



Calc Guide

Chapter 12

Macros

Automating repetitive tasks

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Using LibreOffice on macOS

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

<i>Windows or Linux</i>	<i>macOS equivalent</i>	<i>Effect</i>
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
Ctrl+Q	⌘ + Q	Exit / quit LibreOffice
F11	⌘ + T	Open the Sidebar's Styles deck

Contents

Copyright	2
Contributors.....	2
To this edition.....	2
To previous editions.....	2
Feedback.....	2
Publication date and software version.....	2
Using LibreOffice on macOS.....	2
Introduction	4
Using the macro recorder	4
Write your own functions	8
Create function macro.....	8
Using a macro as a function.....	12
Macro security warnings.....	12
Loaded / unloaded libraries.....	13
Passing arguments to a macro.....	15
Arguments are passed as values.....	16
Writing macros that act like built-in functions.....	16
Deleting LibreOffice Basic macros.....	17
Accessing cells directly	18
Sorting	19
Overview of BeanShell, JavaScript, and Python macros	20
Introduction.....	20
BeanShell macros.....	21
JavaScript macros.....	23
Python macros.....	25
Conclusion	26

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, BeanShell, JavaScript, and Python). 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 BeanShell, JavaScript and Python scripting languages but fuller descriptions of the facilities for these languages are beyond the scope of this document.

Using the macro recorder

Chapter 13 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.

- 1) Use **Tools > Options > LibreOffice > Advanced** from the Menu bar and select the **Enable macro recording** option to enable the macro recorder.
- 2) Use **File > New > Spreadsheet** from the Menu bar to create a new spreadsheet.
- 3) Enter the numbers shown in Figure 1 into cells A1:C3 of the first sheet in the new spreadsheet.

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

Figure 1: Enter numbers into cells A1:C3

- 4) Select cell A3, which contains the number 3, and use **Edit > Copy** from the Menu bar to copy the value to the clipboard.
- 5) Select all cells in the range A1:C3.
- 6) Use **Tools > Macros > Record Macro** from the Menu bar to start the macro recorder. Calc displays the Record Macro dialog, which includes a **Stop Recording** button (Figure 2).

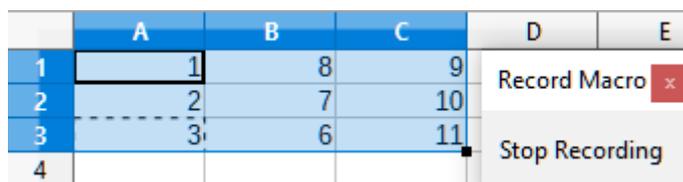


Figure 2: Record Macro dialog with Stop Recording button

- 7) Use **Edit > Paste Special > Paste Special** from the Menu bar to open the Paste Special dialog (Figure 3).

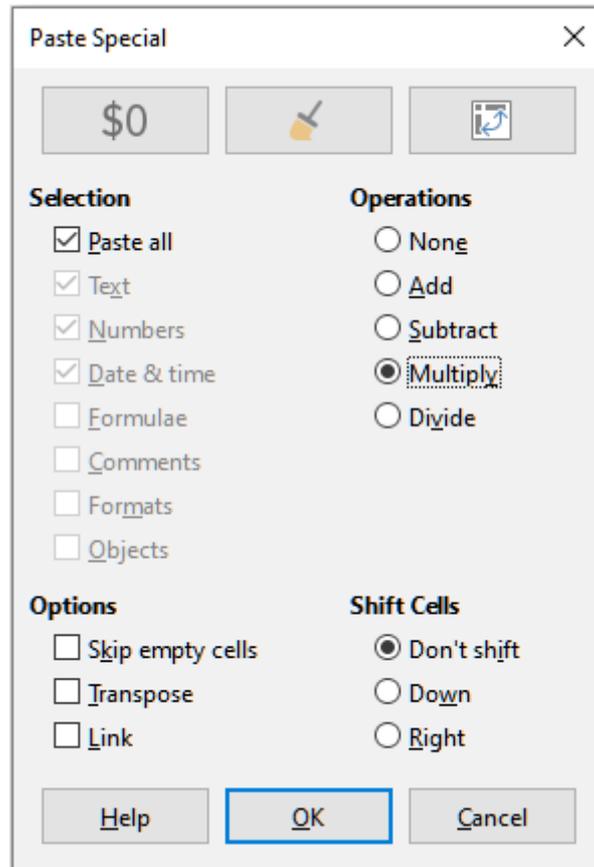


Figure 3: Paste Special dialog

- 8) Select the **Paste all** option in the *Selection* area and the **Multiply** option in the *Operations* area, and click **OK**. The values in cells A1:C3 are now multiplied by 3 (Figure 4).

