Base Guide

Chapter 9
Macros

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Contents

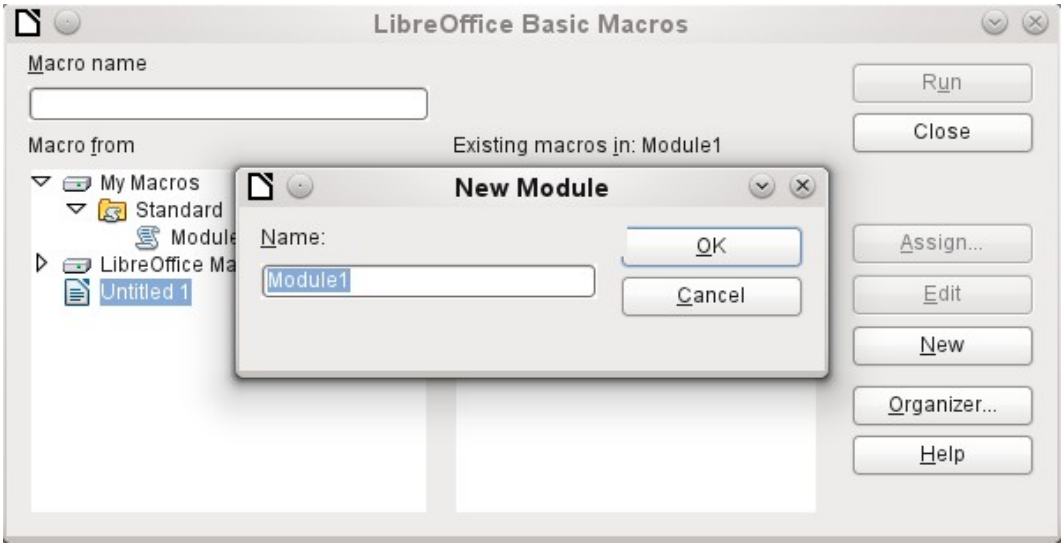
General remarks on macros

In principle a database in Base can be managed without macros. At times, however, they may become necessary for:

- More effective prevention of input errors.
- Simplifying certain processing tasks (changing from one form to another, updating data after input into a form, and so on).
- Allowing certain SQL commands to be called up more easily than with the separate SQL editor.

You must decide for yourself how intensively you wish to use macros in Base. Macros can improve usability but are always associated with small reductions in the speed of the program, and sometimes with larger ones (when coded poorly). It is always better to start off by fully utilizing the possibilities of the database and the provisions for configuring forms before trying to provide additional functionality with macros. Macros should always be tested on larger databases to determine their effect on performance.

Macros are created using **Tools > Macros > Organize macros > LibreOffice Basic**. A window appears which provides access to all macros. For Base, the important area corresponds to the filename of the Base file.



The **New** button in the LibreOffice Basic Macros dialog opens the New Module dialog, which asks for the module name (the folder in which the macro will be filed). The name can be altered later if desired.

As soon as this is given, the macro editor appears. Its input area already contains the Start and the End for a subroutine:

```
REM  *****  BASIC  *****

Sub Main

End Sub
```

If macros are to be used, the following steps are necessary:

- Under **Tools > Options > Security > Macro security** the security level should be reduced to Medium. If necessary, you can additionally use the Trusted sources tab to set the path to your own macro files to prevent later queries about the activation of macros.
- The database file must be closed and then reopened after the creation of the first macro module.

Some basic principles for the use of Basic code in LibreOffice:

- Lines have no line numbers, by default (though there is an option to enable them) and must end with a hard return.
- Functions, reserved expressions, and similar elements are not case-sensitive. So "String" is the same as "STRING" or "string" or any other combination of upper and lower case. Case should be used only to improve legibility. Names for constants and enumerations, however, are case sensitive the first time that they are seen by the macro compiler, so it is best to always write those using the proper case.
- One can distinguish between procedures (beginning with **Sub**) and functions (beginning with **Function**). Procedures were originally program segments without a return value, while functions return values that can be further processed. But this distinction is increasingly becoming irrelevant. People nowadays use terms such as “method” or “routine” whether there is a return value or not. A procedure can also have a return value (apart from “Variant”).

```
Sub myProcedure As Integer
End Sub
```

For further details, see Chapter 13, Getting Started with Macros, in the *Getting Started Guide*.

Note

Macros in the PDF and ODT versions of this chapter are colored according to the rules of the LibreOffice macro editor:

```
Macro designation
Macro comment
Macro operator
Macro reserved expression
Macro number
Macro character string
```

Macros in Base

Using macros

The “direct way”, using **Tools > Macros > Run macro** is possible, but not usual for Base macros. A macro is normally assigned to an event and launched when that event occurs. Macros are used for:

- Handling events in forms
- Editing a data source inside a form
- Switching between form controls
- Reacting to what the user does inside a control

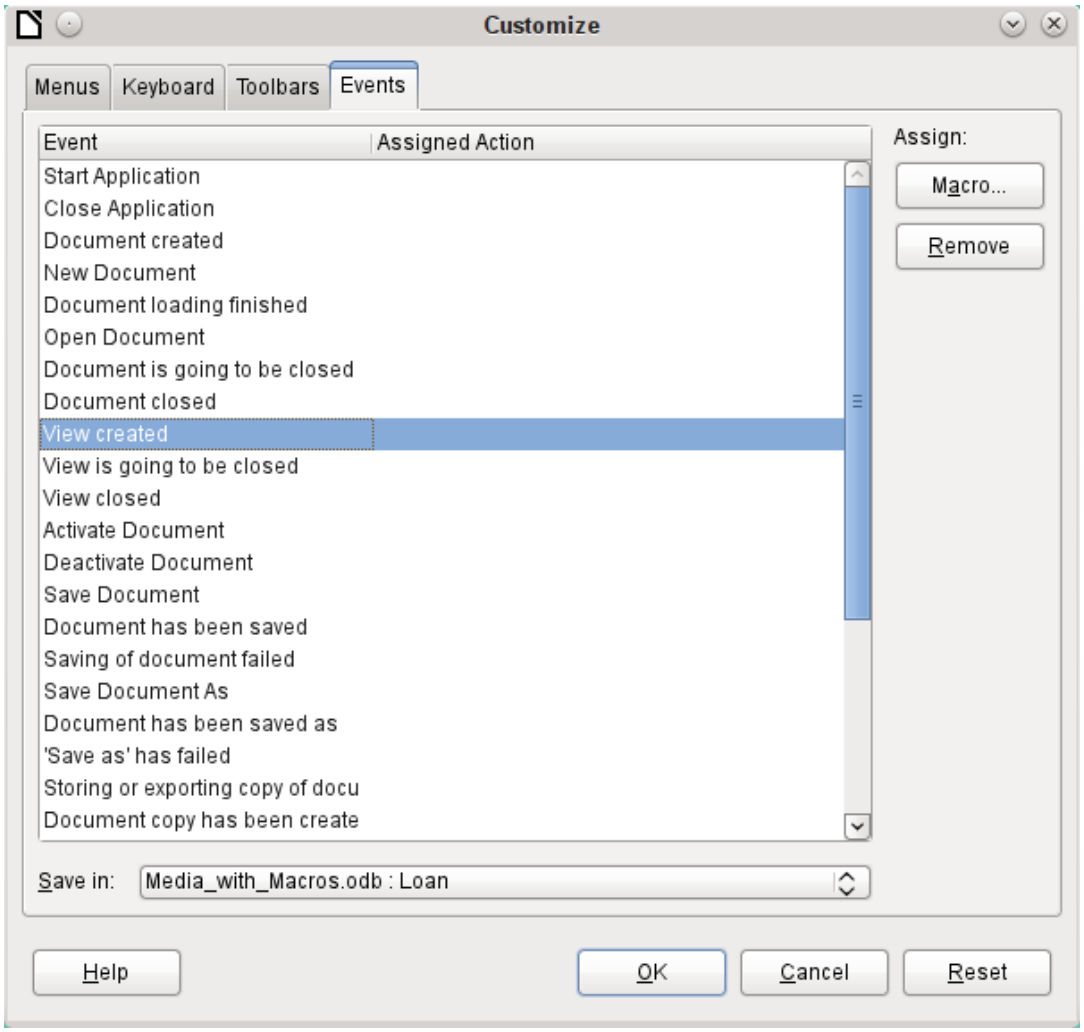
The “direct way” is not possible – not even for testing – when one of the objects **thisComponent** (see “Accessing forms” on page 11) or **oEvent** (see “Accessing form elements” on page 11) is to be used.

Assigning macros

If a macro is to be launched by an event, it must first be defined. Then it can be assigned to an event. Such events can be accessed through two locations.

Events that occur in a form when the window is opened or closed

Actions that take place when a form is opened or closed are registered as follows:



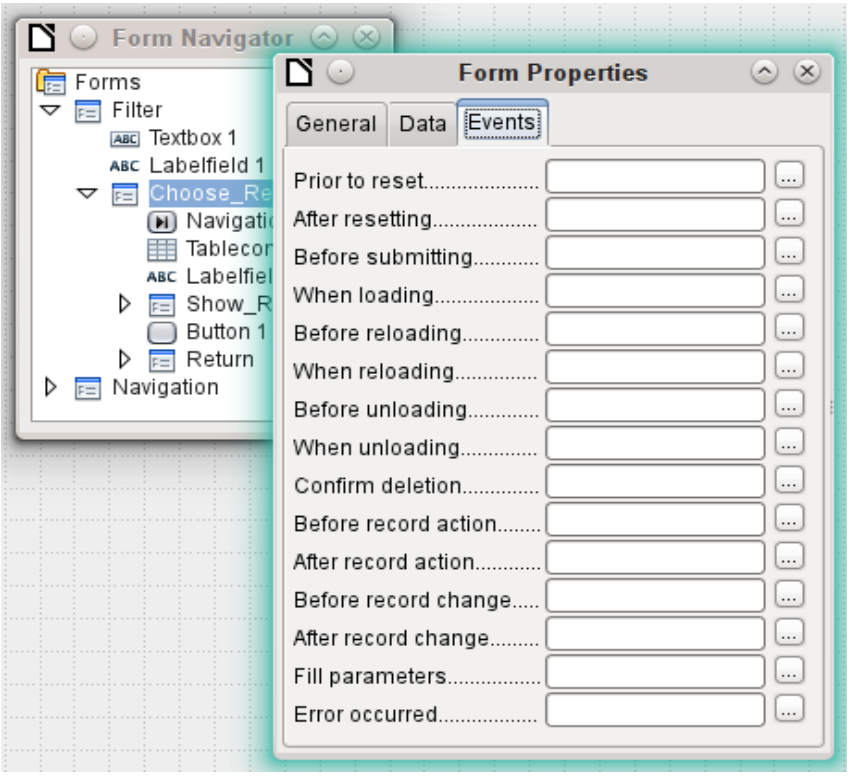
1) While designing the form, open the Events tab in **Tools > Customize**.
2) Choose the appropriate event. Some macros can only be launched when the View created event is chosen. Other macros, for example to create a full-screen form, should be launched by Open document.
3) Use the **Macro** button to find the macro you want and confirm your choice.
4) Under Save in, give the name of the form.
5) Confirm with **OK**.

Events in a form in an open window

Once the window is opened to show the overall content of the form, individual elements of the form can be accessed. This includes the elements you have assigned to the form.

The form elements can be accessed using the Form Navigator, as shown in the illustration below. They can equally well be accessed by using the contextual menus of individual controls within the form interface.

The events listed under **Form Properties > Events** all take place while the form window is open. The can be set separately for each form or subform in the form window.



Note

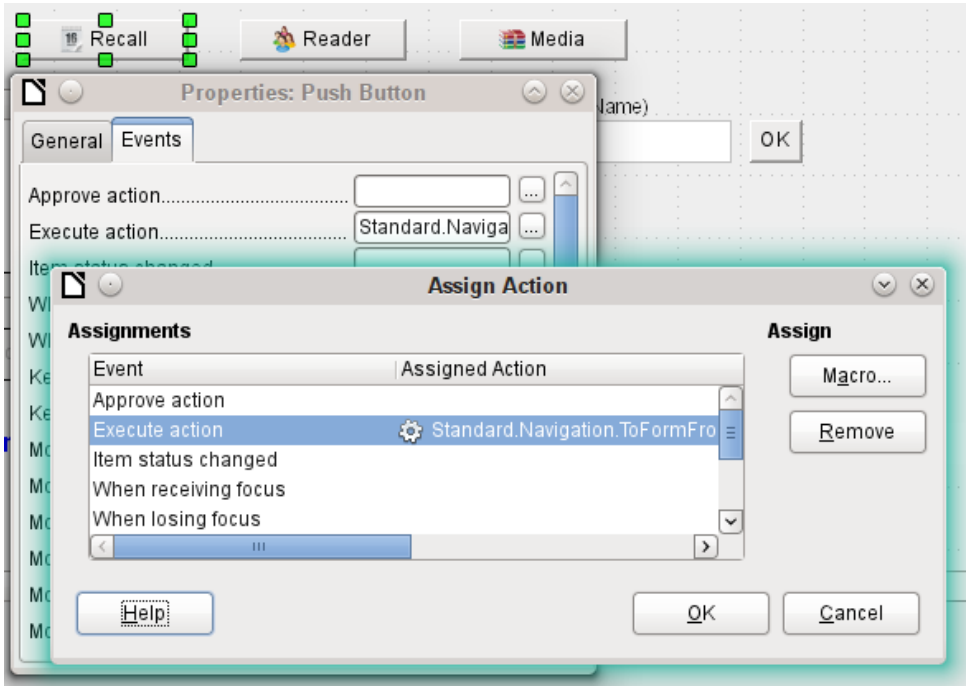
Unfortunately Base uses the word “form” both for a window that is opened for the input of data, and for elements within this window that are bound to a specific data source (table or query).

A single form window might well contain several forms with different data sources. In the Form Navigator, you always see first the term Forms, which in the case of a simple form contains only one subordinate entry.

Events within a form

All other macros are registered using the properties of subforms and controls through the Events tab.

1) Open the window for the properties of the control (if you have not already done so).
2) Choose a suitable event in the Events tab.
3) To edit the data source, use events that refer to *Record* or *Update* or *Reset.*
   - For buttons, or the choices within list or option fields the event *Execute action* would be the first port of call.
   - All other events depend on the type of control and the desired action.
4) Click the ... button to the right to open the Assign action dialog.
5) Click the **Macro** button to choose the macro defined for the action.
6) Click **OK** to confirm the assignment.



Components of macros

This section explains some of the macro language that is commonly used in Base, especially within forms. As far as is possible (and reasonable), examples are given in all the following sections.

The "Framework" of a macro

The definition of a macro begins with its type – **Sub** or **Function** – and ends with **End Sub** or **End Function**. A macro that is assigned to an event can receive arguments (values); the only useful one is the **oEvent** argument. All other routines that might be called by such a macro can be defined with or without a return value, depending on their purpose, and provided with arguments if necessary.

```
Sub update_loan
End Sub
Sub from_Form_to_Form(oEvent As Object)
End Sub
Function confirm_delete(oEvent As Object) As Boolean
    confirm_delete = False
End Function
```

It is helpful to write out this framework immediately and put in the content afterwards. Do not forget to add comments to explain the macro, remembering the rule "As many as necessary, as few as possible". In addition, Basic does not distinguish between upper and lower case. Usually fixed terms like **SUB** are written preferably in upper case, other concepts in mixed case.

Defining variables

In the next step, at the beginning of the routine, the **Dim** command is used to define the variables that will occur within the routine, each with its appropriate data type. Basic itself does not require this; it accepts any new variables that occur within the program. However the program code is "safer" if the variables, especially their data types, are declared. Many programmers make this a requirement, using Basic's Explicit option when they begin to write a module. This means "Do not recognize any old variable, but only those I have declared beforehand".

```
    Dim oDoc As Object
    Dim oDrawpage As Object
```

```
Dim oForm As Object
Dim sName As String
Dim bOKEnabled As Boolean
Dim iCounter As Integer
Dim dBirthday As Date
```

Only alphabetic characters (A-Z or a-z), numbers and the underline character '_' may be used in variable names. No special characters are allowed. Spaces are allowed under some conditions, but are best avoided. The first character must be alphabetic.

It is common practice to specify the data type in the first character[1]. Then it can be recognised wherever the variable occurs in the code. Also recommended are "expressive names", so that the meaning of the variable is obvious from its name.

A list of possible data types in Star Basic can be found in Appendix A in this book. They differ in various places from the types in the database and in the LibreOffice API. Such changes are made clear in the examples.

Defining arrays

For databases in particular, the assembly of several variables into a record is important. If several variables are stored together in a single common location, this is called an array. An array must be defined before data can be written into it.

```
Dim arData()
```

creates an empty array.

```
arData = Array("Lisa","Schmidt")
```

creates an array of a specific size (2 elements) and provides it with values.

