, the cursor moves to the next cell that contains data).
Option+←	Decreases the width of the current column.
Option+*Shift*+←	Optimizes the column width based on the current cell.

Table 44: Home and End key shortcuts

macOS	Description
Home	Moves the cursor to the first cell of the current row.
Cmd+*Home*	Moves the cursor to the first cell in the current sheet (A1).
Shift+*Home*	Selects cells from the cursor to the first cell of the current row.
Shift+*Cmd*+*Home*	Selects all cells from the cursor to the first cell in the current sheet (A1).
End	Moves the cursor along the current row to the cell in the last column containing data in the sheet.
Cmd+*End*	Moves the cursor to the cell in the last column and row that contain data in the current sheet.
Shift+*End*	Selects cells along the current row from the cursor to the cell in the last column containing data in the sheet.
Shift+*Cmd*+*End*	Selects all cells from the cursor to the cell in the last column and row that contain data in the current sheet.

Table 45: Other Page Up and Down key shortcuts

macOS	Description
Pg Up	Moves up one screen page.
Cmd+*Pg Up*	Moves to the previous sheet.
Shift+*Pg Dn*	Selects cells from the cursor to the row one page up.
Option+*Pg Dn*	Moves one screen page to the left.
Option+*Shift*+*Pg Dn*	Selects cells from the cursor to the column one page to the left.
Pg Dn	Moves down one screen page.
Cmd+*Pg Dn*	Moves to the next sheet.
Shift+*Pg Dn*	Selects cells from the cursor to the row one page down.
Option+*Pg Up*	Moves one screen page to the right.
Option+*Shift*+*Pg Up*	Selects cells from the cursor to the column one page to the right.

Table 46: Other miscellaneous key shortcuts

macOS	Description
Esc	Cancels the current cell edit.
Fwd Del	Deletes cell contents without a dialog (does not remove formatting).
Cmd+Delete	Refocuses the view back on the cursor if it is not currently in view.
Option+Delete	Reverses the last command or the last entry you typed.
Cmd+[	Selects the cells on which the current cell is dependent.
Cmd+]	Selects the cells that are dependent on the current cell.
Cmd+/	Selects the cells in the matrix formula range that contains the cursor. Use the forward slash key on the main keyboard or the numeric keypad.
Cmd+'	Copies the contents of the cell above the cursor into the current cell, but remains in cell edit mode so that you can make further changes. Use the single apostrophe key.
Enter	Moves the cursor to the next cell in the selected range, from top to bottom, then left to right. To specify in which direction the cursor moves, go to **LibreOffice > Preferences > LibreOffice Calc > General** on the Menu bar.
Cmd+Enter	Inserts a manual line break in the current cell while editing a cell.
Shift+Cmd+Enter	Creates a matrix in the current range using the information entered on the input line.
Option+Enter	Fills the selected cell range with the formula that you entered on the input line.

Chart keyboard shortcuts

Table 47 lists some shortcuts that are available within a Calc chart.

Tip

You can use the *Option* key with the arrow keys and plus (*+*) and minus (*–*) *keys* to move elements with a finer degree of movement for more accuracy.

Table 47: Chart shortcuts

macOS	Effect
→⇥	Selects the next chart element.
Shift+→⇥	Selects the previous chart element.
Home	Selects the first chart element.
End	Selects the last chart element.
Esc	Cancels selection.
Arrow keys	Moves the element in the direction of the arrow.
Arrow keys in pie charts	Moves the selected pie segment in the direction of the arrow.
F2 in titles	Enters text input mode.
F3 in legends and data series	Opens groups so that you can edit the individual components.

macOS	Effect
Cmd+F3 in legends and data series	Exits groups.

Outline keyboard shortcuts

Table 48 lists shortcuts that are available in an outline window. To use these shortcuts, press *F6* or *Shift+F6* until the vertical or horizontal outline window has the focus.

Table 48: Outline shortcuts

macOS	Effect
→|	Cycles through each outline indicator from top to bottom or left to right.
Shift+→|	Cycles through each outline indicator in the opposite direction.
Cmd+1 to *Cmd+8*	Show all levels up to the specified number while hiding all higher-numbered levels in the outline.
+/-	Shows (*+*) or hides (*–*) the focused outline group (use the *+* / *–* keys in the numeric keypad).
Enter	Activates the focused indicator button.
Arrow keys	Cycles through indicator buttons in the direction of the arrow.