	A	B	C	D	E
1	3	24	27	Record Macro	
2	6	21	30		
3	9	18	33	Stop Recording	
4					

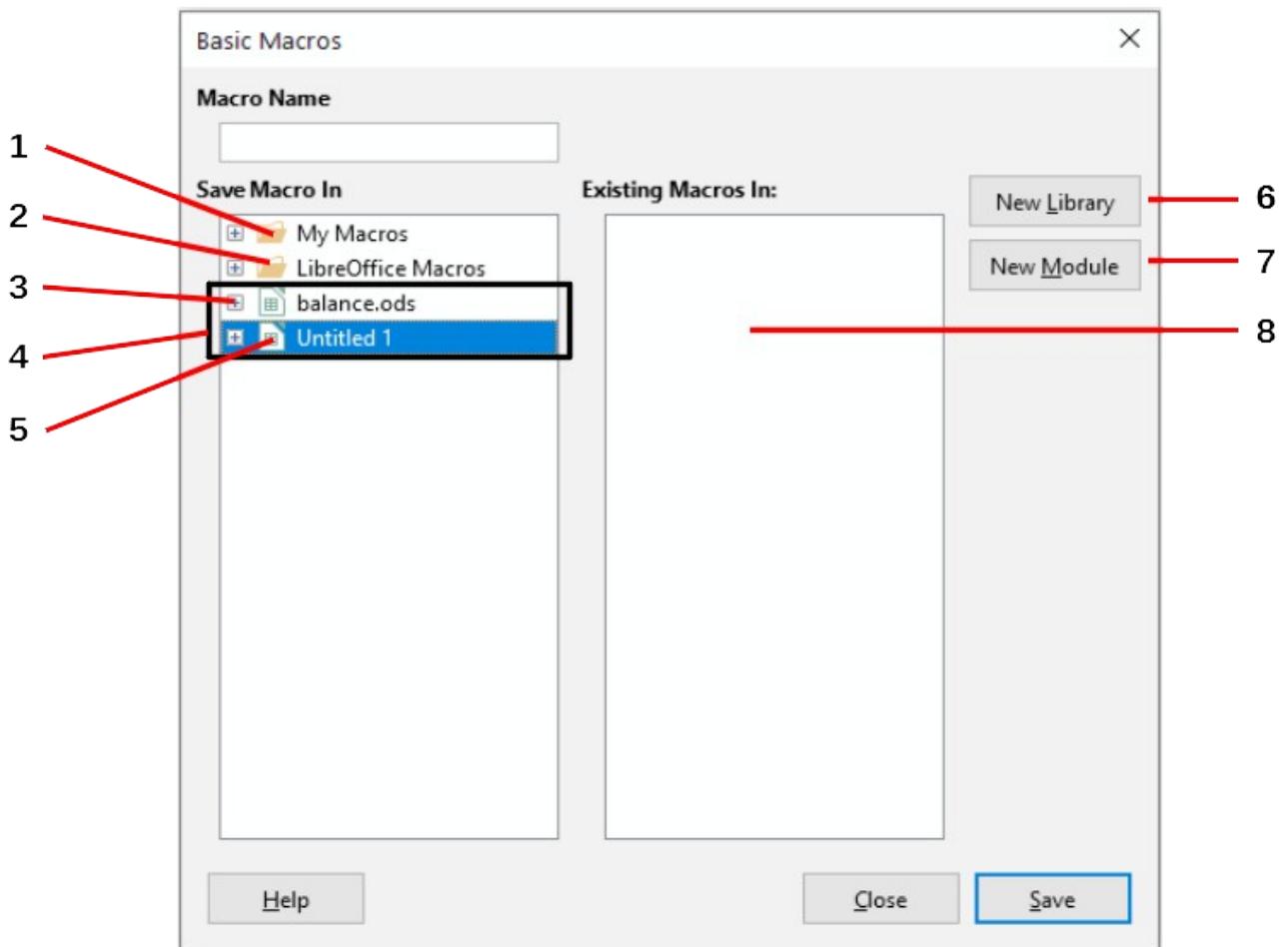
Figure 4: Cells A1:C3 multiplied by 3

- 9) Click the **Stop Recording** button to stop the macro recorder. Calc displays a variant of the Basic Macros dialog (Figure 5).



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 5 shows the *My Macros* library container, the *LibreOffice Macros* library container, the library container for the open *Ba lance . ods* file, and the library container for the untitled file created at step 2. 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 5: Parts of the Basic Macros dialog

- 10) 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*.

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 6). Type a name for the new module or leave the name as the default *Module1*.

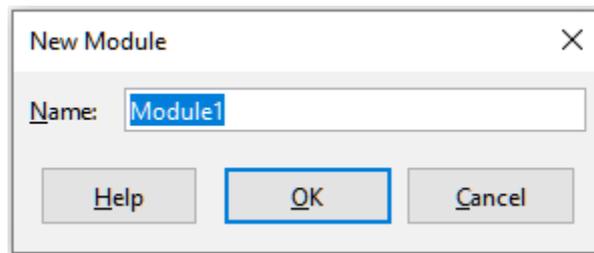


Figure 6: New Module dialog



Note

The libraries, modules and macro names must follow some strict rules. Following the main rules, the names must:

- Begin with a letter
- Comprise lower case letters (a..z), upper case letters (A..Z), digits (0..9), and underscore characters (_)
- 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 7).

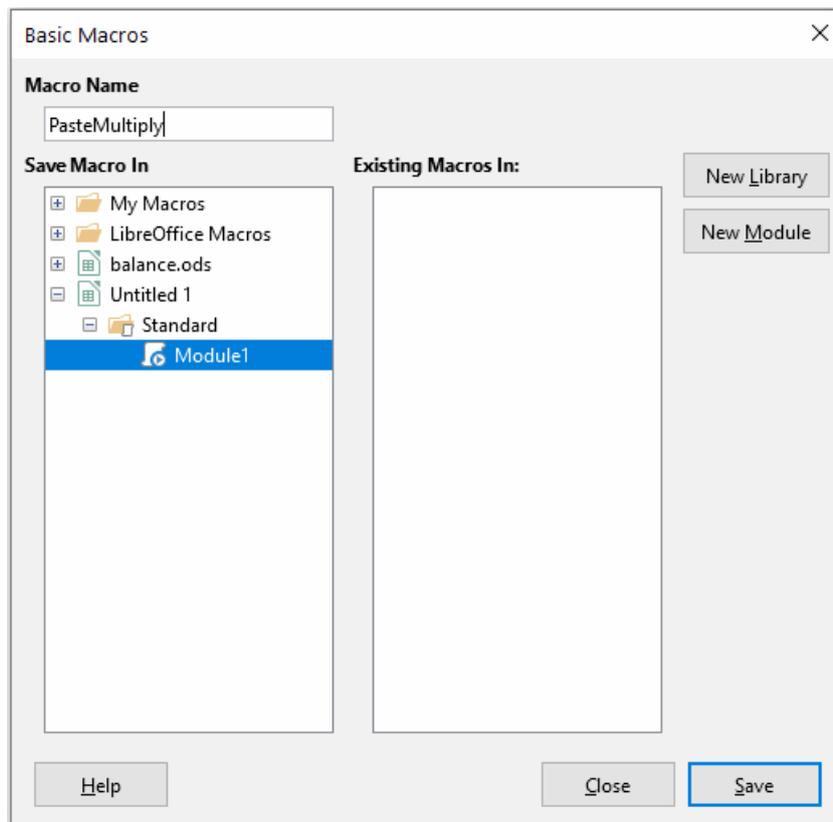


Figure 7: Select the module and name the macro

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
  rem -----
  rem define variables
  dim document as object
  dim dispatcher as object
  rem -----
  rem get access to the document
  document = ThisComponent.CurrentController.Frame
  dispatcher = createUnoService("com.sun.star.frame.DispatchHelper")

  rem -----
  dim args1(5) as new com.sun.star.beans.PropertyValue
  args1(0).Name = "Flags"
  args1(0).Value = "A"
  args1(1).Name = "FormulaCommand"
  args1(1).Value = 3
  args1(2).Name = "SkipEmptyCells"
  args1(2).Value = false
  args1(3).Name = "Transpose"
  args1(3).Value = false
  args1(4).Name = "AsLink"
  args1(4).Value = false
  args1(5).Name = "MoveMode"
  args1(5).Value = 4