Using

```
Print arData(0), arData(1)
```

causes the two defined elements to be displayed onscreen. The element count begins with 0.

```
Dim arData(2)
arData(0) = "Lisa"
arData(1) = "Schmidt"
arData(2) = "Cologne"
```

This creates an array in which three elements of any type can be stored, for example a record for "Lisa""Schmidt""Cologne". You cannot put more than three elements into this array. If you want to store more elements, you must make the array larger. However if the size of an array is redefined while a macro is running, the array is initially empty, just like a new array.

```
ReDim Preserve arData(3)
arData(3) = "18.07.2003"
```

Adding **`Preserve`** keeps the preceding data so that the array is truly extended by the entry of the date (here in the form of text).

The array shown above can store only one record. If you want to store several records, as a table in a database does, you need to define a two-dimensional array.

```
Dim arData(2,1)
arData(0,0) = "Lisa"
arData(1,0) = "Schmidt"
arData(2,0) = "Cologne"
arData(0,1) = "Egon"
arData(1,1) = "Müller"
arData(2,1) = "Hamburg"
```

Here too it is possible to extend the previously defined array and preserve the existing contents by using **`Preserve`**.

1 You should make this more specific where necessary, as only one letter does not allow you to distinguish between the data types "Double" and "Date" or "Single" and "String".

Accessing forms

The form lies in the currently active document. The region which is represented here is called **drawpage**. The container in which all forms are kept is called **forms**; in the Form Navigator this shows up as the primary heading with all the individual forms attached. The variables named above receive their values like this:

```
oDoc = thisComponent
oDrawpage = oDoc.drawpage
oForm = oDrawpage.forms.getByName("Filter")
```

The form to be accessed is called Filter. This is the name that is visible in the top level of the Form Navigator (by default the first form is called MainForm). Subforms lie in hierarchical order within the main form and can be reached step by step:

```
Dim oSubForm As Object
Dim oSubSubForm As Object
oSubForm = oForm.getByName("Readerselect")
oSubSubForm = oSubForm.getByName("Readerdisplay")
```

Instead of using intermediate varables, you can go straight to a particular form. An intermediate object, which can be used more than once, needs to be declared and assigned a separate value. In the following example, **oSubForm** is no longer used.

```
oForm = thisComponent.drawpage.forms.getByName("Filter")
oSubSubForm = oForm.getByName("readerselect").getByName("readerdisplay")
```

Note

If a name consists solely of ascii letters and numbers with no spaces or special characters, the name can be used directly in an assignment statement.

```
oForm = thisComponent.drawpage.forms.Filter
oSubSubForm = oForm.readerselect.readerdisplay
```

Contrary to normal Basic usage, such names must be written with the correct case.

A different mode of access to the form is provided by the event that triggers the macro.

If a macro is launched from a form event such as **Form Properties > Before record action**, the form itself can be reached as follows:

```
Sub MacroexampleCalc(oEvent As Object)
   oForm = oEvent.Source
   ...
End Sub
```

If the macro is launched from an event in a form control, such as **Text box > When losing focus**, both the form and the field become accessible:

```
Sub MacroexampleCalc(oEvent As Object)
   oField = oEvent.Source.Model
   oForm = oField.Parent
   ...
End Sub
```

Access to events has the advantage that you need not bother about whether you are dealing with a main form or a subform. Also the name of the form is of no importance to the functioning of the macro.

Accessing form elements

Elements within forms are accessed in a similar way: declare a suitable variable as **object** and search for the appropriate control within the form:

```
Dim btnOK As Object  ' Button »OK»
btnOK = oSubSubForm.getByName("button 1")    ' from the form readerdisplay
```

This method always works when you know which element the macro is supposed to work with. However when the first step is to determine which event launched the macro, the **oEvent** method shown above becomes useful. The variable is declared within the macro "framework" and gets assigned a value when the macro is launched. The **Source** property always yields the element that launched the macro, while the **Model** property describes the control in detail:

```
Sub confirm_choice(oEvent As Object)
    Dim btnOK As Object
    btnOK = oEvent.Source.Model
End Sub
```

If you want, further actions can be carried out with the object obtained by this method.

Please note that subforms count as components of a form.

Access to the database

Normally access to the database is controlled by forms, queries, reports or the mailmerge function, as described in previous chapters. If these possibilities prove insufficient, a macro can specifically access the database in several ways.

Connecting to the database

The simplest method uses the same connection as the form. **oForm** is determined as shown above.

```
Dim oConnection As Object
oConnection = oForm.activeConnection()
```

Or you can fetch the data source (i.e. the database) through the document and use its existing connection for the macro::

```
Dim oDatasource As Object
Dim oConnection As Object
oDatasource = thisComponent.Parent.dataSource
oConnection = oDatasource.getConnection("","")
```

A further way allows the connection to the database to be created on the fly:

```
Dim oDatasource As Object
Dim oConnection As Object
oDatasource = thisComponent.Parent.CurrentController
If Not (oDatasource.isConnected()) Then oDatasource.connect()
oConnection = oDatasource.ActiveConnection()
```

The **If** condition controls only one line so **End If** is not required.

If the macro is to be launched through the user interface and not from an event in a form, the following variant is suitable:

```
Dim oDatasource As Object
Dim oConnection As Object
oDatasource = thisDatabaseDocument.CurrentController
If Not (oDatasource.isConnected()) Then oDatasource.connect()
oConnection = oDatasource.ActiveConnection()
```

Access to databases outside the current database is possible as follows:

```
Dim oDatabaseContext As Object
Dim oDatasource As Object
Dim oConnection As Object
oDatabaseContext = createUnoService("com.sun.star.sdb.DatabaseContext")
oDatasource = oDatabaseContext.getByName("registered name of Database in LO")
oConnection = oDatasource.GetConnection("","")
```

Connections to databases not registered with LibreOffice are also possible. In such cases, instead of the registered name, the path to the database must be given as `file:///……/database.odb`.

Expanded instructions on database connections are given in “Making a connection to a database” (page 62).

SQL commands

You work with the database using SQL commands. These need to be created and sent to the database; the result is determined according to the type of command and the results can be further processed. The **createStatement** directive creates a suitable object for this purpose.

```
Dim oSQL_Statement As Object ' the object that will carry out the SQL-command
Dim stSql As String         ' Text of the actual SQL-command
Dim oResult As Object       ' result of executeQuery
Dim iResult As Integer      ' result of executeUpdate
oSQL_Statement = oConnection.createStatement()
```

To *query data*, you call the **executeQuery** method; the result is then evaluated. Table and field names are usually double-quoted. The macro must mask these with additional double quotes to ensure that they appear in the command.

```
stSql = "SELECT * FROM ""Table1"""
oResult = oSQL_Statement.executeQuery(stSql)
```

To *modify data* – that is to **INSERT**, **UPDATE** or **DELETE** – or to influence the *database structure*, you call the **executeUpdate** method. Depending on the command and the database, this yields either nothing useful (a zero) or the number of records modified.

```
stSql = "DROP TABLE ""Suchtmp"" IF EXISTS"
iResult = oSQL_Statement.executeUpdate(stSql)
```

For the sake of completeness, there is one more special case to be mentioned: if the **oSQL_Statement** is to be used in different ways for **SELECT** or for other purposes, there is another method available, namely **execute**. We will not be using it here. For further information, see the API Reference.

Pre-prepared SQL commands with parameters

In all cases where manual entry by a user needs to be transferred into a SQL statement, it is easier and safer not to create the command as a long character string but to prepare it in advance and use it with parameters. This makes the formatting of numbers, dates, and strings easier (the constant double quotes disappear) and prevents malicious input from causing data loss.

To use this method, the object for a particular SQL command is created and prepared:

```
Dim oSQL_Statement As Object   ' the object, that executes the SQL-command
Dim stSql As String            ' Text of the actual SQL-command
stSql = "UPDATE author " _
      & "SET lastname = ?, firstname = ?" _
      & "WHERE ID = ?"
oSQL_Statement = oConnection.prepareStatement(stSql)
```

The object is created with **prepareStatement** so that the SQL command is known in advance. Each question mark indicates a position which later – before the command is executed – will receive an actual value. Because the command is prepared in advance, the database knows what type of entry – in this case two strings and a number – is expected. The various positions are distinguished by number (counting from 1).

Then the values are transferred with suitable statements and the SQL command is carried out. Here the values are taken from form controls, but they could also originate from other macros or be given as plain text:

```
oSQL_Statement.setString(1, oTextfeld1.Text)   ' Text for the surname
oSQL_Statement.setString(2, oTextfeld2.Text)   ' Text for the first name
oSQL_Statement.setLong(3, oZahlenfeld1.Value)  ' value for the appropriate ID
iResult = oSQL_Statement.executeUpdate
```

The complete list of assignments is in “Parameters for prepared SQL commands" (page 29).

For further information on the advantages of this method, see below (external links):

- SQL-Injection (Wikipedia)
- Why use PreparedStatement (Java JDBC)
- SQL-commands (Introduction to SQL)

Reading and using records

There are several ways, depending on requirements, to transfer information out of a database into a macro so that it can be processed further.

Please note: references to a form include subforms. What is intended is that form or part of a form that is bound to a particular data source.

Using forms

The current record and its data are always available through the form that shows the relevant data (table, query, SELECT). There are several **get***data_ type* methods, such as:

```
Dim ID As Long
Dim sName As String
Dim dValue AS Currency
Dim dEntry As New com.sun.star.util.Date
ID = oForm.getLong(1)
sName = oForm.getString(2)
dValue = oForm.getDouble(4)
dEntry = oForm.getDate(7)
```

All these methods require a column number from the data source; the count starts at 1.

Note

For all methods that work with databases, counting starts at 1. This applies to both columns and rows.

If you prefer to use column names instead of column numbers to work with the underlying data source (table, query, view), the column number can be determined using **findColumn**. Here is an example for finding the column called Name.

```
Dim sName As String
nName = oForm.findColumn("Name")
sName = oForm.getString(nName)
```

The type of value returned always matches the method type, but the following special cases should be noted:

- There are no methods for data of the types **Decimal**, **Currency** etc. which are used for commercially exact calculations. As Basic automatically carries out the appropriate conversion, you can use **getDouble**.
- When using **getBoolean**, you must take account of the way TRUE and FALSE are defined in the database. The usual definitions (logical values, 1 as TRUE) are processed correctly.
- Date values can be defined not only with the data type **Date**, but also (as above) as **util.Date**. This makes it easier to read and modify year, month and day.
- With whole numbers, beware of different data types. The above example uses **getLong**; the Basic variable ID must also have the data type **Long**, as this matches the **Integer** type in the database.

The complete list of these methods is to be found in “Editing rows of data" (page 26).

Tip

If values from a form are to be used directly for further processing in SQL (for example for input into another table), it is much simpler not to have to query the field type.

The following macro, which is bound to **Properties: Button > Events > Execute action** reads the first field in the form independently of the type necessary for future processing in Basic.

```
SUB ReadValues(oEvent As Object)
   Dim oForm As Object
   Dim stFeld1 As String
   oForm = oEvent.Source.Model.Parent
   stFeld1 = oForm.getString(1)
End Sub
```

If fields are read using **`getString()`**, all formatting necessary for further SQL processing is preserved. A date that is displayed as 08.03.19 is read out in the format 2019-03-08 and can be used directly in SQL.

Reading out in a format corresponding to the type is only mandatory if the value is to be further processed within the macro, for example in a calculation.

Result of a query

The set of results from a query can be used in the same way. In the *SQL commands* section, you will find the variable **`oResult`** for this result set, which is usually read out something like this:

```
While oResult.next          ' one record after another
   REM transfer the result into variables
   stVar = oResult.getString(1)
   inVar = oResult.getLong(2)
   boVar = oResult.getBoolean(3)
   REM do something with these values
Wend
```

According to the type of SQL command, the expected result and its purpose, the **`WHILE`** loop can be shortened or dropped altogether. But basically a result set can always evaluated in this way.

If only the first record is to be evaluated

```
oResult.next
```

accesses the row for this record and with

```
stVar = oResult.getString(1)
```

reads the content of the first field. The loop ends here.

The query for the above example has text in the first column, an integer number in the second (**`Integer`** in the database corresponds to **`Long`** in Basic), and a Yes/No field in the third. The fields are accessed through a field index which, unlike an array index, starts from 1.

Navigation through such a result is not possible. Only single steps to the next record are allowed. To navigate within the record, the **`ResultSetType`** must be known when the query is created. This is accessed using

```
oSQL_Result.ResultSetType = 1004
```

or

```
oSQL_Result.ResultSetType = 1005
```

Type **`1004 – SCROLL_INTENSIVE`** allows you to navigate freely but does not pick up changes in the original data. Type **`1005 – SCROLL_SENSITIVE`** recognizes changes in the original data which might affect the query result.

The total number of rows in the result set can be determined only after a numeric type for the result has been specified. It is carried out as follows:

```
Dim iResult As Long
If oResult.last                ' go to the last record if possible
   iResult = oResult.getRow    ' the running number is the sum
Else
   iResult = 0
End If
```

Using a control

If a control is bound to a data source, the value can be read out directly, as described in the next section. However this can lead to problems. It is safer to use the procedure described in “Using forms” (page 14) or else the following method, which is shown for several different types of control:

```
sValue = oTextField.BoundField.Text        ' example for a Text field
nValue = oNumericField.BoundField.Value    ' example for a numeric field
dValue = oDateField.BoundField.Date        ' example for a date field
```

`BoundField` represents the link between the visible control and the actual content of the data set.

Navigating in a data set

In the last but one example the **`Next`** method was used to move from one row of the result set to the next. There are further similar methods and tests that can be used both for the data in a form – represented by the variable **`oForm`** – and for a result set. For example, using the method described in “Automatic updating of forms” (page 29), the previous record can be selected again:

```
Dim loRow As Long
loRow = oForm.getRow()    ' save the current row number
oForm.reload()            ' reload the record set
oForm.absolute(loRow)     ' go back to the same rowthe
```

The section “Automatic updating of forms” shows all the methods that are suitable for this.

Note

Unfortunately, from the beginning of LibreOffice, there has been a bug (carried over from OpenOffice) which affects forms. It sets the current row number when data is altered within a form to ‘0’. See https://bugs.documentfoundation.org/show_bug.cgi?id=82591. To get the correct current row number, bind the following macro to the event **Form > Properties > Events > After record change**.

```
Global loRow As Long
Sub RowCounter(oEvent As Object)
   loRow = oEvent.Source.Row
End Sub
```

The new row number is read out and assigned to the global variable **`loRow`**. This variable is to be placed at the start of all modules and will retain its content until you exit Base or change the value by calling **`RowCounter`** again.

Editing records – adding, modifying, deleting

In order to edit records, several things have to work together:

- Information must be entered by the user into a control, using the keyboard.
- The data set behind the form must be informed about the change. This happens when you move out of the field into a new one.
- The database itself must be modified. This happens when you move from one record to another.

When you are doing this through a macro, these partial steps must all be considered. If any one of them is lacking or is carried out wrongly, changes will be lost and will not end up in the database. First of all the change must not be in the control's displayed value but in the data set itself. This makes it pointless to change the **Text** property of a control.

Please note that tables are the only data sets that can be altered without causing problems. For other data sets, editing is possible only under special circumstances.

Changing the content of a control

If you wish to change only a single value, the **BoundField** property of the control can be used with an appropriate method. Then the change must be transmitted to the database. Here is an example for a date field into which the actual date is to be entered:

```
Dim unoDate As New com.sun.star.util.Date
unoDate.Year = Year(Date)
unoDate.Month = Month(Date)
unoDate.Day = Day(Date)
oDateField.BoundField.updateDate( unoDate )
oForm.updateRow()       ' the change is transmitted to the databset
```

For **BoundField** you use the **updateXxx** method that matches the data type of the field. In this example the field is a **Date** field. The new value is passed as the argument – in this case the current date, converted into the format which the macro requires.

Altering rows in a data set

The previous method is unsuitable when several values in a row need to be changed, For one thing, a control would have to exist on the form for every field, which is often not desired and not useful. Also, an object must be fetched for each field. The simple and direct way uses the form like this:

```
Dim unoDate As New com.sun.star.util.Date
unoDate.Year = Year(Date)
unoDate.Month = Month(Date)
unoDate.Day = Day(Date)
oForm.updateDate(3, unoDate )
oForm.updateString(4, "ein Text")
oForm.updateDouble(6, 3.14)
oForm.updateInt(7, 16)
oForm.updateRow()
```

For each column in the data set, the **updateXxx** method appropriate to its type is called. The arguments are the column number (counting from 1) and the desired value. Then the alterations are passed on to the database.

Creating, modifying, and deleting rows

The named changes refer to the current row of the data set underlying the form. Under some circumstances it is necessary to call a method from "Navigating in a data set" (page 25). The following steps are necessary:

1) Choose the current record.
2) Change the values as described in the previous section.
3) Confirm the change with the following command:
   `oForm.updateRow()`
4) In special cases it is possible to cancel and return to the previous state:
   `oForm.cancelRowUpdates()`

For a new record there is a special method, comparable with changing to a new row in a table control. This is done as follows:

1) Prepare for a new record:
   `oForm.moveToInsertRow()`
2) Enter all wanted/required values. This is done using the **`updateXxx`** methods as shown in the previous section.
3) Confirm the new data with the following command:
   `oForm.insertRow()`
4) The new entry cannot be easily reversed. Instead you will have to delete the new record.