Keyboard shortcuts that cannot be modified

Table 49 identifies the key combinations that are grayed out (not available for modification) in the *Shortcut Keys* list on the **Tools > Customize > Keyboard** dialog with **Calc** selected.

Table 49: Grayed key combinations in Tools > Customize > Keyboard

Operating system	Key combinations grayed in Customize dialog
macOS	*F1*, *Cmd+F1*, *Shift+F1* *Shift+F2* *Cmd+F4*, *Option+F4*, *Cmd+Option+F4* *F6*, *Cmd+F6*, *Shift+F6*, *Shift+Cmd+F6* *F10* *Shift+Cmd+0*, *Shift+Cmd+1*, *Shift+Cmd+2*, *Shift+Cmd+3*, *Shift+Cmd+4*, *Shift+Cmd+5*, *Shift+Cmd+6*, *Shift+Cmd+7*, *Shift+Cmd+8*, *Shift+Cmd+9*



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Appendix B
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 580), or on the Status bar (Figure 581), 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 580 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*.

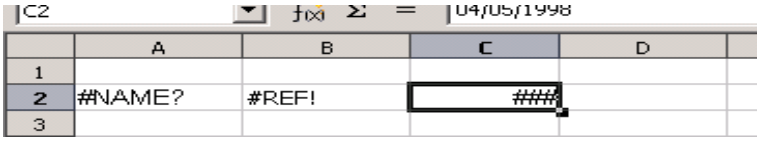


Figure 580: Error codes displayed within cells

When the cell displaying the #REF! error code in Figure 580 is selected, the Status bar displays the error message as shown in Figure 581. 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*.

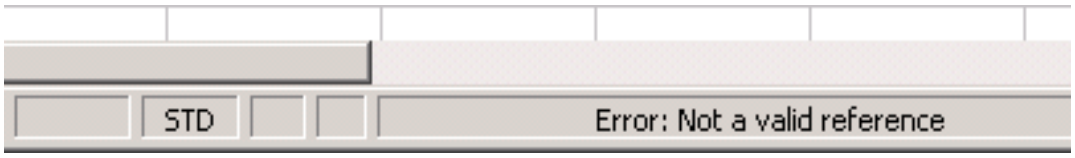


Figure 581: An error message displayed in the Status bar

This appendix presents error codes in two tables.

1) Table 50 lists error strings 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. Alphanumeric codes such as *Err502* and *Err511* can also appear in cells; these are not separately identified in the Table 50 but their meanings are given in Table 51.
2) Table 51 explains all of the error codes, listed by code number, including those error codes in the first table.

Tip

You can use the ERRORTYPE() function to find the code number for an error occurring in a different cell. Refer to the Help system for more detail about this function.

Error codes displayed within cells

Table 50: Error codes in cells

Code	Message	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 *Wrap text automatically* or *Shrink to fit cell size* in the *Properties* area to make the text match the current column width.
503	#NUM!	A calculation resulted in an overflow of the defined value range.
519	#VALUE!	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.
524	#REF!	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.
525	#NAME?	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.
532	#DIV/0!	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 *Internal errors* should not be encountered by users under normal conditions. Errors listed as *Not used* are not currently assigned to any error condition and will not occur.

Table 51: List of error codes

Code	Message	Explanation of the error
501	Invalid character	Character in a formula is not valid. This error is the same as the *Invalid Name* 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 SQRT() 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.
507, 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 8192, 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.
515	Internal syntax error	Unknown error.
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 (cell displays #NULL!)	No code or 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	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 to 529	—	Not used.
530	No AddIn	Add-in not found.
531	No Macro	Macro not found.
532	Division by zero (cell displays #DIV/0!)	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
533	Nested arrays are not supported	For example, "`={1;{2}}`"
538	Error: Array or matrix size	Array or matrix size invalid.
539	Unsupported inline array content	For example, "`={1+2}`"
540	External content disabled	Occurs when a function that requires (re)loading of external sources is encountered and the user hasn't confirmed reloading of external sources yet.

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Calc Guide

Working With Spreadsheets

About this book:

This book is for beginners to advanced users of Calc, the spreadsheet component of LibreOffice. It covers the main features of Calc, including:

Entering, editing, and formatting data
Functions and formulas to perform complex calculations on data
Statistic analysis, pivot tables and goal seek for decision making
Database functions to arrange, store, and filter data
A wide range of 2D and 3D charts
Macros
And much more

About the authors:

This book was written by volunteers from the LibreOffice community. Profits from sales of the printed edition will be used to benefit the community.
A PDF version of this book can be downloaded free from:
https://documentation.libreoffice.org

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