  dispatcher.executeDispatch(document, ".uno:InsertContents", "", 0,
args1())
end sub
```

Write your own functions

Create 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) Create a new spreadsheet, save it with the name `CalcTestMacros.ods`, and leave it open in Calc.
- 2) Use **Tools > Macros > Organize Macros > Basic** from the Menu bar to open the Basic Macros dialog (Figure 8). 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 (see Figure 5).

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.

- 3) Click **Organizer** to open the Basic Macro Organizer dialog (Figure 9).

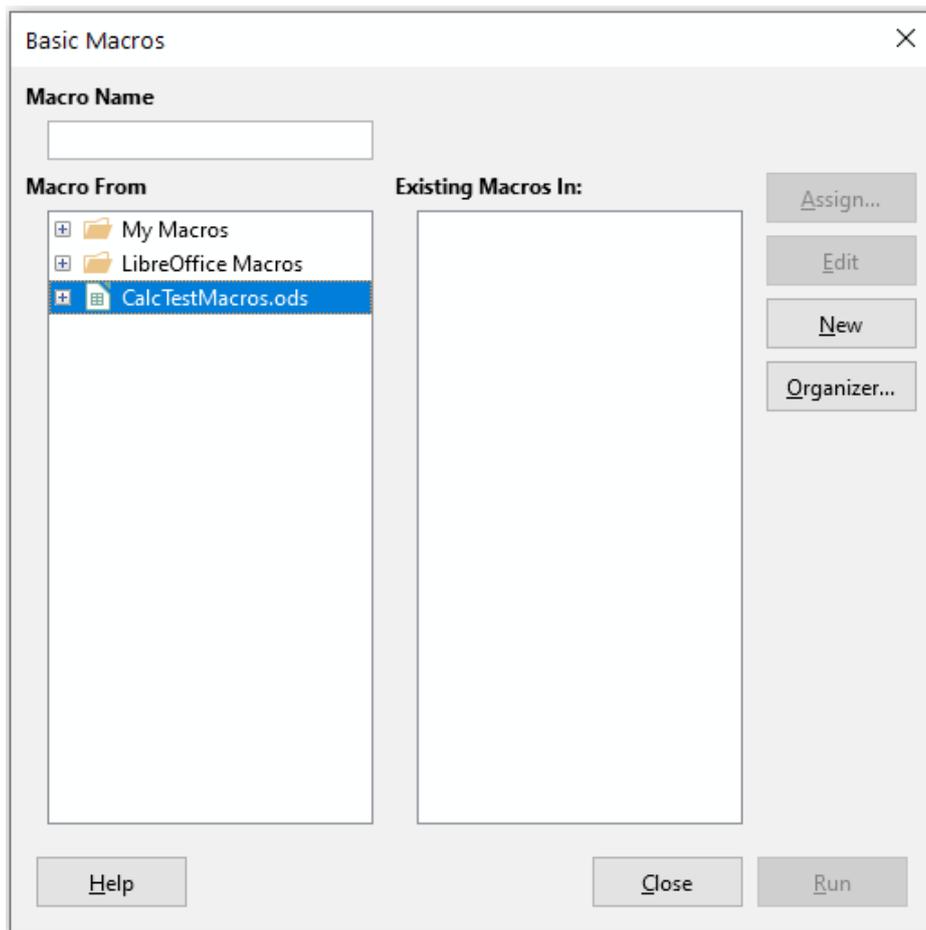


Figure 8: Basic Macros dialog

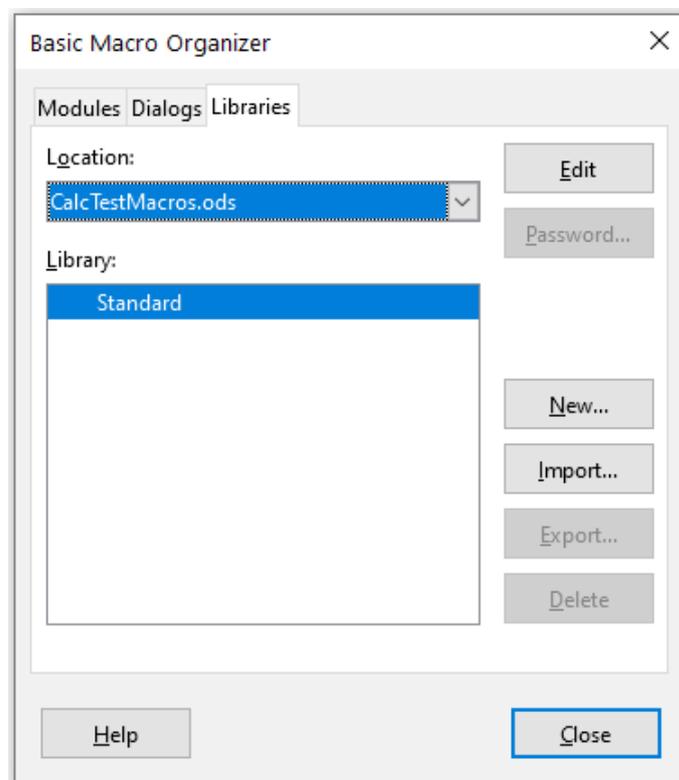


Figure 9: Basic Macro Organizer

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.