There is a simple command to delete a record; proceed as follows:

1) Choose the desired record and make it current, as for a modification.
2) Use the following command to delete it:
   `oForm.deleteRow()`

Tip

To ensure that changes are carried over into the database, they must be confirmed explicitly with **`updateRow`** or **`insertRow`** as appropriate. While pressing the Save button will automatically use the appropriate function, with a macro you must determine before saving if the record is new (**`Insert`**) or a modification of an existing one (**`Update`**).

```
If oForm.isNew Then
   oForm.insertRow()
Else
   oForm.updateRow()
End If
```

Testing and changing controls

Apart from the content of the data set, a lot more information can be read out of a control, edited and modified. This is particularly true of properties, as described in Chapter 4, Forms.

Several examples in “Improving usability” (page 29) use the additional information in the field:

```
Dim stTag As String
stTag = oEvent.Source.Model.Tag
```

As mentioned in the previous section, the **`Text`** property can only be modified usefully if the control is not bound to a data set. However there are other properties which are determined as part of the form definition but can be adapted at run time. For example, a label could be given a different text color if it represented a warning rather than information:

```
Sub showWarning(oField As Object, iType As Integer)
   Select Case iType
      Case 1
         oField.TextColor = RGB(0,0,255)    ' 1 = blue
      Case 2
         oField.TextColor = RGB(255,0,0)    ' 2 = red
      Case Else
         oField.TextColor = RGB(0,255,0)    ' 0 = green (neither 1 nor 2)
   End Select
End Sub
```

English names in macros

Whereas the designer of a form can use native language designations for properties and data access, only English names can be used in Basic. These are set out in the following synopsis.

Properties that are normally only set in the form definition are not included here. Nor are methods (functions and/or procedures) which are only rarely used or only required for more complex declarations.

The synopsis includes the following:

- Name Name to be used for the property in macro code
- Data type A Basic data type. For functions, the return type. Not included for procedures.
- R/W Indicates how you can use the value:
  - R read only
  - W write (modify) only
  - (R) Reading possible, not suitable for editing
  - (W) Writing possible but not useful
  - R+W suitable for reading and writing

Further information can be found in the API Reference by searching for the English name of the control. There is a useful tool called Xray for finding out which properties and methods are available for an element.

```
Sub Main(oEvent)
   Xray(oEvent)
End Sub
```

This launches the Xray extension for the argument.

Properties of forms and controls

The model of a control describes its properties. According to the situation, the value of a property can be accessed read-only or write-only. The order follows that in the lists of “Properties of Control Fields” in Chapter 4, Forms.

Font

In every control that shows text, the font properties can be customized.

Name	*Data type*	*L/S*	*Property*
FontName	string	L+S	Name of the font
FontHeight	single	L+S	Size of the font
FontWeight	single	L+S	Whether bold or normal
FontSlant	integer	L+S	Whether italic or roman
FontUnderline	integer	L+S	Whether underlined
FontStrikeout	integer	L+S	Whether struck through

Formula

English term: Form

Name	*Data type*	*L/S*	*Property*
ApplyFilter	boolean	L+S	Filter applied
Filter	string	L+S	Current filter for the record
FetchSize	long	L+S	Number of records loaded at once
Row	long	L	Current row number
RowCount	long	L	Number of records

These properties apply to all controls

Control – see also FormComponent

Name	*Data type*	*L/S*	*Property*
Name	string	L+(S)	Name of the field
Enabled	boolean	L+S	Active: Field can be selected
EnableVisible	boolean	L+S	Field is displayed
ReadOnly	boolean	L+S	Field content cannot be changed
TabStop	boolean	L+S	Field can be reached through the Tab key
Align	integer	L+S	Horizontal alignment: 0 = left, 1 = centered, 2 = right
BackgroundColor	long	L+S	Background color
Tag	string	L+S	Additional information
HelpText	string	L+S	Help text as a Tooltip

These apply to many types of control

Name	*Data type*	*L/S*	*Property*
Text	string	(L+S)	Displayed content of the field. In text fields, this can be read and further processed, but that does not usually work for other types.
Spin	boolean	L+S	Spinbox incorporated in a formatted field.
TextColor	long	L+S	Text (foreground) color.
DataField	string	L	Name of the field in the Data set.
BoundField	object	L	Object representing the connection to the data set and providing access to the field content.

Text field – further properties (TextField)

Name	*Data type*	*L/S*	*Property*
String	string	L+S	Displayed field content.
MaxTextLen	integer	L+S	Maximum text length.
DefaultText	string	L+S	Default text.
MultiLine	boolean	L+S	Indicates if there is more than one line.
EchoChar	(integer)	L+S	Character displayed during password entry.

Numeric Field (NumericField)

Name	*Data type*	*L/S*	*Property*
ValueMin	double	L+S	Minimum acceptable input value
ValueMax	double	L+S	Maximum acceptable input value
Value	double	L+(S)	Current value (Do not use for values from the data set).

Name	Data type	L/S	Property
ValueStep	double	L+S	Interval corresponding to one click for the mouse wheel or spinbox.
DefaultValue	double	L+S	Default value.
DecimalAccuracy	integer	L+S	Number of decimal places.
ShowThousandsSeparator	boolean	L+S	Show the locale separator for thousands.

Date field (DateField)

Date values are defined by the data type **`long`** and are displayed in ISO format: YYYYMMDD, for example 20190304 for 04 March 2019. To use this type with **`getDate`** and **`updateDate`**, and with the type **`com.sun.star.util.Date`**, see the examples.

Name	Data type	Datatype since LO 4.1.1	L/S	Property
DateMin	long	com.sun.star.util.Date	L+S	Minimum acceptable entry date.
DateMax	long	com.sun.star.util.Date	L+S	Maximum acceptable entry date.
Date	long	com.sun.star.util.Date	L+(S)	Current value (Do not use for values from the data set).
DateFormat	integer		L+S	OS-specific date format: 0 = short Date (simple) 1 = short Date `dd.mm.yy` (2-digit year) 2 = short Date`dd.mm.yyyy` (4-digit year) 3 = long Date (includes day of the week and month name) Further possibilities can be found in the form definition or in the API reference.
DefaultDate	long	com.sun.star.util.Date	L+S	Default value.
DropDown	boolean		L+S	Show a drop-down monthly calendar.

Time field (TimeField)

Time values are also of the type **`long`**.

Name	Data type	Data type from LO 4.1.1	L/S	Property
TimeMin	long	com.sun.star.util.Time	L+S	Minimum acceptable entry value.
TimeMax	long	com.sun.star.util.Time	L+S	Maximum acceptable entry value.
Time	long	com.sun.star.util.Time	L+(S)	Current value (Do not use for values from the data set).

Name	Data type	Data type from LO 4.1.1	L/S	Property
TimeFormat	integer		L+S	Time format: 0 = short as hh:mm (hours, minutes, 24 hour clock) 1 = long as hh:mm:ss (same thing with Seconds, 24 hour clock) 2 = short as hh:mm (12 hour clock with AM/PM) 3 = long as hh:mm:ss (12 hour clock with AM/PM) 4 = short entry for a time duration 5 = long entry for a time duration
DefaultTime	long	com.sun.star .util.Time	L+S	Default value.

Currency field (CurrencyField)

A currency field is a numeric field with the following additional possibilities.

Name	Datatype	L/S	Property
CurrencySymbol	string	L+S	Currency symbol for display only.
PrependCurrencySymbol	boolean	L+S	Symbol is displayed before the number.

Formated field (FormattedControl)

A formatted control can be used as desired for numbers, currency or date/time. Very many of the properties already described apply here to but with different names.

Name	Data type	L/S	Property
CurrentValue	variant	L	Current value of the contents. The actual data type depends on the contents and format.
EffectiveValue		L+(S)	
EffectiveMin	double	L+S	Minimum acceptable entry value.
EffectiveMax	double	L+S	Maximum acceptable entry value.
EffectiveDefault	variant	L+S	Default value.
FormatKey	long	L+(S)	Format for display and entry. There is no easy way to alter this using a macro.
EnforceFormat	boolean	L+S	Format is tested during entry. Only certain characters and combinations are allowed.

Listbox (ListBox)

Read and write access to the value lying behind the selected line is somewhat complicated but possible.

Name	Data type	L/S	Property
ListSource	array of string	L+S	Data source: Source of the list contents or name of the data set that provides the visible entry.

Name	*Data type*	*L/S*	*Property*
ListSourceType	integer	L+S	Type of data source: 0 = Value list 1 = Table 2 = Query 3 = Result set from a SQL command 4 = Result of a database command 5 = Field names from a database-table
StringItemList	array of string	L	List entries available for selection.
ItemCount	integer	L	Number of available list entries
ValueItemList	array of string	L	List of values to be passed from the form to the table.
DropDown	boolean	L+S	Drop-down list.
LineCount	integer	L+S	Total displayed lines when fully dropped down.
MultiSelection	boolean	L+S	Multiple selection intended.
SelectedItems	array of integer	L+S	List of selected entries as a list of positions in the overall entry list.

The first selected element from the list field is obtained like this:

```
oControl = oForm.getByName("Name of the Listbox")
sEintrag = oControl.ValueItemList( oControl.SelectedItems(0) )
```

Note

Since LibreOffice 4.1, the value passed to the database can be determined directly.

```
oControl = oForm.getByName("Name of the Listbox")
iD = oControl.getCurrentValue()
```

`getCurrentValue()` returns the value that will be stored in the database table. In listboxes this depends on the field to which they are bound (`BoundField`).

Up to and including LibreOffice 4.0, this function returned the displayed content, not the underlying value in the table.

Please note that the entry is an “array of string”, should the query for a list field be exchanged to restrict a selection option:

```
Sub Listenfeldfilter
   Dim stSql(0) As String
   Dim oDoc As Object
   Dim oDrawpage As Object
   Dim oForm As Object
   Dim oFeld As Object
   oDoc = thisComponent
   oDrawpage = oDoc.drawpage
   oForm = oDrawpage.forms.getByName("MainForm")
   oFeld = oForm.getByname("Listenfeld")
   stSql(0) = "SELECT ""Name"", ""ID"" FROM ""Filter_Name"" ORDER BY ""Name"""
   oFeld.ListSource = stSql
   oFeld.refresh
End Sub
```

Combo boxes (ComboBox)

In spite of having similar functionality as listboxes, the properties of comboboxes are somewhat different. See the example “Comboboxes as listboxes with an entry option” on page 45.

Name	*Data type*	*L/S*	*Property*
Autocomplete	boolean	L+S	Fill automatically.
StringItemList	array of string	L+S	List entries available for use.
ItemCount	integer	L	Number of available list entries.
DropDown	boolean	L+S	Drop-down list.
LineCount	integer	L+S	Number of rows shown when dropped down.
Text	string	L+S	Currently displayed text.
DefaultText	string	L+S	Default entry.
ListSource	string	L+S	Name of the data source that provides the list entries.
ListSourceType	integer	L+S	Type of data source. Same possibilities as for listboxes (only the choice of Value list is ignored).

Checkboxes (CheckBox) and radio buttons (RadioButton)

Option Buttons can also be used.

Name	*Data type*	*L/S*	*Property*
Label	string	L+S	Title (label)
State	short	L+S	Status 0 = not selected 1 = selected 2 = undefined
MultiLine	boolean	L+S	Line breaks for long text.

Pattern Field (PatternField)

In addition to the properties for simple text, the following are of interest:

Name	*Data type*	*L/S*	*Property*
EditMask	string	L+S	Input mask.
LiteralMask	string	L+S	Character mask.
StrictFormat	boolean	L+S	Format testing during input.

Table control (GridControl)

Name	*Data type*	*L/S*	*Property*
Count	long	L	Number of columns.
ElementNames	array of string	L	List of column names.
HasNavigationBar	boolean	L+S	Navigation bar available.
RowHeight	long	L+S	Row height.

FixedText – also called Label

Name	*Data type*	*L/S*	*Property*
Label	string	L+S	Text displayed.
MultiLine	boolean	L+S	Line breaks for long text.

Group Boxes (GroupBox)

There are no properties for group boxes that are normally processed using macros. It is the status of the individual option fields that matters.

Buttons

CommandButton or ImageButton

Name	*Data type*	*L/S*	*Property*
Label	string	L+S	Title – Label text.
State	short	L+S	Default state selected for toggling.
MultiLine	boolean	L+S	Line breaks for long text.
DefaultButton	boolean	L+S	Whether this is a default button.

Navigation bar (NavigationBar)

Further properties and methods associated with navigation – for example filters and changing the record pointer – are controlled using the form.

Name	*Data type*	*L/S*	*Property*
IconSize	short	L+S	Size of icons.
ShowPosition	boolean	L+S	Position can be entered and is displayed.
ShowNavigation	boolean	L+S	Allows navigation.
ShowRecordActions	boolean	L+S	Allows record actions.
ShowFilterSort	boolean	L+S	Allows filter sorting.

Methods for forms and controls

The data type of the parameter is indicated by an abbreviation:

- column number for the desired field in the data set, counting from 1
- numerical value – could be either an integer or a decimal number
- s String; maximum length depends on the table definition.
- b boolean (logical) – true or false
- d Date value

Navigating in a data set

These methods work both in forms and in the results set from a query.

“Cursor” in the description means the record pointer.

Name	*Data type*	*Description*
Testing for the position of the cursor		
isBeforeFirst	boolean	The cursor is before the first record. This is the case if it has not yet been reset after entry.

Name	Data type	Description
isFirst	boolean	Shows if the cursor is on the first entry.
isLast	boolean	Shows if the cursor is on the last entry.
isAfterLast	boolean	The cursor is after the last row when it is moved on with next.
getRow	long	Current row number.
Setting the cursor For boolean data types, True means that the navigation was successful.		
beforeFirst	–	Moves before the first row.
first	boolean	Moves to the first row.
previous	boolean	Goes back one row.
next	boolean	Goes forward one row.
last	boolean	Goes to the last record.
afterLast	–	Goes after the last record.
absolute(n)	boolean	Goes to the row with the given row number.
relative(n)	boolean	Goes backwards or forwards by the given amount: forwards for positive and backwards for negative arguments.
Methods affecting the current record status		
refreshRow	–	Reads the original values for the row back in.
rowInserted	boolean	Indicates if this is a new row.
rowUpdated	boolean	Indicates if the current row has been altered.
rowDeleted	boolean	Indicates if the current row has been deleted.

Editing rows of data

The methods used for reading are available for any form or data set. Methods for alteration and storage can be used only for editable data sets (usually tables, not queries).

Name	Data type	Description
Methods for the whole row		
insertRow	–	Saves a new row.
updateRow	–	Confirms alteration of the current row.
deleteRow	–	Deletes the current row.
cancelRowUpdates	–	Reverses changes in the current row.
moveToInsertRow	–	Moves the cursor into a row corresponding to a new record.
moveToCurrentRow	–	After the entry of a new record, returns the cursor to its previous position.
Reading values		
getString(c)	string	Gives the content of the column as a character string.
getBoolean(c)	boolean	Gives the content of the column as a boolean value.

Name	*Data type*	*Description*
getByte(c)	byte	Gives the content of the column as a single byte.
getShort(c)	short	Gives the content of the column as an integer.
getInt(c)	integer	
getLong(c)	long	
getFloat(c)	float	Gives the content of the column as a single precision decimal number.
getDouble(c)	double	Gives the content of the column as a double precision decimal number. The automatic conversions carried out by Basic makes this a suitable type for decimal and currency fields.
getBytes(c)	array of bytes	Gives the content of the column as an array of single bytes.
getDate(c)	Date	Gives the content of the column as a date.
getTime(c)	Time	Gives the content of the column as a time value.
getTimestamp(c)	DateTime	Gives the content of the column as a timestamp (date and time).
In Basic itself, date and time values are both given the type DATE. To access dates in data sets, various types are available: com.sun.star.util.Date for a date, com.sun.star.util.Time for a time, and com.sun.star.util.DateTime for a timestamp.		
wasNull	boolean	Indicates if the value of the most recently read column was NULL.
Werte speichern		
updateNull(c)	–	Sets the column content to NULL.
updateBoolean(c,b)	–	Changes the content of column c to the logical value b.
updateByte(c,x)	–	Stores byte x in column c.
updateShort(c,n)	–	Stores the integer n in column c.
updateInt(c,n)	–	
updateLong(c,n)	–	
updateFloat(c,n)	–	Stores the decimal number n in column c.
updateDouble(c,n)	–	
updateString(c,s)	–	Stores the string s in column c.
updateBytes(c,x)	–	Stores the byte array x in column c.
updateDate(c,d)	–	Stores the date d in column c.
updateTime(c,d)	–	Stores the time d in column c.
updateTimestamp(c,d)	–	Stores the timestamp d in column c.

Editing individual values

This method uses the **`BoundField`** property of a control to read or modify the content of the corresponding column. It corresponds almost exactly to the method described in the previous section, except that the column number is not given.

Name	*Data type*	*Description*
Reading values		
getString	string	Gives the content of the field as a character string.
getBoolean	boolean	Gives the content of the field as a logical value.
getByte	byte	Gives the content of the field as a single byte.
getShort	short	Gives the content of the field as an integer.
getInt	integer	
getLong	long	
getFloat	float	Gives the content of the field as a single-precision decimal value.
getDouble	double	Gives the content of the field as a double-precision decimal number. The automatic conversions carried out by Basic makes this a suitable type for decimal and currency fields.
getBytes	array of bytes	Gives the content of the field as an array of bytes.
getDate	Date	Gives the content of the field as a date.
getTime	Time	Gives the content of the field as a time.
getTimestamp	DateTime	Gives the content of the field as a timestamp.
In Basic itself, date and time values are both given the type DATE. To access dates in data sets, various types are available: com.sun.star.util.Date for a date, com.sun.star.util.Time for a time, and com.sun.star.util.DateTime for a timestamp.		
wasNull	boolean	Indicates if the value of the most recently read column was NULL.
Storing values		
updateNull	–	Sets the content of the column to NULL.
updateBoolean(b)	–	Sets the content of the column to the logical value b.
updateByte(x)	–	Stores the byte x in the column.
updateShort(n)	–	Stores the integer n in the column.
updateInt(n)	–	
updateLong(n)	–	
updateFloat(n)	–	Stores the decimal number n in the column.
updateDouble(n)	–	
updateString(s)	–	Stores the character string s in the column.
updateBytes(x)	–	Stores the byte array x in the column.

Name	Data type	Description
updateDate(d)	–	Stores the date d in the column.
updateTime(d)	–	Stores the time d in the column.
updateTimestamp(d)	–	Stores the timestamp d in the column.

Parameters for prepared SQL commands

The methods which transfer the value of a pre-prepared SQL command (see “Pre-prepared SQL commands with parameters” on page 13) are similar to those in the previous section. The first parameter (denoted by I) is a numbered position within the SQL command.

Name	Data type	Description
setNull(i, n)	–	Sets the content of the column to NULL. N is the SQL data type as given in the API Reference.
setBoolean(i, b)	–	Puts the given logical value b into the SQL command.
setByte(i, x)	–	Puts the given byte x into the SQL command.
setShort(i, n)	–	Puts the given integer n into the SQL command.
setInt(i, n)		
setLong(i, n)		
setFloat(i, n)	–	Puts the given decimal number into the SQL command.
setDouble(i, n)		
setString(i, s)	–	Puts the given character string into the SQL command.
setBytes(i, x)	–	Puts the given byte array x into the SQL command.
setDate(i, d)	–	Puts the given date d into the SQL command.
setTime(i, d)	–	Puts the given time d into the SQL command.
setTimestamp(i, d)	–	Puts the given timestamp d into the SQL command.
clearParameters	–	Removes the previous values of all parameters from a SQL command.

Improving usability

For this first category of macro use, we show various possibilities for improving the usability of Base forms.

Automatic updating of forms

Often something is altered in a form and this alteration is required to appear in a second form on the same page. The following code snippet calls the reload method on the second form, causing it to refresh.

```
Sub Update
```

First the macro is named. The default designation for a macro is **Sub**. This may be written in upper or lower case. **Sub** allows a subroutine to run without returning a value. Further down by contrast a function is described, which does return a value.

The macro has the name Update. You do not need to declare variables because LibreOffice Basic automatically creates variables when they are used. Unfortunately, if you misspell a variable, LibreOffice Basic silently creates a new variable without complaint. Use **`Option Explicit`** To prevent LibreoOffice Basic from automatically creating variables; this is recommended by most programmers.

Therefore we usually start by declaring variables. All the variables declared here are objects (not numbers or text), so we add **`As Object`** to the end of the declaration. To remind us later of the type of the variables, we preface their names with an "o". In principle, though, you can choose almost any variable names you like.

```
    Dim oDoc As Object
    Dim oDrawpage As Object
    Dim oForm As Object
```

The form lies in the currently active document. The container, in which all forms are stored, is named **`drawpage`**. In the form navigator this is the top-level concept, to which all the forms are subsidiary.

In this example, the form to be accessed is named Display. Display is the name visible in the form navigator. So, for example, the first form by default is called Form1.

```
    oDoc = thisComponent
    oDrawpage = oDoc.drawpage
    oForm = oDrawpage.forms.getByName("Display")
```

Since the form has now been made accessible and the point at which it can be accessed is saved in the variable **`oForm`**, it is now reloaded (refreshed) with the **`reload()`** command.

```
    oForm.reload()
End Sub
```

The subroutine begins with **`SUB`** so it must end with **`End Sub`**.

This macro can now be selected to run when another form is saved. For example, on a cash register (till), if the total number of items sold and their stock numbers (read by a barcode scanner) are entered into one form, another form in the same open window can show the names of all the items, and the total cost, as soon as the form is saved.

Filtering records

The filter itself can function perfectly well in the form described in Chapter 8, Database Tasks. The variant shown below replaces the Save button and reads the listboxes again, so that a chosen filter from one listbox can restrict the choices available in the other listbox.[2]

```
Sub Filter
    Dim oDoc As Object
    Dim oDrawpage As Object
    Dim oForm1 As Object
    Dim oForm2 As Object
    Dim oFieldList1 As Object
    Dim oFieldList2 As Object
    oDoc = thisComponent
    oDrawpage = oDoc.drawpage
```

First the variables are defined and set to access the set of forms. This set comprises the two forms "Filter" and "Display". The listboxes are in the "Filter" form and have the names "List_1" and "List_2".

```
    oForm1 = oDrawpage.forms.getByName("filter")
    oForm2 = oDrawpage.forms.getByName("display")
    oFieldList1 = oForm1.getByName("listbox1")
```

2 See also the database `Example_Search_and_Filter.odb` associated with this book.

```
    oFieldList2 = oForm1.getByName("listbox2")
```

First the contents of the listboxes are transferred to the underlying form using **`commit()`**. The transfer is necessary, because otherwise the change in a listbox will not be recognized when saving. The **`commit()`** instruction need only be applied to the listbox that has just been accessed. After that the record is saved using **`updateRow()`**. In principle, our filter table contains only one record, which is written once at the beginning. This record is therefore overwritten continuously using an update command.

```
    oFieldList1.commit()
    oFieldList2.commit()
    oForm1.updateRow()
```

The listboxes are meant to influence each other. For example, if one listbox is used to restrict displayed media to CDs, the other listbox should not include all the writers of books in its list of authors. A selection in the second listbox would then all too often result in an empty filter. That is why the listboxes must be read again. Strictly speaking, the **`refresh()`** command only needs to be carried out on the listbox that has not been accessed.

After this, form2, which should display the filtered content, is read in again.

```
    oFieldList1.refresh()
    oFieldList2.refresh()
    oForm2.reload()
End Sub
```

Listboxes that are to be influenced using this method can be supplied with content using various queries.

The simplest variant is to have the listbox take its content from the filter results. Then a single filter determines which data content will be further filtered.

```
SELECT "Field_1" || ' - ' || "Count" AS "Display", "Field_1"
FROM ( SELECT COUNT( "ID" ) AS "Count", "Field_1" FROM "searchtable" GROUP BY
"Field_1" )
ORDER BY "Field_1"
```

The field content and the number of hits is displayed. To get the number of hits, a sub-query is used. This is necessary as otherwise only the number of hits, without further information from the field, will be shown in the listbox.

The macro creates listboxes quite quickly by this action; they are filled with only one value. If a listbox is not NULL, it is taken into account by the filtering. After activation of the second listbox, only the empty fields and one displayed value are available to both listboxes. That may seem practical for a limited search. But what if a library catalog shows clearly the classification for an item, but does not show uniquely if this is a book, a CD or a DVD? If the classification is chosen first and the second listbox is then set to "CD", it must be reset to NULL in order to carry out a subsequent search that includes books. It would be more practical if the second listbox showed directly the various media types available, with the corresponding hit counts.

To achieve this aim, the following query is constructed, which is no longer fed directly from the filter results. The number of hits must be obtained in a different way.

```
SELECT
IFNULL( "Field_1" || ' - ' || "Count", 'empty - ' || "Count" ) AS "Display",
"Field_1"
FROM
   ( SELECT COUNT( "ID" ) AS "Count", "Field_1" FROM "Table"
      WHERE "ID" IN
      ( SELECT "Table"."ID" FROM "Filter", "Table"
         WHERE "Table"."Field_2" = IFNULL( "Filter"."Filter_2",
         "Table"."Field_2" ) )
   GROUP BY "Field_1" )
```

```
ORDER BY "Field_1"
```

This very complex query can be broken down. In practice it is common to use a **VIEW** for the sub-query. The listbox receives its content from a query relating to this **VIEW.**

The query in detail: The query presents two columns. The first column contains the view seen by a person who has the form open. This view shows the content of the field and, separated by a hyphen, the hits for this field content. The second column transfers its content to the underlying table of the form. Here we have only the content of the field. The listboxes thus draw their content from the query, which is presented as the filter result in the form. Only these fields are available for further filtering.

The table from which this information is drawn is actually a query. In this query the primary key fields are counted (**SELECT COUNT("ID") AS "Count"**). This is then grouped by the search term in the field (**GROUP BY "Field_1"**). This query presents the term in the field itself as the second column. This query in turn is based on a further sub-query:

```
SELECT "Table"."ID" FROM "Filter", "Table"
WHERE "Table"."Field_2" =
   IFNULL( "Filter"."Filter_2", "Table"."Field_2" )
```

This sub-query deals with the other field to be filtered. In principle, this other field must also match the primary key. If there are further filters, this query can be extended:

```
SELECT "Table"."ID" FROM "Filter", "Table" WHERE
"Table"."Field_2" = IFNULL( "Filter"."Filter_2", "Table"."Field_2" )
AND
"Table"."Field_3" = IFNULL( "Filter"."Filter_3", "Table"."Field_3" )
```

This allows any further fields that are to be filtered to control what finally appears in the listbox of the first field, "Field_1".

Finally the whole query is sorted by the underlying field.

What the final query underlying the displayed form, actually looks like, can be seen from Chapter 8, Database Tasks.

The following macro can control through a listbox which listboxes must be saved and which must be read in again.

The following subroutine assumes that the Additional Information property for each listbox contains a comma-separated list of all listbox names with no spaces. The first name in the list must be the name of that listbox.

```
Sub Filter_more_info(oEvent As Object)
   Dim oDoc As Object
   Dim oDrawpage As Object
   Dim oForm1 As Object
   Dim oForm2 As Object
   Dim sTag As String
   sTag = oEvent.Source.Model.Tag
```

An array (a collection of data accessible via an index number) is established and filled with the field names of the listboxes. The first name in the list is the name of the listbox linked to the event.

```
   aList() = Split(sTag, ",")
   oDoc = thisComponent
   oDrawpage = oDoc.drawpage
   oForm1 = oDrawpage.forms.getByName("filter")
   oForm2 = oDrawpage.forms.getByName("display")
```

The array is run through from its lower bound (**'Lbound()'**) to its upper bound (**'Ubound()'**) in a single loop. All values which were separated by commas in the additional information, are now transferred successively.

```
   For i = LBound(aList()) To UBound(aList())
```

```
        If i = 0 Then
```

The listbox that triggered the macro must be saved. It is found in the variable **`aList(0)`**. First the information for the listbox is carried across to the underlying table, and then the record is saved.

```
            oForm1.getByName(aList(i)).commit()
            oForm1.updateRow()
        Else
```

The other listboxes must be refreshed, as they now contain different values depending on the first listbox.

```
            oForm1.getByName(aList(i)).refresh()
        End If
    Next
    oForm2.reload()
End Sub
```

The queries for this more usable macro are naturally the same as those already presented in the previous section.

Preparing data from text fields to fit SQL conventions

When data is stored in a SQL command, apostrophes in names such as “O’Connor” can cause problems. This is because single quotes (`''`) are used to enclose text that is to be entered into records. In such cases, we need an intermediate function to prepare the data appropriately.

```
Function String_to_SQL(st As StringString)
    If InStr(st,"'") Then
        st = Join(Split(st,"'"),"''")
    End If
    String_to_SQL = st
End Function
```

Note that this is a function, not a sub. A function takes a value as argument and then returns a value.

The text to be transferred is first searched to see if it contains an apostrophe. If this is the case, the text is split at this point – the apostrophe itself is the delimiter for the split – and joined together again with two apostrophes. This masks the SQL code. The function yields its result through the following call:

```
stTextnew = String_to_SQL(stTextold)
```

This simply means that the variable stTextold is reworked and the result stored in stTextnew. The two variables do not actually need to have different names. The call can be done with:

```
stText = String_to_SQL(stText)
```

This function is used repeatedly in the following macros so that apostrophes can also be stored using SQL commands.

Calculating values in a form in advance

Values which can be calculated using database functions are not stored separately in the database. The calculation takes place not during the entry into the form but after the record has been saved. If the form consists only of a single table control, this makes little difference. The calculated value can be read out immediately after data entry. But when forms have a set of different individual fields, the previous record may not be visible. In such cases it makes sense for the values that are otherwise calculated inside the database to be shown in the appropriate fields[3]

The following three macros show how such a thing can be done in principle. Both macros are linked to the exit from the particular field. This also allows for the fact that the value in an existing field might subsequently be changed.

3 See the database `Example_direct_Calculation_Form.odb` associated with this book.

```
Sub Calculation_without_Tax(oEvent As Object)
   Dim oForm As Object
   Dim oField As Object
   Dim oField2 As Object
   oField = oEvent.Source.Model
   oForm = oField.Parent
   oField2 = oForm.getByName("price_without_tax")
   oField2.BoundField.UpdateDouble(oField.getCurrentValue / 1.19)
   If Not IsEmpty(oForm.getByName("quantity").getCurrentValue()) Then
      total_calc2(oForm.getByName("quantity"))
   End If
End Sub
```

If a value is entered into the price field, the macro is launched on leaving that field. In the same form as the price field is a field called price_without_tax. For this field **`BoundField.UpdateDouble`** is used to calculate the price without VAT. The data field is derived from a query which in principle carries out the same calculation but using saved data. In this way the calculated value is visible during data entry and also later during navigation through the record without being stored.

If the quantity field contains a value, a further calculation is carried out for the fields bound to it.

```
Sub Calculation_Total(oEvent As Object)
   oField = oEvent.Source.Model
   Calculation_Total2(oField)
End Sub
```

This short procedure serves only to transmit the solution of the following procedure when leaving the quantity field on the form.

```
Sub Calculation_Total2(oFeld As Object)
   Dim oForm As Object
   Dim oField2 As Object
   Dim oField3 As Object
   Dim oField4 As Object
   oForm = oFeld.Parent
   oField2 = oForm.getByName("price")
   oField3 = oForm.getByName("total")
   oField4 = oForm.getByName("tax_total")
   oField3.BoundField.UpdateDouble(oField.getCurrentValue *
oField2.getCurrentValue)
   oField4.BoundField.UpdateDouble(oField.getCurrentValue *
oField2.getCurrentValue -
      oField.getCurrentValue * oField2.getCurrentValue / 1.19)
End Sub
```

This procedure is merely a way of affecting several fields at once. The procedure is launched from one field quantity, which contains the number of items bought. Using this field and the price field, the total and tax_total are calculated and transferred to the appropriate fields.

These procedures and queries have one shortcoming: the rate of VAT is effectively hard-coded into the program. It would be better to use an argument for this, related to the price, since VAT might vary and not be the same for all products. In such cases the appropriate value for VAT would need to read out of a form field.

Providing the current LibreOffice version

LibreOffice version 4.1 brought some changes to listfields and date values that make it necessary to determine the current version when executing macros in these areas. The following code serves this purpose:

```
Function OfficeVersion()
   Dim aSettings, aConfigProvider
   Dim aParams2(0) As New com.sun.star.beans.PropertyValue
```

```
    Dim sProvider$, sAccess$
    sProvider = "com.sun.star.configuration.ConfigurationProvider"
    sAccess = "com.sun.star.configuration.ConfigurationAccess"
    aConfigProvider = createUnoService(sProvider)
    aParams2(0).Name = "nodepath"
    aParams2(0).Value = "/org.openoffice.Setup/Product"
    aSettings = aConfigProvider.createInstanceWithArguments(sAccess,
aParams2())
    OfficeVersion() = Array(aSettings.ooName,aSettings.ooSetupVersionAboutBox)
End Function
```

This function returns an array in which the first element is LibreOffice and the second is the full version number, for example 4.1.5.2.