- 4) Click **New** to open the New Library dialog to create a new library for this document (Figure 10).

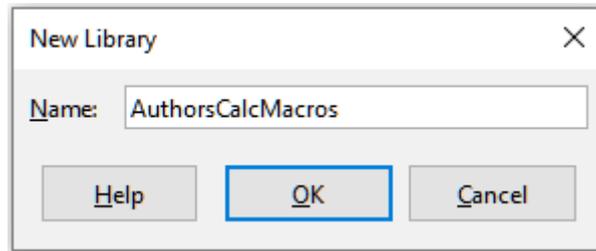


Figure 10: New Library dialog

- 5) 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.

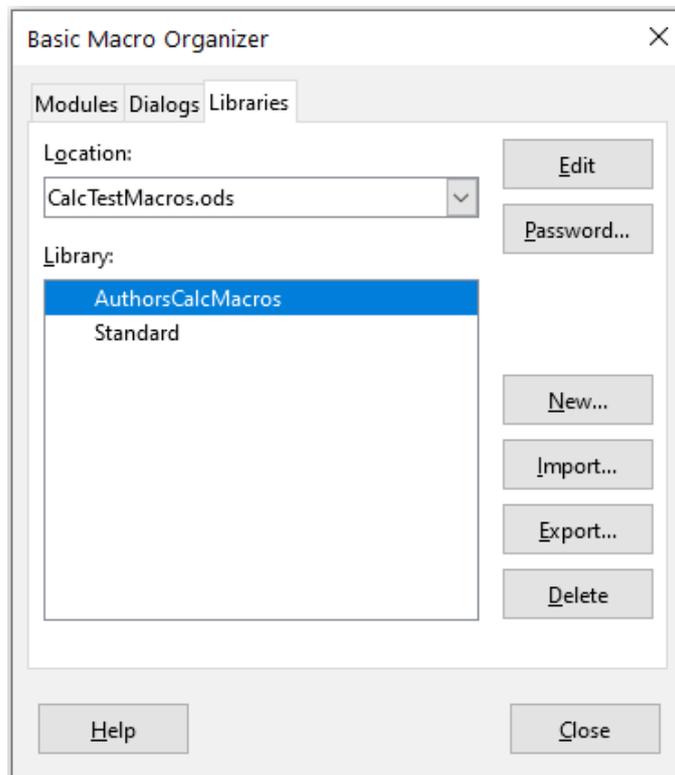


Figure 11: The new library is shown in the *Library:* area

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 12.

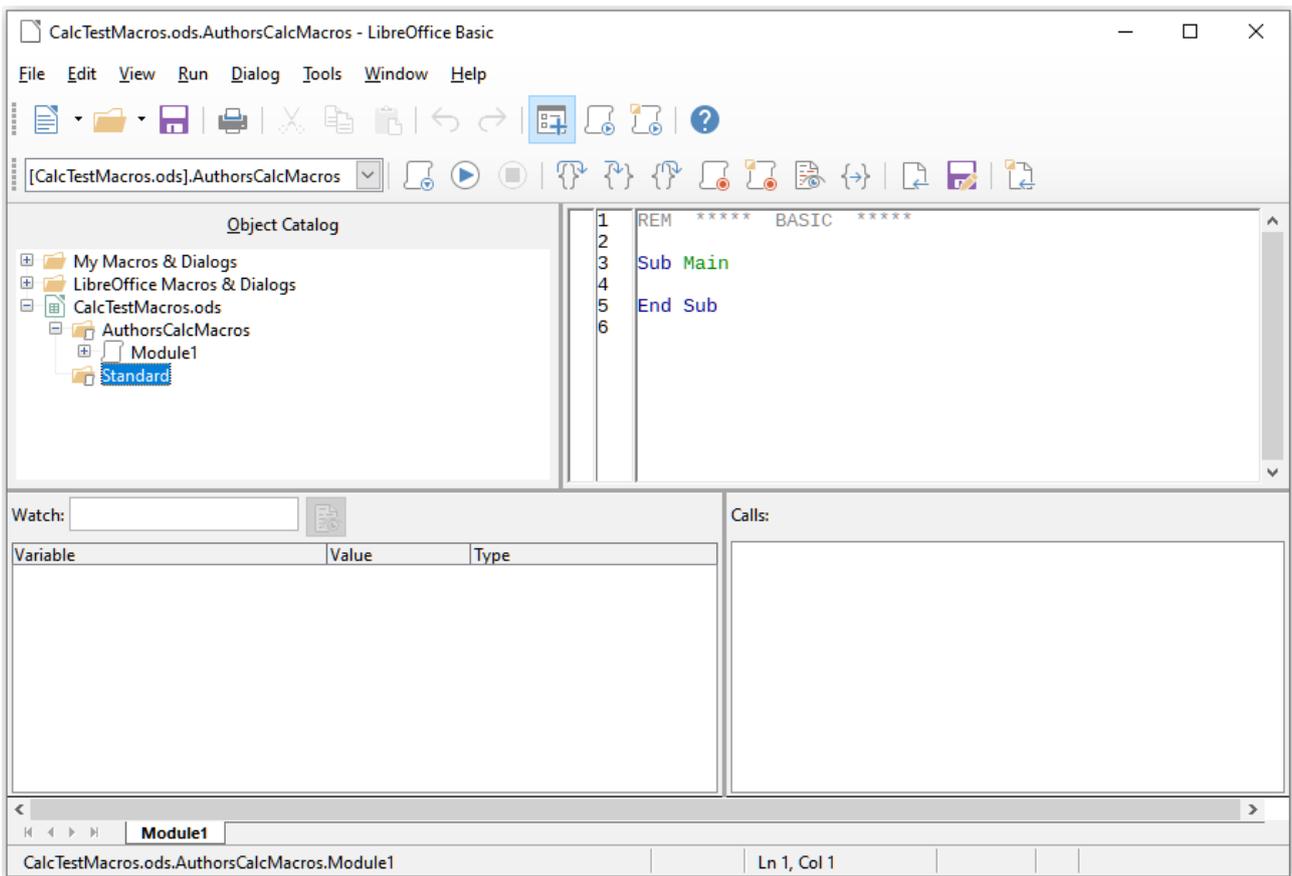


Figure 12: LibreOffice Basic Integrated Development Environment

Figure 12 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 selection of the required library container, library, module, and macro.
- 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 Call Stack 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.

- 6) 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