Returning the value of listfields

Since LibreOffice 4.1, the value returned by a listbox to the database is stored in CurrentValue. This was not the case in previous versions, nor in OpenOffice or Apache OpenOffice. The following function will do the calculation. The LibreOffice version must be checked to see if it is later than LibreOffice 4.0.

```
Function ID_Determination(oField As Object) As Integer
    a() = OfficeVersion()
    If a(0) = "LibreOffice" And (LEFT(a(1),1) = 4 And RIGHT(LEFT(a(1),3),1) > 0) Or
        LEFT(a(1),1) > 4 Then
        stContent = oField.currentValue
    Else
```

Before LibreOffice 4.1, the value that was passed on was read out of the listbox's value list. The visibly chosen record is SelectedItems(0). '0' because several additional values could be selected in a listbox.

```
        stContent = oField.ValueItemList(oField.SelectedItems(0))
    End If
    If IsEmpty(stContent) Then
```

-1 is a value that is not used as an AutoValue and therefore will not exist in most tables as a foreign key.

```
        ID_Determination = -1
    Else
        ID_Determination = Cint(stContent)
```

Convert to integer

```
    End If
End Function
```

The function transmits the value as an integer. Most primary keys are automatically incrementing integers. When a foreign key does not satisfy this criterion, the return value must be adjusted to the appropriate type.

The displayed value of a listfield can be further determined using the field's view property.

```
Sub Listfielddisplay
    Dim oDoc As Object
    Dim oForm As Object
    Dim oListbox As Object
    Dim oController As Object
    Dim oView As Object
    oDoc = thisComponent
    oForm = oDoc.Drawpage.Forms(0)
    oListbox = oForm.getByName("Listbox")
    oController = oDoc.getCurrentController()
    oView = oController.getControl(oListbox)
    print "Displayed content: " & oView.SelectedItem
End Sub
```

The controller is used to access the view of the form. This determines what appears in the visual interface. The selected value is **SelectedItem**.

Limiting listboxes by entering initial letters

It can sometimes happen that the content of listboxes grows too big to handle. To make searching faster in such cases, it is useful to limit the content of the listbox to the values indicated by entering one or more initial characters. The listbox itself is provided with a SQL command that serves as a placeholder. This could be:

```
SELECT "Name", "ID" FROM "Table" ORDER BY "Name" LIMIT 5
```

This prevents Base from having to read a huge list of values when the form is opened.

The following macro is linked to **Properties: Listbox > Events > Key released**.

```
Global stListStart As String
Global lTime As Long
```

First, global variables are created. These variables are necessary to enable searching not only for a single letter but also, after further keys have been pressed, for combinations of letters.

The letters entered are stored sequentially in the global variable **stListStart**.

The global variable **lTime** is used to store the current time in seconds. If there is a long pause between keystrokes, the **stListStart** variable should be reset. For this reason, the time difference between successive entries is queried.

```
Sub ListFilter(oEvent As Object)
   oField = oEvent.Source.Model
   If oEvent.KeyCode < 538 Then
```

The macro is launched by a keystroke. Within the API, each key has a numeric code which can be looked up under com>sun>star>awt>Key. Special characters like ä, ö, and ü have the KeyCode 0. All other letters and numbers have a KeyCode less than 538.

It is important to check the **KeyCode** because hitting the Tab key to move to another field will also launch the macro. The **KeyCode** for the Tab key is 1282, so any further code in the macro will not be executed.

```
        Dim stSql(0) As String
```

The SQL code for the listbox is stored in an array. However, SQL commands count as single data elements, so the array is dimensioned as **stSql(0)**.

When reading SQL code out of the listbox, please note that the SQL code is not directly accessible as text. Instead the code is available as a single array element: **oField.ListSource(0)**.

After declaring variables for future use, the SQL command is split up. To get the field which is to be filtered, we split the code at the first comma. The field must therefore be placed first in the command. Then this code is split again at the first double quote character, which introduces the fieldname. Here this is done using simple arrays. The **stField** variable needs to have the quotation marks put back at the beginning. In addition **Rtrim** is used to prevent any space from occurring at the end of the expression.

```
        Dim stText As String
        Dim stField As String
        Dim stQuery As String
        Dim ar0()
        Dim ar1()
        ar0() = Split(oField.ListSource(0),",", 2)
        ar1() = Split(ar0(0),"""", 2)
        stFeld = """ & Rtrim(ar1(1))
```

A sort instruction is expected next in the SQL code. However commands in SQL can be in upper, lower or mixed case, so the **inStr** function is used instead of **Split** to find the ORDER character string. The last parameter for this function is 1, indicating that the search should be case-insensitive. Everything to the left of the ORDER string is to be used for constructing the new SQL code. This ensures that the code can also serve listfields which come from different tables or have been defined in SQL code using further conditions.

```
stQuery = Left(oField.ListSource(0), inStr(1,oField.ListSource(0), "ORDER",1)-1)
If inStr(stQuery, "LOWER") > 0 Then
    stQuery = Left(stQuery, inStr(stQuery, "LOWER")-1)
ElseIf inStr(1,stQuery, "WHERE",1) > 0 Then
    stQuery = stQuery & " AND "
Else
    stQuery = stQuery & " WHERE "
End If
```

If the query contains the term LOWER, it means that it was created using this **ListFilter** procedure. Therefore in constructing the new query, we need go only as far as this position.

If this is not the case, and the query already contains the term WHERE (in upper or lower case), any further conditions to the query need to be prepended with **AND**.

If neither condition is fulfilled, a **WHERE** is attached to the existing code.

```
        If lTime > 0 And Timer() - lTime < 5 Then
           stListStart = stListStart & oEvent.KeyChar
        Else
           stListStart = oEvent.KeyChar
        End If
        lTime = Timer()
```

If a time value has been stored in the global variable, and the difference between this and the current time is less than 5 seconds, the entered letter is joined onto the previous one. Otherwise the letter is treated as a new single-letter entry. The listfield will then be re-filtered according to this entry. After this, the current time is stored in **lTime**.

```
        stText = LCase( stListStart & "%")
        stSql(0) = stQuery + "LOWER("+stField+") LIKE '"+stText+"' ORDER BY "+stField+""
        oFeld.ListSource = stSql
        oField.refresh
    End If
End Sub
```

The SQL code is finally put together. The lower-case version of the field content is compared with the lower-case version of the entered letter(s). The code is inserted into the listbox and the field updated so that only the filtered content can be looked up.

Converting dates from a form into a date variable

```
Function DateValue(oField As Object) As Date
    a() = OfficeVersion()
    If a(0) = "LibreOffice" And (LEFT(a(1),1) = 4 And RIGHT(LEFT(a(1),3),1) > 0)
        Or LEFT(a(1),1) > 4 Then
```

Here all LibreOffice versions from 4.1 onward are intercepted. For this purpose, the version number is split into its individual elements, and the major and minor release numbers are checked. This will work up to LibreOffice 9.

```
        Dim stMonth As String
        Dim stDay As String
        stMonth = Right(Str(0) & Str(oField.CurrentValue.Month),2)
        stDay =  Right(Str(0) & Str(oField.CurrentValue.Day),2)
        Datumswert = CDateFromIso(oField.CurrentValue.Year & stMonth & stDay)
    Else
        DateValue = CDateFromIso(oField.CurrentValue)
    End If
End Function
```

Since LibreOffice 4.1.2, dates have been stored as arrays within form controls. This means that the current value of the control cannot be used to access the date itself. The date needs to be recreated from the day, month and year if it is to be used further in macros.

Searching data records

You can search database records without using a macro. However, the corresponding query that must be set up can be very complicated. A macro can solve this problem with a loop.

The following subroutine reads the fields in a table, creates a query internally, and finally writes a list of primary key numbers of records in the table that are retrieved by this search term. In the following description, there is a table called Searchtmp, which consists of an auto-incrementing primary key field (ID) and a field called Nr. that contains all the primary keys retrieved from the table being searched. The table name is supplied initially to the subroutine as a variable.

To get a correct result, the table must contain the content you are searching for as text and not as foreign keys. If necessary, you can create a VIEW for the macro to use.[4]

```
Sub Searching(stTable As String)
   Dim oDataSource As Object
   Dim oConnection As Object
   Dim oSQL_Command As Object
   Dim stSql As String
   Dim oResult As Object
   Dim oDoc As Object
   Dim oDrawpage As Object
   Dim oForm As Object
   Dim oForm2 As Object
   Dim oField As Object
   Dim stContent As String
   Dim arContent() As String
   Dim inI As Integer
   Dim inK As Integer
   oDoc = thisComponent
   oDrawpage = oDoc.drawpage
   oForm = oDrawpage.forms.getByName("searchform")
   oField = oForm.getByName("searchtext")
   stContent = oField.getCurrentValue()
   stContent = LCase(stContent)
```

The content of the search text field is initially converted into lower case so that the subsequent search function need only compare lower case spellings.

```
   oDataSource = ThisComponent.Parent.DataSource
   oConnection = oDataSource.GetConnection("","")
   oSQL_Command = oConnection.createStatement()
```

First it must be determined if a search term has actually been entered. If the field is empty, it will be assumed that no search is required. All records will be displayed without further searching.

If a search term has been entered, the column names are read from the table being searched, so that the query can access the fields.

```
If stContent <> "" Then
   stSql = "SELECT ""COLUMN_NAME"" FROM
""INFORMATION_SCHEMA"".""SYSTEM_COLUMNS"" WHERE ""TABLE_NAME"" = '" + stTable
+ "' ORDER BY ""ORDINAL_POSITION"""
   oResult = oSQL_Statement.executeQuery(stSql)
```

4 See the database `Example_Search_and_Filter.odb` associated with this book.

Note

SQL formulas in macros must first be placed in double quotes like normal character strings. Field names and table names are already in double quotes inside the SQL formula. To create final code that transmits the double quotes properly, field names and table names must be given two sets of these quotes.

```
stSql = "SELECT ""Name"" FROM ""Table"";"
```

becomes, when displayed with the command `MsgBox stSql`,
`SELECT "Name" FROM "Table";`

The index of the array, in which the field names are written is initially set to 0. Then the query begins to be read out. As the size of the array is unknown, it must be adjusted continuously. That is why the loop begins with **`'ReDim Preserve arContent(inI)'`** to set the size of the array and at the same time to preserve its existing contents. Next the fields are read and the array index incremented by 1. Then the array is dimensioned again and a further value can be stored.

```
        InI = 0
        While oResult.next
           ReDim Preserve arContent(inI)
           arContent(inI) = oResult.getString(1)
           inI = inI + 1
        Wend
        stSql = "DROP TABLE ""searchtmp"" IF EXISTS"
        oSQL_Command.executeUpdate (stSql)
```

Now the query is put together within a loop and subsequently applied to the table defined at the beginning. All case combinations are allowed for, since the content of the field in the query is converted to lower case.

The query is constructed such that the results end up in the "searchtmp" table. It is assumed that the primary key is the first field in the table (**`arContent(0)`**).

```
      stSql = "SELECT """+arContent(0)+""" INTO ""searchtmp"" FROM """ + stTable
       + """ WHERE "
      For inK = 0 To (inI - 1)
         stSql = stSql+"LCase("""+arContent(inK)+""") LIKE '%"+stContent+"%'"
         If inK < (inI - 1) Then
            stSql = stSql+" OR "
         End If
      Next
      oSQL_Command.executeQuery(stSql)
   Else
      stSql = "DELETE FROM ""searchtmp"""
      oSQL_Command.executeUpdate (stSql)
   End If
```

The display form must be reloaded. Its data source is a query, in this example Searchquery.

```
      oForm2 = oDrawpage.forms.getByName("display")
      oForm2.reload()
   End Sub
```

This creates a table that is to be evaluated by the query. As far as possible, the query should be constructed so that it can subsequently be edited. A sample query is shown:

```
SELECT * FROM "searchtable" WHERE "Nr." IN ( SELECT "Nr." FROM
"searchtmp" ) OR "Nr." = CASE WHEN ( SELECT COUNT( "Nr." ) FROM
"searchtmp" ) > 0 THEN '0' ELSE "Nr." END
```

All elements of the **`searchtable`** are included, including the primary key. No other table appears in the direct query; therefore no primary key from another table is needed and the query result remains editable.

The primary key is saved in this example under the name **Nr.** The macro reads precisely this field. There is an initial check to see if the content of the **Nr.** field appears in the **searchtmp** table. The **IN** operator is compatible with multiple values. The sub-query can also yield several records.

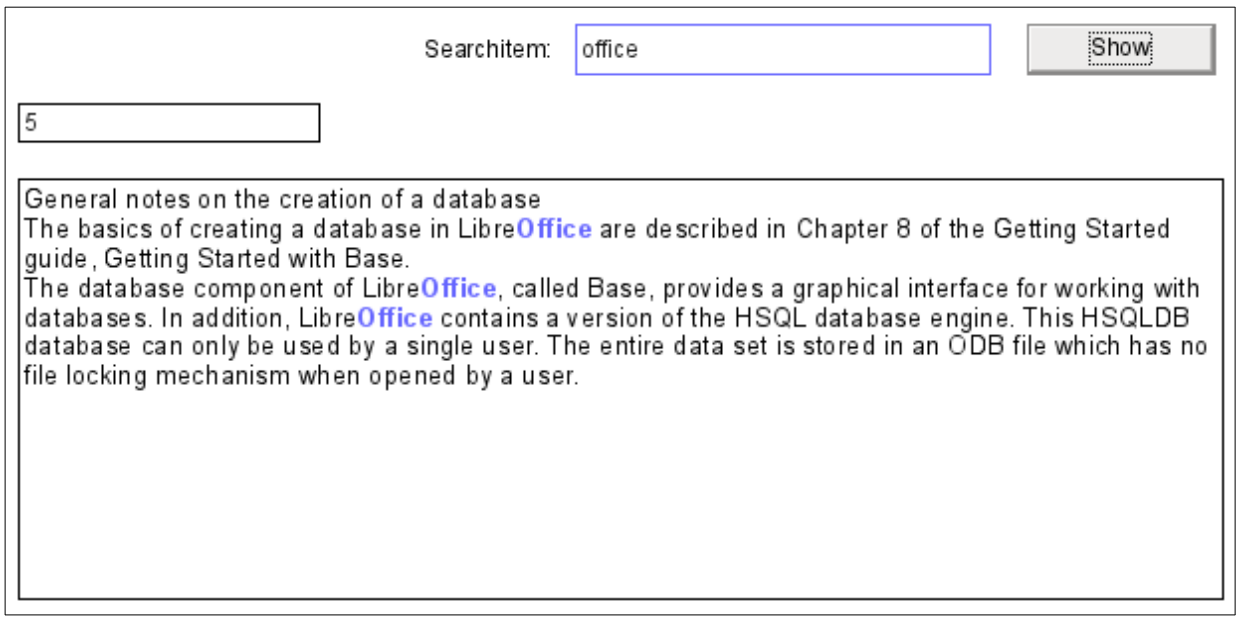
For larger amounts of data, value matching by using the **IN** operator quickly slows down. Therefore it is not a good idea to use an empty search field simply to transfer all primary key fields from **searchtable** into the **searchtmp** table and then view the data in the same way. Instead an empty search field creates an empty **searchtmp** table, so that no records are available. This is the purpose of the second half of the condition:

```
OR "Nr." = CASE WHEN ( SELECT COUNT( "Nr." ) FROM "searchtmp" ) > 0
THEN '-1' ELSE "Nr." END
```

If a record is found in the Searchtmp table, it means that the result of the first query is greater than 0. In this case: **"Nr." = '-1'** (here we need a number which cannot occur as a primary key, so **'-1'**is a good value). If the query yields precisely 0 (which will be the case if no records are present), then **"Nr." = "Nr."**. This will list every record which has a **Nr.** As **Nr.** is the primary key, this means all records.

Highlighting search terms in forms and results

With a large text field, it is often unclear where matches to a search term occur. It would be nice if the form could highlight the matches. It should look something like this:



To get a form to work like this, we need a couple of extra items in our box of tricks.[5]

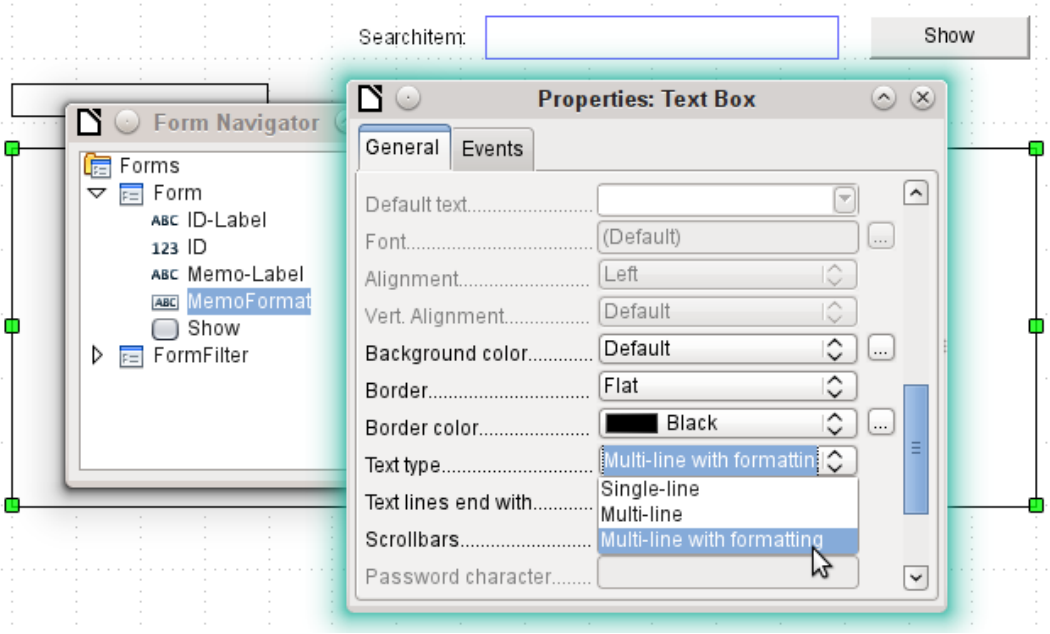
The operation of a search field like this has already been explained. A filter table is created and a form is used to write the current values of a single record into this table. The main form is provided with its content using a query which looks like this:

```
SELECT "ID", "memo"
FROM "table"
WHERE LOWER ( "memo" ) LIKE '%' || LOWER (
   ( SELECT "searchtext" FROM "filter" WHERE "ID" = TRUE ) ) || '%'
```

When search text is entered, all records in the table “Table” that have the search text in the “memo” field are displayed. The search is not case-sensitive.

If no search text is entered, all the records in the table are displayed. As the primary key of this table is included in the query, the latter can be edited.

5 See the database Example_Autotext_Searchmarkin_Spelling.odb associated with this book.



In the form, in addition to the ID field for the primary key, there is a field called MemoFormat which has been configured (using **Properties > General > Text type > Multi-line with formatting**) to show colored as well as black text. Careful consideration of the properties of the text field reveals that the Data tab has now disappeared. This is because data cannot be entered into a field that has additional formatting which the database itself cannot store. Nevertheless, it is still possible to get text into this field, to mark it up, and to transfer it out after an update by using a macro.

The ContentRead procedure serves to transfer the content of the database field “memo” into the formatted text field MemoFormat, and to format it so that any text corresponding to that in the search field will be highlighted.

The procedure is bound to **Form > Events > After record change**.

```
Sub ContentRead(oEvent As Object)
   Dim inMemo As Integer
   Dim oField As Object
   Dim stSearchtext As String
   Dim oCursor As Object
   Dim inSearch As Integer
   Dim inSearchOld As Integer
   Dim inLen As Integer
   oForm = oEvent.Source
   inMemo = oForm.findColumn("memo")
   oField = oForm.getByName("MemoFormat")
   oField.Text = oForm.getString(inMemo)
```

First the variables are defined. Then the table field “memo” is searched from the form and the **`getString`**() function is used to read the text from the numbered column. This is transferred into the field which can be formatted but which has no link to the database: MemoFormat.

Initial tests showed that the form opened but the form toolbar at the bottom was no longer created. Therefore a very short wait of 5/1000 seconds was built in. After this the displayed content is read out of the FormFilter (which is parallel to the Form in the forms hierarchy).

```
   Wait 5
   stSearchtext = oForm.Parent.getByName("FormFilter").getByName("Search").Text
```

To be able to format text, an (invisible) **`TextCursor`** must be created in the field that contains the text. The default display of the text uses a 12-point serif font which may not occur in other parts of the form and cannot be directly customized using the form control properties. In this procedure, the text is set to the desired appearance right at the beginning. If this is not done, differences in

formatting can cause the upper boundary of the text in the field to be cut off. In early tests, only 2/3 of the first line was legible.

In order for the invisible cursor to mark the text, It is set initially to the beginning of the field and then to the end. The argument in both cases is **`true`**. Next come the specifications for font size, font face, color, and weight. Then the cursor is set back to the beginning again.

```
oCursor = oField.createTextCursor()
oCursor.gotoStart(true)
oCursor.gotoEnd(true)
oCursor.CharHeight = 10
oCursor.CharFontName = "Arial, Helvetica, Tahoma"
oCursor.CharColor = RGB(0,0,0)
oCursor.CharWeight = 100.000000  'com::sun::star::awt::FontWeight
oCursor.gotoStart(false)
```

If there is text in the field and an entry has been made requesting a search, this text is now searched to find the search string. The outer loop asks first if these conditions are met; the inner one establishes if the search string is really in the text in the MemoFormat field. These settings could actually be omitted, since the query on which the form is based only displays text that fulfills these conditions.

```
If oField.Text <> "" And stSearchtext <> "" Then
   If inStr(oField.Text, stSearchtext) Then
      inSearch = 1
      inSearchOld = 0
      inLen = Len(stSearchtext)
```

The text is searched for the search string. This takes place in a loop which ends when no further matches are displayed. **`InStr`**() returns the location of the first character of the search string in the specified display format, independent of case. The loop is controlled by the requirement that at the end of each cycle, the start of **`inSearch`** has been incremented by 1 (-1 in the first line of the loop and +2 in the last line). For each cycle, the cursor is moved to the initial position without marking using **`oCursor.goRight(Position, false)`**, and then to the right *with* marking by the length of the search string. Then the desired formatting (blue and somewhat bolder) is applied and the cursor moved back to its next starting point for the next run.

```
      Do While inStr(inSearch, oField.Text, stSearchtext) > 0
         inSearch = inStr(inSearch, oField.Text, stSearchtext) - 1
         oCursor.goRight(inSearch-inSearchOld,false)
         oCursor.goRight(inLen,true)
         oCursor.CharColor = RGB(102,102,255)
         oCursor.CharWeight = 110.000000
         oCursor.goLeft(inLen,false)
         inSearchOld = inSearch
         inSearch = inSearch + 2
      Loop
   End If
End If
End Sub
```

The ContentWrite procedure serves to transfer the content of the formattable text field MemoFormat into the database. This proceeds independently of whether any alteration takes place.

The procedure is bound to **Form > Events > Before record change**.

```
Sub ContentWrite(oEvent As Object)
   Dim oForm As Object
   Dim inMemo As Integer
   Dim loID As Long
   Dim oField As Object
   Dim stMemo As String
```

```
    oForm = oEvent.Source
    If InStr(oForm.ImplementationName, "ODatabaseForm") Then
```

The trigger event is implemented twice. Only the implementation name which ends with OdatabaseForm gives the correct access to the record (implementations are explained on page 59).

```
        If Not oForm.isBeforeFirst() And Not oForm.isAfterLast() Then
```

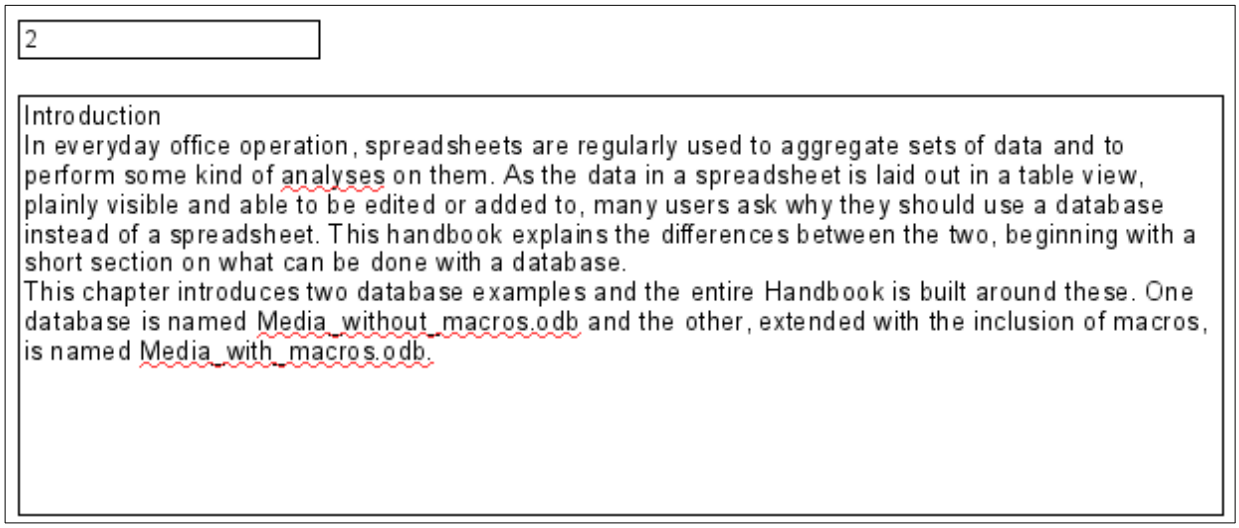
When the form is read or reloaded, the cursor stands before the current record. Then if an attempt is made, you get the message “Invalid cursor status”.

```
            inMemo = oForm.findColumn("memo")
            loID = oForm.findColumn("ID")
            oField = oForm.getByName("MemoFormat")
            stMemo = oField.Text
            If stMemo <> "" Then
               oForm.updateString(inMemo,stMemo)
            End If
            If stMemo <> "" And oForm.getString(loID) <> "" Then
               oForm.UpdateRow()
            End If
         End If
      End If
   End Sub
```

The “memo” table field is located from the data source of the form, along with that for “ID”. If the field MemoFormat contains text, it is transferred into the Memo field of the data source using **`oForm.updateString`**(). Only if there is an entry in the ID field (in other words a primary key has been set) does an update follow. Otherwise a new record is inserted through the normal working of the form; the form recognizes the change and stores it independently.

Checking spelling during data entry

This macro can be used for **multi-line formatted text fields**. As in the previous chapter, the content of each record must first be written and then the new record can be loaded into the form control. The procedures TransferContent and WriteContent differ only in the point at which the search function can be bracketed out.



The spelling checker is launched in the above form whenever a space or a return is hit within the form control. In other words, it runs at the end of each word. It could also be linked to the control losing focus to ensure that the last word is checked.

The procedure is bound to **Form > Events > Key released**.

```
SUB MarkWrongWordsDirect(oEvent As Object)
   GlobalScope.BasicLibraries.LoadLibrary("Tools")
```

The **RTrimStr** function is used to remove any punctuation mark at the end of the string. Otherwise all words which ended with a comma, full stop or other punctuation mark would show up as spelling mistakes. In addition, **LTrimChar** is used to remove brackets at the beginning of words.

```
Dim aProp() As New com.sun.star.beans.PropertyValue
Dim oLinuSvcMgr As Object
Dim oSpellChk As Object
Dim oField As Object
Dim arText()
Dim stWord As String
Dim inlenWord As Integer
Dim ink As Integer
Dim i As Integer
Dim oCursor As Object
Dim stText As Object
oLinguSvcMgr = createUnoService("com.sun.star.linguistic2.LinguServiceManager")
If Not IsNull(oLinguSvcMgr) Then
   oSpellChk = oLinguSvcMgr.getSpellChecker()
End If
```

First all variables are declared. Then the Basic spell-checking module **SpellChecker** is accessed. It will be this module that will actually check individual words for correctness.

```
oField = oEvent.Source.Model
ink = 0
If oEvent.KeyCode = 1280 Or oEvent.KeyCode = 1284 Then
```

The event that launches the macro is a keystroke. This event includes a code, the **KeyCode**, for each individual key. The **KeyCode** for the Return key is 1280, the one for the space is 1284. Like many other pieces of information, these items are retrieved through the Xray tool. If space or return is pressed, the spelling is checked. It is launched, in other words, at the end of each word. Only the test for the last word does not occur automatically.

Each time the macro runs, all words in the text are checked. Checking individual words might also be possible but would take a lot more work.

The text is split up into single words. The delimiter is the space character. Before that, words split by line breaks must be joined together again, or the pieces might be mistaken for complete words.

```
stText = Join(Split(oField.Text,CHR(10))," ")
stText = Join(Split(stText,CHR(13))," ")
arText = Split(RTrim(stText)," ")
For i = LBound(arText) To Ubound(arText)
   stWord = arText(i)
   inlenWord = len(stWord)
   stWord = Trim( RtrimStr( RtrimStr( RtrimStr( RtrimStr( RtrimStr(
      RtrimStr(stWord,","), "."),"?"),"!"),"."),")"))
   stWord = LTrimChar(stWord,"(")
```

The individual words are read out. Their untrimmed length is needed for the following editing step. Only so can the position of the word within the whole text (which is necessary for the specific highlighting of spelling mistakes) be determined.

Trim is used to remove spaces, while **RTrimStr** removes commas and full stops at the end of the text and **LTrimChar** any punctuation marks at the beginning.

```
If stWord <> "" Then
   oCursor = oField.createTextCursor()
   oCursor.gotoStart(false)
   oCursor.goRight(ink,false)
   oCursor.goRight(inLenWord,true)
   If Not oSpellChk.isValid(stWord, "en", aProp()) Then
      oCursor.CharUnderline = 9
```

```
                oCursor.CharUnderlineHasColor = True
                oCursor.CharUnderlineColor = RGB(255,51,51)
             Else
                oCursor.CharUnderline = 0
             End If
          End If
          ink = ink + inLenWord + 1
       Next
    End If
End Sub
```

If the word is not null, a text cursor is created. This cursor is moved without highlighting to the beginning of the text in the entry field. Then it jumps forward to the right, still without highlighting, to the term stored in the variable **`ink`**. This variable starts as 0, but after the first loop has run, it is equal to the length of the word (+1 for the following space). Then the cursor is moved to the right by the length of the current word. The font properties are modified to create the highlighted region.

The **`spellchecker`** is launched. It requires the word and the country code as arguments; without a country code everything counts as correct. The array argument is usually empty.

If the word is not in the dictionary, it is marked with a red wavy line. This type of underlining is represented here by **`'9'`**. If the word is found, there is no underline (**`'0'`**). This step is necessary because otherwise a word recognised as false and then corrected would continue to be shown with the red wavy line. It would never be removed because no conflicting format was given.

Comboboxes as listboxes with an entry option

A table with a single record can be directly created by using comboboxes and invisible numeric fields and the corresponding primary key entered into another table.[6]

The Combobox control treats form fields for combined entry and choice of values (comboboxes) as listboxes with an entry option. For this purpose, in addition to the comboboxes in the form, the key field values which are to be transferred to the underlying table are stored in separate numeric fields. Fields can be declared as invisible. The keys from these fields are read in when the form is loaded and the combobox is set to show the corresponding content. If the content of the combobox is changed, it is saved and the new primary key is transferred into the corresponding numeric field to be stored in the main table.

If editable queries are used instead of tables, the text to be displayed in the combination fields can be directly determined from the query. A macro is then not required for this step.

An assumption for the functioning of the macro is that the primary key of the table which is the data source for the combination field is an automatically incrementing integer. It is also assumed that the field name for the primary key is ID.

Text display in comboboxes

This subroutine is to show text in the combobox according to the value of the invisible foreign key fields from the main form. It can also be used for listboxes which refer to two different tables. This might happen if, for example, the postcode in a postal address is stored separately from the town. In that case the postcode might be read from a table that contains only a foreign key for the town. The listbox should show postcode and town together.

```
Sub ShowText(oEvent As Object)
```

This macro should be bound to the following form event: 'After record change'.

The macro is called directly from the form. The trigger event is the source for all the variables the macro needs. Some variables have already been declared globally in a separate module and are not declared here again.

6 For the use of combo boxes instead of list boxes, see the database `Example_Combobox_Listfield.odb` associated with this book.

```
Dim oForm As Object
Dim oFieldList As Object
Dim stFieldValue As String
Dim inCom As Integer
Dim stQuery As String
oForm = oEvent.Source
```

In the form there is a hidden control from which the names of all the different comboboxes can be obtained. One by one, these comboboxes are processed by the macro.

```
aComboboxes() = Split(oForm.getByName("combofields").Tag,",")
For inCom = LBound(aComboboxes) TO Ubound(aComboboxes)
   ...
Next inCom
```

The additional information (Tag) attached to the hidden control contains this list of combobox names, separated by commas The names are written into an array and then processed within a loop. The loop ends with the **NEXT** term.

The combobox, which has replaced a listbox, is called **oFieldList**. To get the foreign key, we need the correct column in the table that underlies the form. This is accessible using the name of the table field, which is stored in the combobox's additional information.

```
oFieldList = oForm.getByName(Trim(aComboboxes(inCom)))
stFieldID = oForm.getString(oForm.findColumn(oFieldList.Tag))
oFieldList.Refresh()
```

The combobox is read in again using **Refresh()**in case the content of the field has been changed by the entry of new data.

The query needed to provide the visible content of the combobox is based on the field underlying the control and the value determined for the foreign key. To make the SQL code usable, any sort operation that might be present is removed. Then a check is made for any relationship definitions (which will begin with the word **WHERE**). By default the **InStr()** function does not distinguish between upper and lower case, so all case combinations are covered. If there is a relationship, it means that the query contains fields from two different tables. We need to find the table that provides the foreign key for the link. The macro depends here on the fact that the primary key in every table is called ID.