```
REM ***** BASIC *****  
Option Explicit  
  
Sub Main  
  
End Sub  
  
Function NumberFive ()  
    NumberFive = 5  
End Function
```

- 7) Use the **Save** button of the Standard toolbar within the LibreOffice Basic IDE 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 13). Calc finds the macro, calls it, and displays the result (5) in that cell.

	A	B	C	D
1				
2		5		

Figure 13: Use the `NumberFive` macro as a Calc function



Tip

Function names are not case sensitive. In Figure 13, 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** from the Menu bar, Calc may display one of the warnings shown in Figures 14 and 15.

In the case of the warning shown in Figure 14, 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 15, 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.

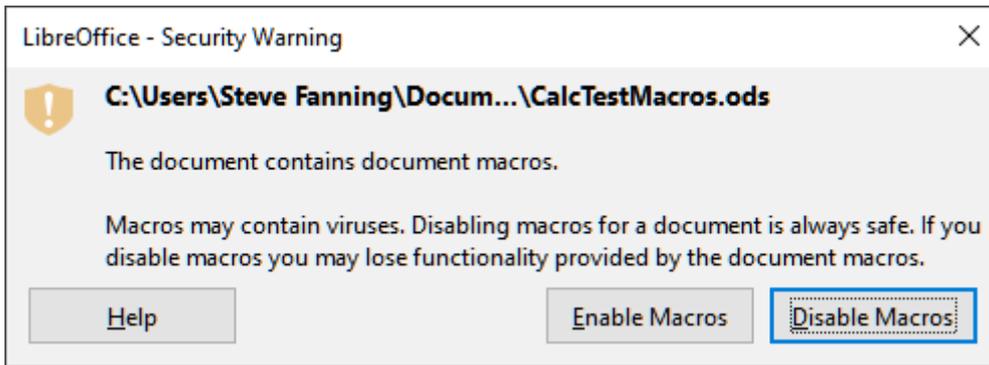


Figure 14: Warning that a document contains macros

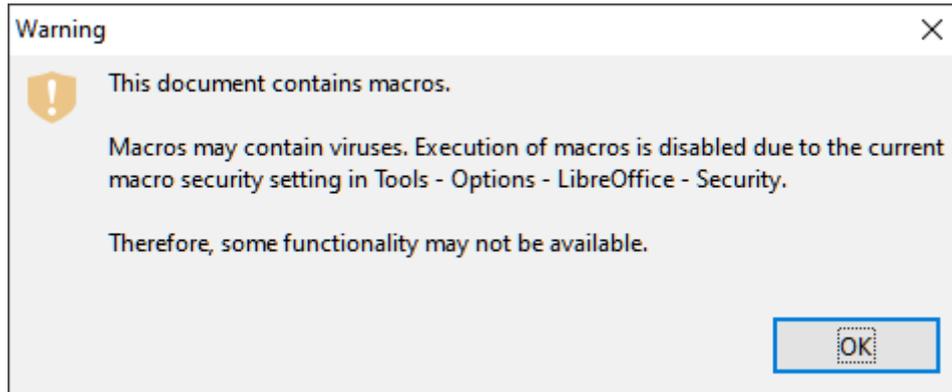


Figure 15: Warning that macros in the document are disabled

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. No other libraries are automatically loaded.

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 16).

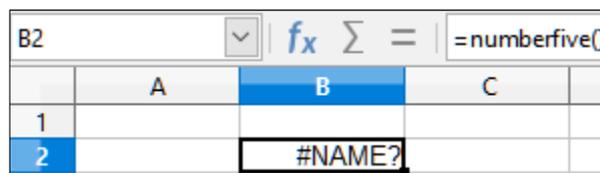


Figure 16: The macro function is not available

Use **Tools > Macros > Organize Macros > Basic** from the Menu bar to open the Basic Macros dialog (Figure 17). 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.

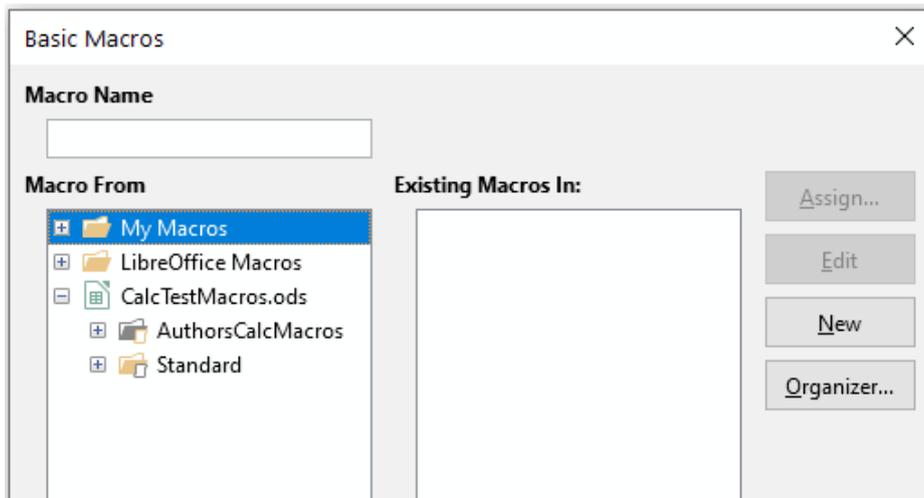


Figure 17: Different symbols for loaded and unloaded libraries

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** in the Menu bar to open the Basic Macros dialog. Select the *NumberFive* macro and click **Edit** to open the macro for editing (Figure 18).

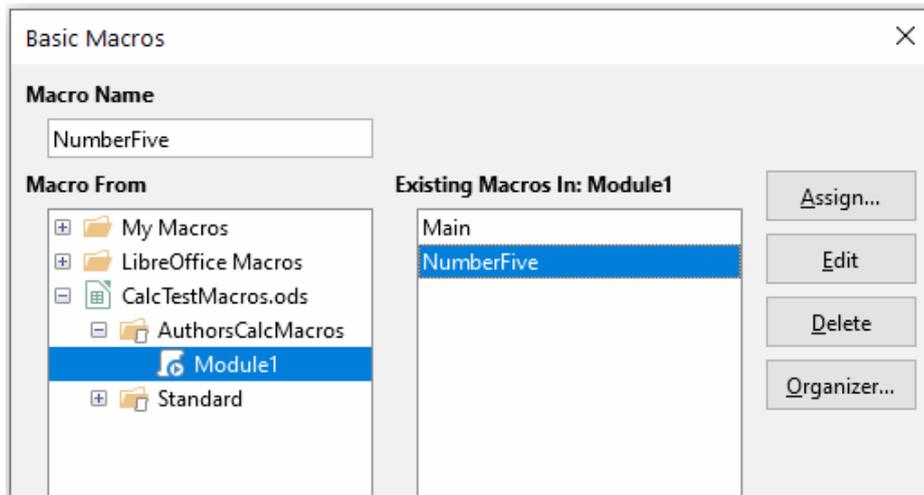


Figure 18: Select a macro and click Edit

- 2) Calc displays the LibreOffice Basic IDE (Figure 12), 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 18).

- 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

```
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.

Deleting LibreOffice Basic macros

Use the following steps to delete an unwanted macro:

- 1) Use **Tools > Macros > Organize Macros > Basic** in the Menu bar to open the Basic Macros dialog (see Figure 18 on page 14).
- 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** in the Menu bar to open the Basic Macros dialog (see Figure 18 on page 14).

- 2) Click the **Organizer** button to open the Basic Macro Organizer dialog (Figure 19).
- 3) Make sure that the *Modules* tab is selected.

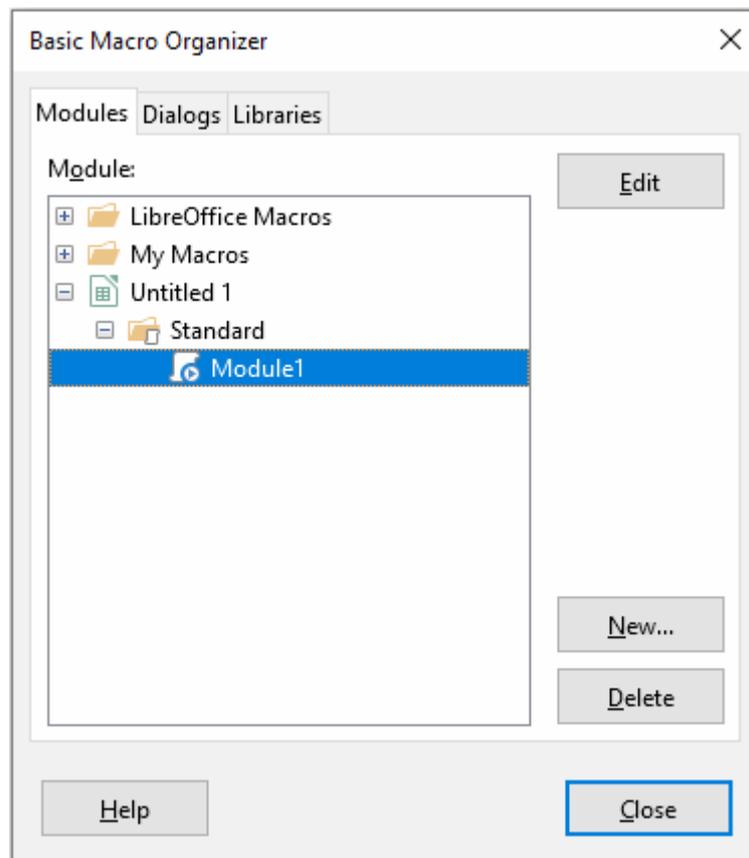


Figure 19: Basic Macro Organizer dialog, Modules tab

- 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")

        REM The getDataArray() method returns strings and numbers
        REM but is not used in this function.

        REM The getData() method returns only numbers and is applicable
        REM 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 20. First, sort on column B descending and then on column A ascending.

	A	B	C
1	1	5	One
2	4	1	Two
3	3	1	Three
4	7	8	Four
5	4	2	Five

Becomes

	A	B	C
1	7	8	Four
2	1	5	One
3	4	2	Five
4	3	1	Three
5	4	1	Two

Figure 20: 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.

    REM An array of sort fields determines the columns that are
    REM sorted. This is an array with two elements, 0 and 1.
    REM To sort on only one column, use:
    REM Dim oSortFields(0) As New com.sun.star.util.SortField
    Dim oSortFields(1) As New com.sun.star.util.SortField

    REM The sort descriptor is an array of properties.
    REM The primary property contains the sort fields.
    Dim oSortDesc(0) As New com.sun.star.beans.PropertyValue

    REM Get the sheet named "Sheet1"
    oSheet = ThisComponent.Sheets.getByName("Sheet1")

    REM Get the cell range to sort
    oCellRange = oSheet.getCellRangeByName("A1:C5")

    REM Select the range to sort.
    REM The only purpose would be to emphasize the sorted data.
    'ThisComponent.getCurrentController.select(oCellRange)

    REM The columns are numbered starting with 0, so
    REM column A is 0, column B is 1, etc.
    REM Sort column B (column 1) descending.
    oSortFields(0).Field = 1
    oSortFields(0).SortAscending = FALSE
```

```
REM If column B has two cells with the same value,  
REM then use column A ascending to decide the order.  
oSortFields(1).Field = 0  
oSortFields(1).SortAscending = TRUE  
  
REM Setup the sort descriptor.  
oSortDesc(0).Name = "SortFields"  
oSortDesc(0).Value = oSortFields()  
  
REM Sort the range.  
oCellRange.Sort(oSortDesc())  
End Sub
```

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** from the Menu bar, Calc displays the Macro Selector dialog. This dialog enables selection and running of any available macro, coded in any of the available languages (Figure 21).

When you select to edit a macro using **Tools > Macros > Edit Macros** from 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.

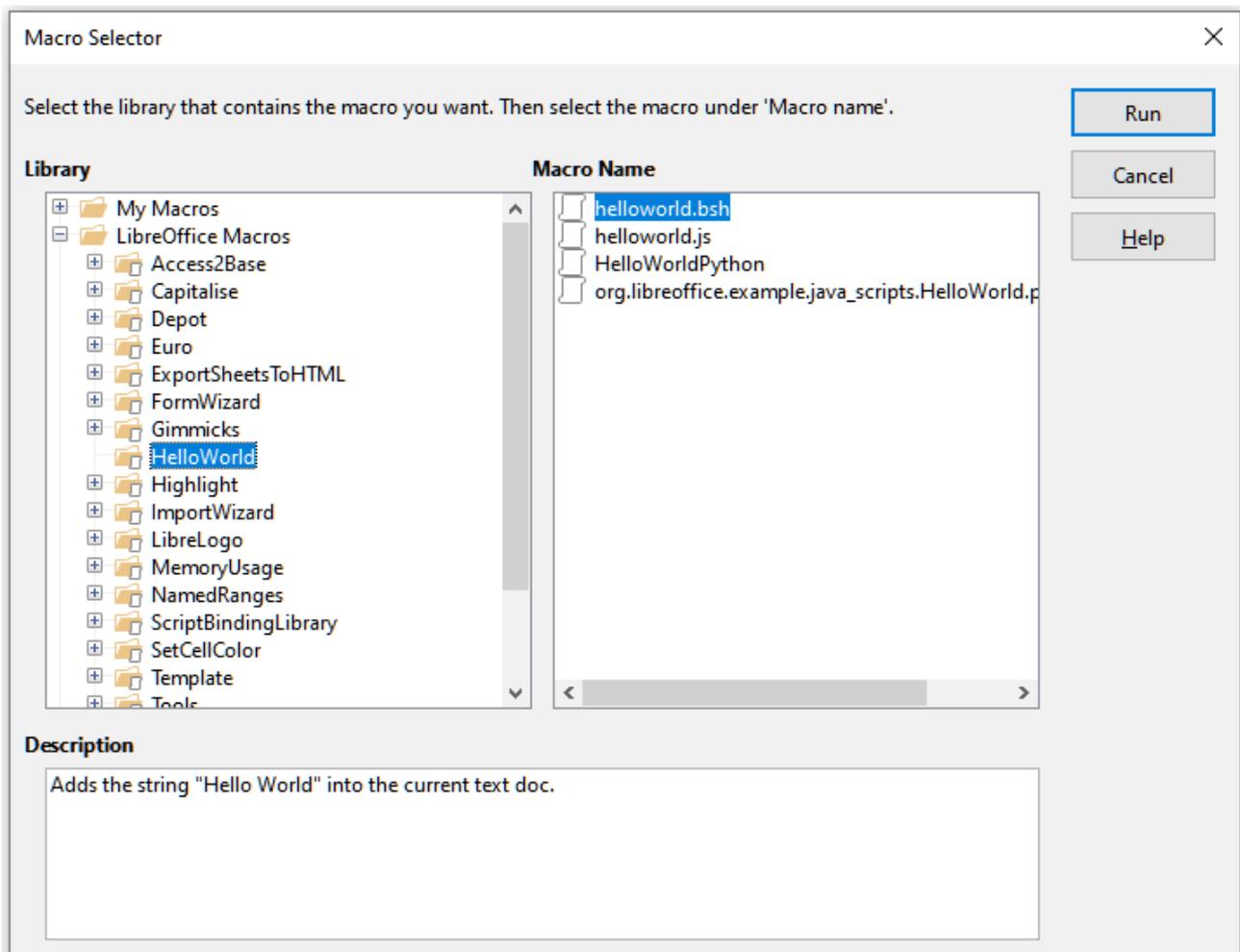


Figure 21: Macro Selector dialog

BeanShell macros

BeanShell is a Java-like scripting language that was first released in 1999.

When you select **Tools > Macros > Organize Macros > BeanShell** from the Menu bar, Calc displays the BeanShell Macros dialog (Figure 22).

Click the **Edit** button on the BeanShell Macros dialog to access the BeanShell Debug Window (Figure 23).

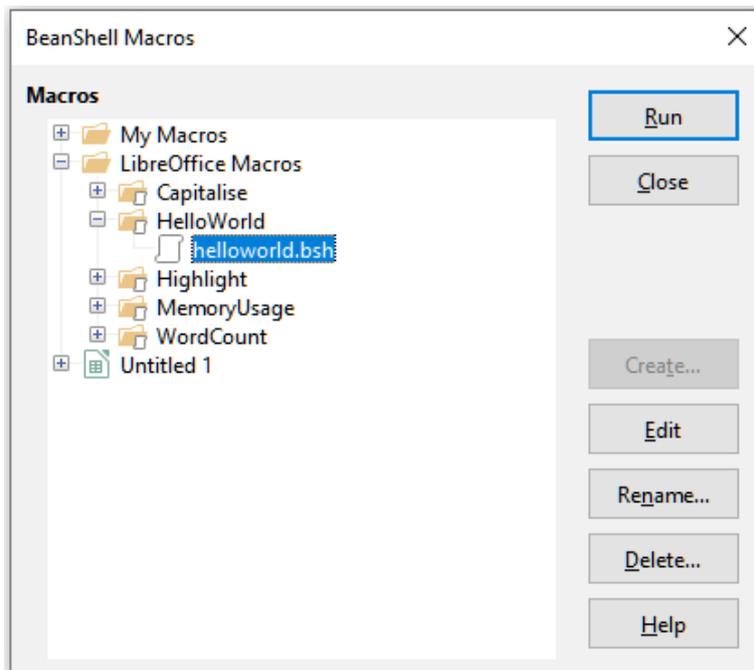


Figure 22: BeanShell Macros dialog