If there is no relationship defined, the query accesses only one table. The table information can be discarded and the condition formulated directly using the foreign key value.

```
If stFieldID <> "" Then
   stQuery = oFieldList.ListSource
   If InStr(stQuery,"order by") > 0 Then
      stSql = Left(stQuery, InStr(stQuery,"order by")-1)
   Else
      stSql = stQuery
   End If
   If InStr(stSql,"where") Then
      st = Right(stSql, Len(stSql)-InStr(stSql,"where")-4)
      If InStr(Left(st, InStr(st,"=")),"."ID"") Then
         a() = Split(Right(st, Len(st)-InStr(st,"=")-1),".")
      Else
         a() = Split(Left(st, InStr(st,"=")-1),".")
      End If
      stSql = stSql + "AND "+a(0)+"."ID" = "+stFieldID
   Else
      stSql = stSql + "WHERE "ID" = "+stFieldID
   End If
```

Each field and table name must be entered into the SQL command with two sets of quotation marks. Quotation marks are normally interpreted by Basic as text string delimiters, so they no longer appear when the code is passed on to SQL. Doubling the quotation marks ensures that one

set are passed on. **""ID""** signifies that the field **"ID"** will be accessed in the query, with the single set of quotes that SQL requires.

The query stored in the **stSql** variable is now carried out and its result saved in **oResult**.

```
            oDatasource = ThisComponent.Parent.CurrentController
            If Not (oDatasource.isConnected()) Then
               oDatasource.connect()
            End If
            oConnection = oDatasource.ActiveConnection()
            oSQL_Command = oConnection.createStatement()
            oResult = oSQL_Command.executeQuery(stSql)
```

The result of the query is read in a loop. As with a query in the GUI, several fields and records could be shown. But the construction of this query requires only one result, which will be found in the first column **(1)** of the query result set. It is the record which provides the displayed content of the combobox. The content is text (**getString()**), hence the command **oResult.getString(1)**.

```
            While oResult.next
               stFieldValue = oResult.getString(1)
            Wend
```

The combobox must now be set to the text value retrieved by the query.

```
            oFieldList.Text = stFieldValue
         Else
```

If there is no value in the field for the foreign key **oField**, the query has failed and the combobox is set to an empty string.

```
            oFieldList.Text = ""
         End If
      Next inCom
   End Sub
```

This procedure manages the contact between the combobox and the foreign key available in a field of the form's data source. This should be enough to show the correct values in comboboxes. Storage of new values would require a further procedure.

Transfering a foreign key value from a combobox to a numeric field

If a new value is entered into the combobox (and this after all is the purpose for which this macro was constructed), the corresponding primary key must be entered into the form's underlying table as a Foreign key.

```
   Sub TextSelectionSaveValue(oEvent As Object)
```

This macro should be bound to the following form event: 'Before record action'.

After the variables have been declared (not shown here), we must first determine exactly which event should launch the macro. Before record action, two implementations are called in succession. It is important for the macro itself to retrieve the form object. This can be done in both implementations but in different ways. Here the implementation called OdatabaseForm is filtered out.

```
      If InStr(oEvent.Source.ImplementationName,"ODatabaseForm") Then
         ...
      End If
   End Sub
```

This loop builds in the same start as the **Display_text** procedure:

```
         oForm = oEvent.Source
         aComboboxes() = Split(oForm.getByName("combofields").Tag,",")
         For inCom = LBound(aComboboxes) To Ubound(aComboboxes)
            ...
         Next inCom
```

The field **oFieldList** shows the text. It might lie inside a table control, in which case it is not possible to access it directly from the form. In such cases, the additional information for the hidden control comboboxes should contain the path to the field using “tablecontrol” combobox. Splitting this entry up will reveal how the combobox is to be accessed.

```
a() = Split(Trim(aComboboxen(inCom)),">")
   If Ubound(a) > 0 Then
      oFieldList = oForm.getByName(a(0)).getByName(a(1))
   Else
      oFieldList = oForm.getByName(a(0))
   End If
```

Next the query is read from the combobox and split up into its individual parts. For simle comboboxes, the necessary items of information are the field name and table name:

```
SELECT "Field" FROM "Table"
```

This could in some cases be augmented by a sort instruction. Whenever two fields are to be put together in the combobox, more work will be required to separate them.

```
SELECT "Field1"||' '||"Field2" FROM "Table"
```

This query puts two fields together with a space between them. As the separator is a space, the macro will search for it and split the text into two parts accordingly. Naturally this will only work reliably if Field1 does not already contain text in which spaces are permitted. Otherwise, if the first name is “Anne Marie” and the surname “Müller”, the macro will treat “Anne” as the first name and “Marie Müller” as the surname. In such cases a more suitable separator should be used, which can then be found by the macro. In the case of names, this could be “Surname, Given name”.

Things get even more complicated if the two fields come from different tables:

```
SELECT "Table1"."Field1"||' > '||"Table2"."Field2"
FROM "Table1", "Table2"
WHERE "Table1"."ID" = "Table2"."ForeignID"
ORDER BY "Table1"."Field1"||' > '||"Table2"."Field2" ASC
```

Here the fields must be separated from one another, the table to which each field belongs must be established and the corresponding foreign keys determined.

```
stQuery = oFieldList.ListSource
aFields() = Split(stQuery, """")
stContent = ""
For i=LBound(aFields)+1 To UBound(aFields)
```

The content of the query is stripped of unnecessary ballast. The parts are reassembled into an array with an unusual character combination as separator. FROM separates the visible field display from the table names. WHERE separates the condition from the table names. Joins are not supported.

```
   If Trim(UCASE(aFields(i))) = "ORDER BY" Then
      Exit For
   ElseIf Trim(UCASE(aFields(i))) = "FROM" Then
      stContent = stcontent+" §§ "
   ElseIf Trim(UCASE(aFields(i))) = "WHERE" Then
      stContent = stcontent+" §§ "
   Else
   stContent = stContent+Trim(aFields(i))
   End If
Next i
aContent() = Split(stContent, " §§ ")
```

In some cases the content of the visible field display comes from different fields:

```
aFirst() = Split(aContent(0),"||")
If UBound(aFirst) > 0 Then
   If UBound(aContent) > 1 Then
```

The first part contains at least two fields. The fields begin with a table name. The second part contains two table names, which can be determined from the first part. The third part contains a relationship with a foreign key, separated by =:

```
            aTest() = Split(aFirst(0),".")
            NameTable1 = aTest(0)
            NameTableField1 = aTest(1)
            Erase aTest
            stFieldSeperator = Join(Split(aFirst(1),"'"),"")
            aTest() = Split(aFirst(2),".")
            NameTable2 = aTest(0)
            NameTableField2 = aTest(1)
            Erase aTest
            aTest() = Split(aContent(2),"=")
            aTest1() = Split(aTest(0),".")
            If aTest1(1) <> "ID" Then
               NameTab12ID = aTest1(1)
               IF aTest1(0) = NameTable1 Then
                  Position = 2
               Else
                  Position = 1
               End If
            Else
               Erase aTest1
               aTest1() = Split(aTest(1),".")
               NameTab12ID = aTest1(1)
               If aTest1(0) = NameTable1 Then
                  Position = 2
               Else
                  Position = 1
               End If
            End If
         Else
```

The first part contains two field names without table names, possibly with separators. The second part contains the table names. There is no third part:

```
            If UBound(aFirst) > 1 Then
               NameTableField1 = aFirst(0)
               stFieldSeperator = Join(Split(aFirst(1),"'"),"")
               NameTableField2 = aFirst(2)
            Else
               NameTableField1 = aFirst(0)
               NameTableField2 = aFirst(1)
            End If
            NameTable1 = aContent(1)
         End If
      Else
```

There is only one field from one table:

```
         NameTableField1 = aFirst(0)
         NameTable1 = aContent(1)
      End If
```

The maximum character length that an entry can have is given by the **`ColumnSize`** function. The combobox cannot be used to limit the size as it may need to contain two fields at the same time.

```
      LengthField1 = ColumnSize(NameTable1,NameTableField1)
      If NameTableField2 <> "" Then
         If NameTable2 <> "" Then
            LengthField2 = ColumnSize(NameTable2,NameTableField2)
         Else
            LengthField2 = ColumnSize(NameTable1,NameTableField2)
```

```
            End If
         Else
            LengthField2 = 0
         End If
```

The content of the combobox is read out:

```
         stContent = oFieldList.getCurrentValue()
```

Leading and trailing spaces and non-printing characters are removed if necessary.

```
      stContent = Trim(stContent)
      If stContent <> "" Then
         If NameTableField2 <> "" Then
```

If a second table field exists, the content of the combobox must be split. To determine where the split is to occur, we use the field separator provided to the function as an argument.

```
         a_stParts = Split(stContent, FieldSeparator, 2)
```

The last parameter signifies that the maximum number of parts is 2.

Depending on which entry corresponds to field 1 and which to field 2, the content of the combobox is now allocated to the individual variables. "Position = 2" serves here as a sign that the second part of the content stands for Field 2.

```
         If Position = 2 Then
            stContent = Trim(a_stParts(0))
            If UBound(a_stParts()) > 0 Then
               stContentField2 = Trim(a_stParts(1))
            Else
               stContentField2 = ""
            End If
            stContentField2 = Trim(a_stParts(1))
         Else
            stContentField2 = Trim(a_stParts(0))
            If UBound(a_stParts()) > 0 Then
               stContent = Trim(a_stParts(1))
            Else
               stContent = ""
            End If
            stContent = Trim(a_stParts(1))
         End If
      End If
```

It can happen that with two separable contents, the installed size of the combobox (text length) does not fit the table fields to be saved. For comboboxes that represent a single field, this is normally handled by suitably configuring the form control. Here by contrast, we need some way of catching such errors. The maximum permissible length of the relevant field is checked.

```
      If (LengthField1 > 0 And Len(stContent) > LengthField1) Or (LengthField2 >
   0 And  Len(stContentField2) > LengthField2) Then
```

If the field length of the first or second part is too big, a default string is stored in one of the variables. The character **`Chr(13)`** is used to put in a line break .

```
         stmsgbox1 = "The field " + NameTableField1 + " must not exceed " +
   Field1Length + "characters in length." + Chr(13)
         stmsgbox2 = "The field " + NameTableField2 + " must not exceed " +
   Field2Length + "characters in length." + Chr(13)
```

If both field contents are too long, both texts are displayed.

```
         If (LengthField1 > 0 And Len(stContent) > LengthField1) And
   (LengthField2 > 0 And Len(stContentField2) > LengthField2) Then
            MsgBox("The entered text is too long." + Chr(13) + stmsgbox1 +
   stmsgbox2 + "Please shorten it.",64,"Invalid entry")
```

The display uses the **MsgBox()** function. This expects as its first argument a text string, then optionally a number (which determines the type of message box displayed), and finally an optional text string as a title for the window. The window will therefore have the title "Invalid entry" and the number '64' provides a box containing the Information symbol.

The following code covers any further cases of excessively long text that might arise.

```
      ElseIf (Field1Length > 0 And Len(stContent) > Field1Length) Then
         MsgBox("The entered text is too long." + Chr(13) + stmsgbox1 +
"Please shorten it.",64,"Invalid entry")
      Else
         MsgBox("The entered text is too long." + Chr(13) + stmsgbox2 +
"Please shorten it.",64,"Invalid entry")
      End If
   Else
```

If there is no excessively long text, the function can proceed. Otherwise it exits here.

Now the entries are masked so that any quotes that may be present will not generate an error.

```
            stContent = String_to_SQL(stContent)
            If stContentField2 <> "" Then
               stContentField2 = String_to_SQL(stContentField2)
            End If
```

First variables are preallocated which can subsequently be altered by the query. The variables inID1 and inID2 store the content of the primary key fields of the two tables. If a query yields no results, Basic assigns these integer variable a value of 0. However this value could also indicate a successful query returning a primary key value of 0; therefore the variable is preset to -1. HSQLDB cannot set this value for an autovalue field.

Next the database connection is set up, if it does not already exist.

```
      inID1 = -1
      inID2 = -1
      oDatasource = ThisComponent.Parent.CurrentController
      If Not (oDatasource.isConnected()) Then
         oDatasource.connect()
      End If
      oConnection = oDatasource.ActiveConnection()
      oSQL_Command = oConnection.createStatement()
      If NameTableField2 <> "" And Not IsEmpty(stContentField2) And NameTable2 <> ""
Then
```

If a second table field exists, a second dependency must first be declared.

```
         stSql = "SELECT ""ID"" FROM """ + NameTable2 + """ WHERE """ +
NameTableField2 + """='" + stContentField2 + "'"
         oResult = oSQL_Command.executeQuery(stSql)
            While oResult.next
               inID2 = oResult.getInt(1)
            Wend
         If inID2 = -1 Then
            stSql = "INSERT INTO """ + NameTable2 + """ (""" + NameTableField2 +
""") VALUES ('" + stContentField2 + "') "
            oSQL_Command.executeUpdate(stSql)
            stSql = "CALL IDENTITY()"
```

If the content within the combobox is not present in the corresponding table, it is inserted there. The primary key value which results is then read. If it is present, the existing primary key is read in the same way. The function uses the automatically generated primary key fields (**IDENTITY**).

```
            oResult = oSQL_Command.executeQuery(stSql)
               While oResult.next
                  inID2 = oResult.getInt(1)
               Wend
```

```
            End If
```

The primary key for the second value is temporarily stored in the variable **inID2** and then written as a foreign key into the table corresponding to the first value. According to whether the record from the first table was already available, the content is freshly saved (**INSERT**) or altered (**UPDATE**):

```
            If inID1 = -1 Then
                stSql = "INSERT INTO """ + NameTable1 + """ (""" + NameTableField1 +
"""," + NameTab12ID + """) VALUES ('" + stContent + "','" + inID2 + "') "
                oSQL_Command.executeUpdate(stSql)
```

And the corresponding ID directly read out:

```
                stSql = "CALL IDENTITY()"
                oResult = oSQL_Command.executeQuery(stSql)
                    While oResult.next
                        inID1 = oResult.getInt(1)
                    Wend
```

The primary key for the first table must finally be read again so that it can be transferred to the form's underlying table.

```
            Else
                stSql = "UPDATE """ + NameTable1 + """ SET """ + NameTab12ID + """='" +
inID2 + "' WHERE """ + NameTableField1 + """ = '" + stContent + "'"
                oSQL_Command.executeUpdate(stSql)
            End If
        End If
```

In the case where both the fields underlying the combobox are in the same table (for example Surname and Firstname in the Name table), a different query is needed:

```
        If NameTableField2 <> "" And NameTable2 = "" Then
            stSql = "SELECT ""ID"" FROM """ + NameTable1 + """ WHERE """ +
NameTableField1 + """='" + stContent + "' AND """ + NameTableField2 + """='" +
stContentField2 + "'"
            oResult = oSQL_Command.executeQuery(stSql)
                While oResult.next
                    inID1 = oResult.getInt(1)
                Wend
            If inID1 = -1 Then
```

... and a second table does not exist:

```
            stSql = "INSERT INTO """ + NameTable1 + """ (""" + NameTableField1 +
"""," + NameTableField2 + """) VALUES ('" + stContent + "','" + stContentField2 +
"') "
            oSQL_Command.executeUpdate(stSql)
```

Then the primary key is read again.

```
            stSql = "CALL IDENTITY()"
            oResult = oSQL_Command.executeQuery(stSql)
                While oResult.next
                    inID1 = oResult.getInt(1)
                Wend
        End If
    End If
    IF NameTableField2 = "" Then
```

Now we consider the simplest case: The second table field does not exist and the entry is not yet present in the table. In other words, a single new value has been entered into the combobox.

```
        stSql = "SELECT ""ID"" FROM """ + NameTable1 + """ WHERE """ + NameTableField1
+ """='" + stContent + "'"
        oResult = oSQL_Command.executeQuery(stSql)
            While oResult.next
```

```
            inID1 = oResult.getInt(1)
         Wend
      If inID1 = -1 Then
```

If there is no second field, the content of the box is inserted as a new record.

```
         stSql = "INSERT INTO """ + NameTable1 + """ (""" + NameTableField1 +
"""") VALUES ('" + stContent + "') "
         oSQL_Command.executeUpdate(stSql)
```

… and the resulting ID directly read out.

```
         stSql = "CALL IDENTITY()"
         oResult = oSQL_Command.executeQuery(stSql)
            While oResult.next
               inID1 = oResult.getInt(1)
            Wend
      End If
   End If
```

The value of the primary key field must be determined, so that it can be transferred to the main part of the form.