```

BeanShell Debug Window: $BRAND_BASE_DIR/$BRAND_SHARE_SUBDIR/Scripts/beanshell/Hello...
Run | Clear | Save | Close | Undo | Redo
1  /*
2  * This file is part of the LibreOffice project.
3  *
4  * This Source Code Form is subject to the terms of the Mozilla Public
5  * License, v. 2.0. If a copy of the MPL was not distributed with this
6  * file, You can obtain one at http://mozilla.org/MPL/2.0/.
7  *
8  * This file incorporates work covered by the following license notice:
9  *
10 *   Licensed to the Apache Software Foundation (ASF) under one or more
11 *   contributor license agreements. See the NOTICE file distributed
12 *   with this work for additional information regarding copyright
13 *   ownership. The ASF licenses this file to you under the Apache
14 *   License, Version 2.0 (the "License"); you may not use this file
15 *   except in compliance with the License. You may obtain a copy of
16 *   the License at http://www.apache.org/licenses/LICENSE-2.0 .
17 */
18 // Hello World in BeanShell
19 import com.sun.star.uno.UnoRuntime;
20 import com.sun.star.text.XTextDocument;
21 import com.sun.star.text.XText;
22 import com.sun.star.text.XTextRange;
23

```

Figure 23: 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** from the Menu bar, Calc displays the JavaScript Macros dialog (Figure 24).

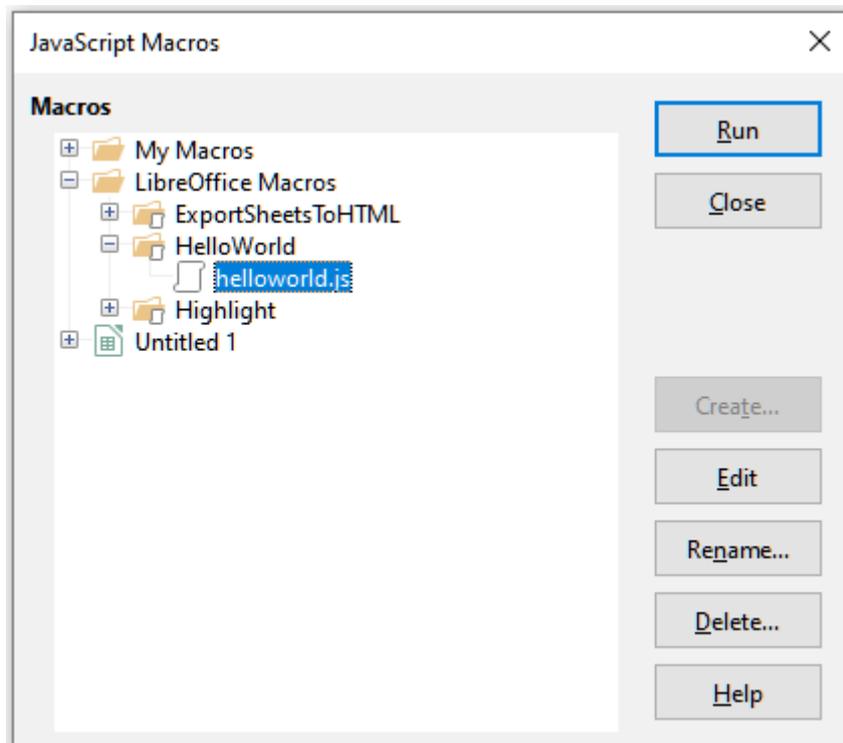


Figure 24: JavaScript Macros dialog

Click the **Edit** button on the JavaScript Macros dialog to access the Rhino JavaScript Debugger (Figure 25). Detailed instructions for using this tool can be found on Mozilla's website at <https://developer.mozilla.org/en-US/docs/Mozilla/Projects/Rhino/Debugger>.

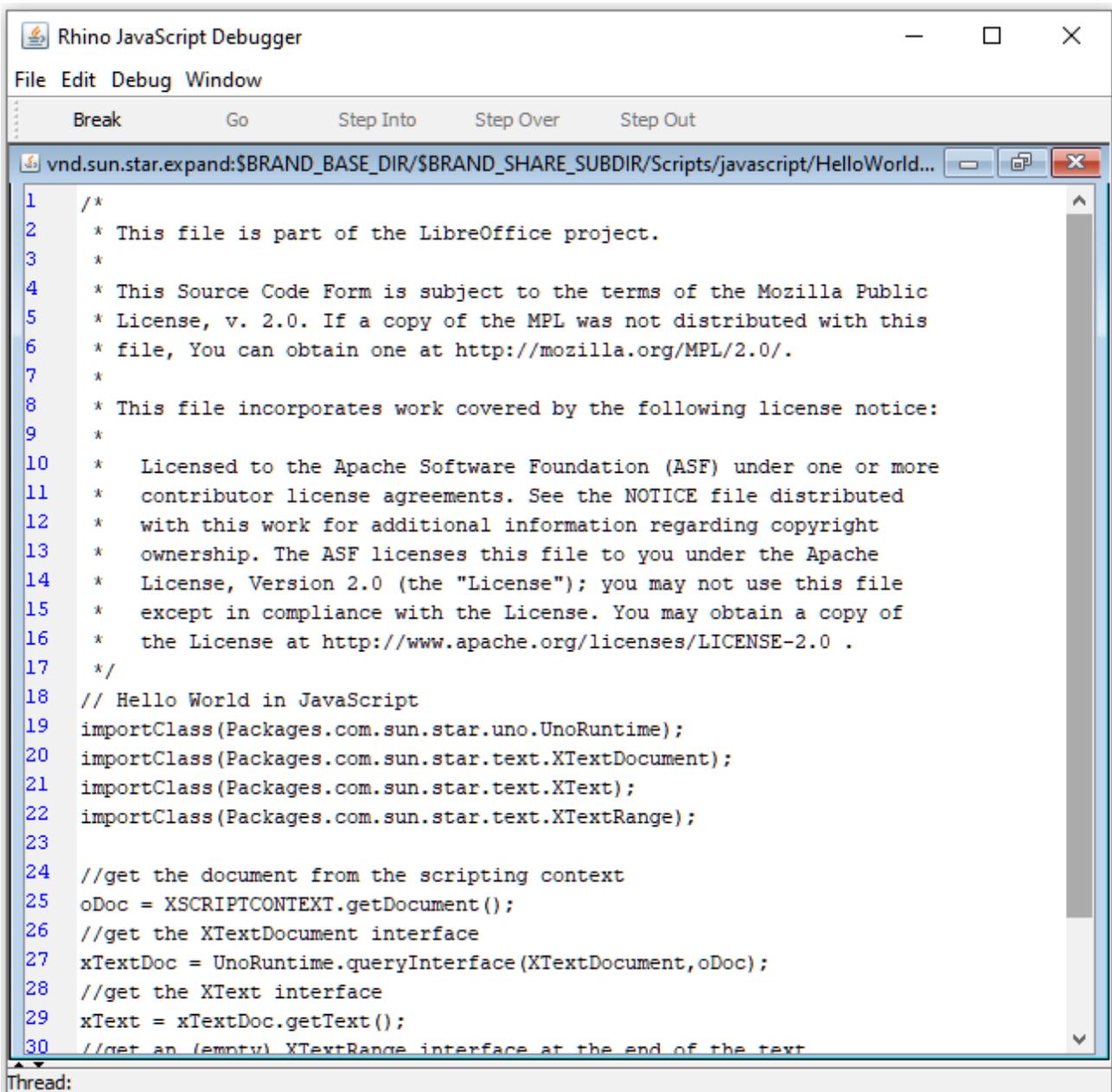


Figure 25: Rhino JavaScript Debugger

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.

When you select **Tools > Macros > Organize Macros > Python** from the Menu bar, Calc displays the Python Macros dialog (Figure 26).

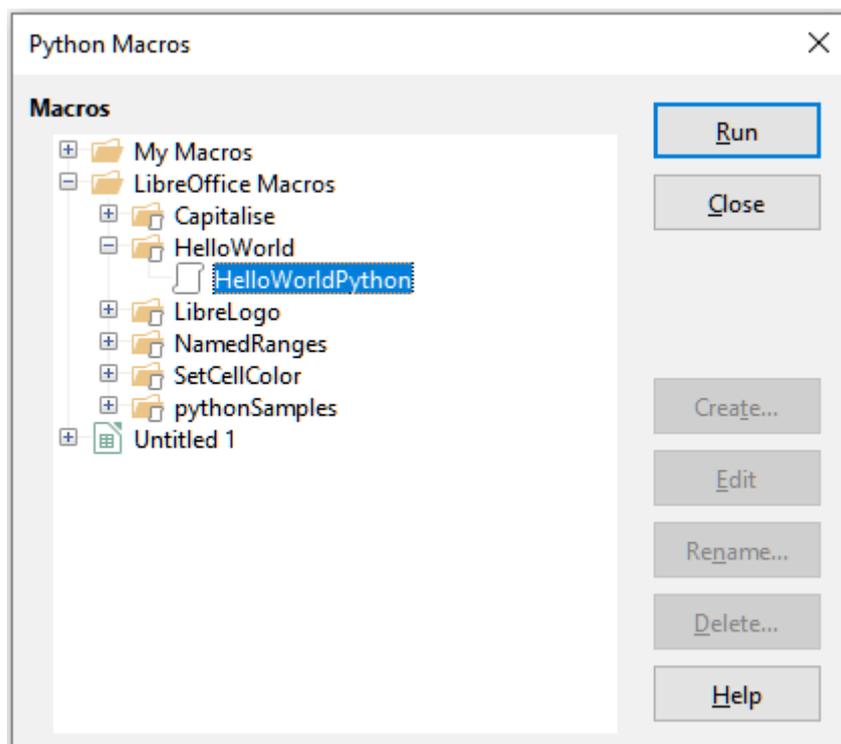


Figure 26: Python Macros dialog

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 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
```

Conclusion

This chapter provides an overview of how to create libraries and modules, using the macro recorder, using macros as Calc functions, and writing your own macros without the macro recorder. Each topic deserves at least one chapter, and writing your own macros for Calc could easily fill an entire book. In other words, this is just the beginning of what you can learn.

Additional detail about Calc's macro facilities can be obtained from the Help system, The Document Foundation's wiki pages (for example <https://wiki.documentfoundation.org/Macros>) and other Internet sources (for example the <http://ask.libreoffice.org/> Q&A site).