Next the primary key value that has resulted from all these loops is transferred to the invisible field in the main table and the underlying database. The table field linked to the form field is reached by using **'BoundField'**. **'updateInt'** places an integer (see under numerical type definitions) in this field.

```
         oForm.updateLong(oForm.findColumn(oFeldList.Tag),inID1)
      End If
   ELSE
```

If no primary key is to be entered, because there was no entry in the combobox or that entry was deleted, the content of the invisible field must also be deleted. **updateNull()** is used to fill the field with the database-specific expression for an empty field, **NULL**.

```
            oForm.updateNULL(oForm.findColumn(oFeldList.Tag),NULL)
         End If
      NEXT inCom
   End If
End Sub
```

Function to measure the length of the combobox entry

The following function gives the number of characters in the respective table column, so that entries that are too long do not just get truncated. A **Function** is chosen here to provide return values. A **SUB** has no return value that can be passed on and processed elsewhere.

```
Function ColumnSize(Tablename As String, Fieldname As String) As Integer
   oDatasource = ThisComponent.Parent.CurrentController
   If Not (oDatasource.isConnected()) Then
      oDatasource.connect()
   End If
   oConnection = oDataSource.ActiveConnection()
   oSQL_Command = oConnection.createStatement()
   stSql = "SELECT ""COLUMN_SIZE"" FROM
""INFORMATION_SCHEMA"".""SYSTEM_COLUMNS"" WHERE ""TABLE_NAME"" = '" +
Tablename + "' AND ""COLUMN_NAME"" = '" + Fieldname + "'"
   oResult = oSQL_Command.executeQuery(stSql)
      While oResult.next
         i = oResult.getInt(1)
      Wend
   ColumnSize = i
End Function
```

Generating database actions

```
Sub GenerateRecordAction(oEvent As Object)
```

This macro should be bound to the *When receiving focus* event of the listbox. It is necessary that in all cases where the listbox is changed, the change is stored. Without this macro, there would be no change in the actual table that Base could recognize, since the combobox is not bound to the form.

This macro directly alters the form properties:

```
    Dim oForm As Object
    oForm = oEvent.Source.Model.Parent
    oForm.IsModified = TRUE
End Sub
```

This macro is not necessary for forms that use queries for the content of comboboxes. Changes in comboboxes are registered directly.

Navigation from one form to another

A form is to be opened when a particular event occurs.

In the form control properties, on the line "Additional information" (tag), enter the name of the form. Further information can also be entered here, and subsequently separated out by using the **`Split()`** function.

```
Sub From_form_to_form(oEvent As Object)
    Dim stTag As String
    stTag = oEvent.Source.Model.Tag
    aForm() = Split(stTag, ",")
```

The array is declared and filled with the form names, first the form to be opened and secondly the current form, which will be closed after the other has been opened.

```
    ThisDatabaseDocument.FormDocuments.getByName( Trim(aForm(0)) ).open
    ThisDatabaseDocument.FormDocuments.getByName( Trim(aForm(1)) ).close
End Sub
```

If instead, the other form is only to be opened when the current one is closed, for example where a main form exists and all other forms are controlled from it using buttons, the following macro should be bound to the form with Tools > Customize > Events > Document closed:

```
Sub Mainform_open
    ThisDatabaseDocument.FormDocuments.getByName( "Mainform" ).open
End Sub
```

If the form documents are sorted within the ODB file into directories, the macro for changing the form needs to be more extensive:

```
Sub From_form_to_form_with_folders(oEvent As Object)
    REM The form to be opened is given first.
    REM If a form is in a folder, use "/" to define the relationship
    REM so that the subfolder can be found.
    Dim stTag As String
    stTag = oEvent.Source.Model.Tag 'Tag is entered in the additional
information
    aForms() = Split(stTag, ",")  'Here the form name for the new form comes
first, then the one for the old form
    aForms1() = Split(aForms(0),"/")
    aForms2() = Split(aForms(1),"/")
    If UBound(aForms1()) = 0 Then
        ThisDatabaseDocument.FormDocuments.getByName( Trim(aForms1(0)) ).open
    Else
        ThisDatabaseDocument.FormDocuments.getByName(
Trim(aForms1(0)) ).getByName( Trim(aForms1(1)) ).open
    End If
```

```
    If UBound(aForms2()) = 0 Then
       ThisDatabaseDocument.FormDocuments.getByName( Trim(aForms2(0)) ).close
    Else
       ThisDatabaseDocument.FormDocuments.getByName(
Trim(aForms2(0)) ).getByName( Trim(aForms2(1)) ).close
    End If
End Sub
```

Form documents that lie in a directory are entered into the Additional Information field as directory/form. This must be converted to:

`...getByName("Directory").getByName("Form")`.

Hierarchical listboxes

Settings in one listfield are intended to influence directly the settings of another. For simple cases, this has already been described above in the section on record filtering. But supposing that the first listbox is meant to affect the content of the second listbox, which then affects the content of a third listbox, and so on.

Jahrgang
1
2
3
4
5
6
7
8
9
10
11
12
13

Klasse
a
b
c
d
e
f
g

Name
Karl Müller
Evelyn Maier
Maria Gott
Eduard Abgefahren
Kurt Drechsler
Kunigunde Schimmel

Example listfields for a hierarchical ordering of listfields

In this example the first listbox (Jahrgang = Years) contains all school years. The Klasse (Classes) in each year are represented by letters. The Names are those of the class members.

Under normal circumstances, the Years listbox would show all 13 years, the Classes listbox all class letters and the Names listbox all pupils at the school.

If these are to be hierarchical listboxes, the choice of classes is restricted once a year has been selected. Only those class letters are shown that are actually present in that year. This might vary because, if pupil numbers are increasing, the number of classes in a year might also increase. The last listbox, Names, is very restricted. Instead of more than 1000 pupils, it would show only 30.

At the beginning, only the year can be selected. Once this has been done, the (restricted) list of classes is made available. Only at the end is the list of names given.

If the Years listbox is altered, the sequence must start again. If only the Classes listbox is altered, the year number for the last listbox remains valid

To create such a function, the form must be able to store an intermediate variable. This takes place in a hidden control.

The macro is bound to a change in the content of a listbox: Properties Listbox > Events > Changed. The necessary variables are stored in the additional information of the listbox.

Here is an example of the additional information provided:
`MainForm,Year,hidden control,Listbox_2`

The form is called MainForm. The current listbox is called Listbox1. This listbox shows the content of the table field Year and the following listboxes must be filtered according to this entry. The hidden control is designated by hidden_control and the existence of a second listbox (Listbox_2) is passed on to the filtering procedure.

```
Sub Hierarchical_control(oEvent As Object)
    Dim oDoc As Object
    Dim oDrawpage As Object
    Dim oForm As Object
    Dim oFieldHidden As Object
    Dim oField As Object
    Dim oField1 As Object
    Dim stSql As String
    Dim acontent()
    Dim stTag As String
    oField = oEvent.Source.Model
    stTag = oField.Tag
    oForm = oField.Parent

    REM Tag goes into the Additional information field
    REM It contains:
    REM 0. Field name of field to be filtered in the table
    REM 1. Field name of the hidden control that will store the filtered value
    REM 2. Possible further listbox
    REM The tag is read from the element that launches the macro. The variable is
    REM passed to the procedure, and if necessary to all further listboxes
    aFilter() = Split(stTag, ",")
    stFilter = ""
```

After the vartiables have been declared, the content of the tag is passed to an array, so that individual elements can be accessed. Then the access to the various fields in the form is declared.

The listbox that called the macro is determined and its value read. Only if this value is not NULL will it be combined with the name of the field to be filtered, in our example Year, to make a SQL command. Otherwise the filter will stay empty. If the listboxes are meant for filtering a form, no hidden control is available. In this case, the filter value is stored directly in the form.

```
        If Trim(aFilter(1)) = "" Then
        If oField.getCurrentValue <> "" Then
            stFilter = """"+Trim(aFilter(0))+"""='"+oField.getCurrentValue()+"'"
```

If a filter already exists (for example one dealing with Listbox 2, which is now being accessed), the new content is attached to the previous content stored in the hidden control.

```
            If oForm.Filter <> ""
```

This must only happen when the same field has not yet been filtered. For example, if we are filtering for Year, a repetition of the filter will find no additional records for the Name listbox. A person can only be found in one year. We must therefore exclude the possibility that the filter name has already been used.

```
                And InStr(oForm.Filter, """"+Trim(aFilter(0))+"""='") = 0 Then
                stFilter = oForm.Filter + " AND " + stFilter
```

If a filter exists and the field that will be used for filtering is already present in the filter, the previous filtering on this fieldname must be deleted and a new filter created.

```
            ElseIf oForm.Filter <> "" Then
                stFilter = Left(oForm.Filter,
                InStr(oForm.Filter, """"+Trim(aFilter(0))+"""='")-1) + stFilter
            End If
        End If
```

Then the filter is entered into the form. This filter can also be empty if the first listbox was selected and has no content.

```
oForm.Filter = stFilter
oForm.reload()
```

The same procedure will run if the form does not need to be filtered immediately. In this case, the filter value is stored in the mean time in a hidden control.

```
Else
    oFieldHidden = oForm.getByName(Trim(aFilter(1)))
    If oField.getCurrentValue <>"" Then
        stFilter = """"+Trim(aFilter(0))+"""='"+oField.getCurrentValue()+"'"
        If oFieldHidden.HiddenValue <> ""
        And InStr(oFieldHidden.HiddenValue, """"+Trim(aFilter(0))+"""='") = 0 Then
            stFilter = oFieldHidden.HiddenValue + " AND " + stFilter
        ElseIf oFieldHidden.HiddenValue <> "" Then
            stFilter = Left(oFieldHidden.HiddenValue,
                InStr(oFieldHidden.HiddenValue, """"+Trim(aFilter(0))+"""='")-1) +
                    stFilter
        End If
    End If
    oFieldHidden.HiddenValue = stFilter
End If
```

If the Additional information has an entry numbered 4 (numbering begins at 0), the following listbox must be set to the corresponding entry from the caller listbox.

```
If UBound(aFilter()) > 1 Then
    oField1 = oForm.getByName(Trim(aFilter(2)))
    aFilter1() = Split(oField1.Tag,",")
```

The necessary data for the filtering is read from the Additional information (Tag) in the corresponding listbox. Unfortunately it is not possible to write only the fresh SQL code into the listbox and then to read the listbox values. Instead the values corresponding to the query must be written into the listbox directly.

The creation of the code starts from the fact that the table to which the form refers is the same one to which the listboxes refer. Such a listbox is not designed to transfer foreign keys to the table.

```
If oField.getCurrentValue <> "" Then
    stSql = "SELECT DISTINCT """+Trim(aFilter1(0))+""" FROM """+oForm.Command+
        """ WHERE "+stFilter+" ORDER BY """+Trim(aFilter1(0))+"""""
    oDatasource = ThisComponent.Parent.CurrentController
    If Not (oDatasource.isConnected()) Then
        oDatasource.connect()
    End If
    oConnection = oDatasource.ActiveConnection()
    oSQL_Statement = oConnection.createStatement()
    oQuery_result = oSQL_Statement.executeQuery(stSql)
```

The values are read into an array. The array is transferred directly into the listbox. The corresponding indices for the array are incremented within a loop.

```
    inIndex = 0
    While oQuery_result.next
        ReDim Preserve aContent(inIndex)
        acontent(inIndex) = oQuery_result.getString(1)
        inIndex = inIndex+1
    WEnd
Else
    aContent(0) = ""
End If
oField1.StringItemList = aContent()
```

The content of the listbox has been created afresh. Now it must be read in again. Then, using the Additional information property of the listbox that has been refreshed, each of the dependent listboxes that follows is emptied, launching a loop for all following listboxes until one is reached that has no fourth term in its Additional information.

```
            oField1.refresh()
            While UBound(aFilter1()) > 1
                Dim aLeer()
                oField2 = oForm.getByName(Trim(aFilter1(2)))
                Dim aFilter1()
                aFilter1() = Split(oField2.Tag,",")
                oField2.StringItemList = aEmpty()
                oField2.refresh()
            Wend
        End If
    End Sub
```

The visible content of the listboxes are stored in `oField1.StringItemList`. If any additional value needs to be stored for transmission to the underlying table as a foreign key, as is usual for listboxes in forms, this value must be passed to the query separately and then stored with `oField1.ValueItemList`.

Such an extension requires additional variables such as, in addition to the table in which the values of the form are to be stored, the table from which the listbox contents are drawn.

Besondere Aufmerksamkeit ist dabei der Formulierung des Filters zu widmen.

Special care must be given to formulating the filter query.

```
stFilter = """"+Trim(aFilter(1))+"""='"+oField.getCurrentValue()+"'"
```

will work only if the underlying LibreOffice version is 4.1 or later, since it is the value which is to be stored that is given as `CurrentValue()`, and not the value that is displayed. To ensure that it works in different versions, set Property: Listbox > Data > Bound Field > '0'.

Entering times with milliseconds

To store times to millisecond precision requires a timestamp field in the table, separately adapted by SQL for the purpose (see “Table creation” in Chapter 3). Such a field can be represented on a form by a formatted field with the format **`MM:SS,00`**. However on the first attempt to write to it, record entry will fail. This can be corrected with the following macro, which should be bound to the form’s “Before record action” property:

```
SUB Timestamp
    Dim unoStmp As New com.sun.star.util.DateTime
    Dim oDoc As Object
    Dim oDrawpage As Object
    Dim oForm As Object
    Dim oFeld As Object
    Dim stZeit As String
    Dim ar()
    Dim arMandS()
    Dim loNano As Long
    Dim inSecond As Integer
    Dim inMinute As Integer
    oDoc = thisComponent
    oDrawpage = oDoc.Drawpage
    oForm = oDrawpage.Forms.getByName("MainForm")
    oField = oForm.getByName("Time")
    stTime = oField.Text
```

The variables are declared first. The rest of the code is executed only when the Time field has something in it. Otherwise the internal mechanism of the form will act to set the field to **`NULL`**.

```
    If stTime <> "" Then
        ar() = Split(stTime,".")
        loNano = CLng(ar(1)&"0000000")
        arMandS() = Split(ar(0),":")
        inSecond = CInt(arMandS(1))
        inMinute = Cint(arMandS(0))
```

The entry in the Time field is broken down into its elements.

First the decimal part is separated out and right-padded with null characters to a total of nine digits. Such a high number can only be stored in a long variable.

Then the rest of the time is split into minutes and seconds, using the colon as a separator, and these are converted into integers.

```
        With unoStmp
            .NanoSeconds = loNano
            .Seconds = inSecond
            .Minutes = inMinute
            .Hours = 0
            .Day = 30
            .Month = 12
            .Year = 1899
        End With
```

The timestamp values are assigned to the standard LibreOffice date of 30.12.1899. Of course the actual current date can be stored alongside it.

Note

Getting and storing the current date:

```
Dim now As Date
   now = Now()
   With unoStmp
      .NanoSeconds = loNano
      .Seconds = inSecond
      .Minutes = inMinute
      .Hours = Hour(now)
      .Day = Day(now)
      .Month = Month(now)
      .Year = Year(now)
   End With
      oField.BoundField.updateTimestamp(unoStmp)
   End If
End Sub
```

Now the timestamp we have created is transferred to the field using **`updateTimestamp`** and stored in the form.

In earlier tutorials, **`NanoSeconds`** were called **`HundrethSeconds`**. This does not match the LibreOffice AI and will cause an error message.

One event – several implementations

It can happen when using forms that a macro linked to a single event is run twice. This occurs because more than one process is linked simultaneously to, for example, the storage of a modified record. The differing causes for such an event can be determined in the following way:

```
Sub Determine_eventcause(oEvent As Object)
   Dim oForm As Object
   oForm = oEvent.Source
   MsgBox oForm.ImplementationName
End Sub
```

When a modified record is stored, there are two implementations involved named **`org.openoffice.comp.svx.FormController`** and **`com.sun.star.comp.forms.ODatabaseForm`**. Using these names, we can ensure that a macro only runs through its code once. A duplicate run usually causes just a (small) pause in the program execution, but it can lead to things like a cursor being put back two records instead of

one. Each implementation allows only specific commands, so knowing the name of the implementation can be important.

Saving with confirmation

For complicated record alterations, it makes sense to ask the user before execution whether the change should actually be carried out. If the answer in the dialog is No, the save is aborted, the change discarded, and the cursor remains on the current record.

```
Sub Save_confirmation(oEvent As Object)
    Dim oFormFeature As Object
    Dim oFormOperations As Object
    Dim inAnswer As Integer
    oFormFeature = com.sun.star.form.runtime.FormFeature
    Select Case oEvent.Source.ImplementationName
        Case "org.openoffice.comp.svx.FormController"
            inAnswer = MsgBox("Should the record be changed?" ,4, "Change_record")
            Select Case inAnswer
                Case 6 ' Yes, no further action
                Case 7 ' No, interrupt save
                    oFormOperations = oEvent.Source.FormOperations
                    oFormOperations.execute(oFormFeature.UndoRecordChanges)
                Case Else
            End Select
        Case "com.sun.star.comp.forms.ODatabaseForm"
    End Select
End Sub
```

There are two trigger moments with different implementation names. These two implementations are distinguished in **`SELECT CASE`**. The code will be executed only for the **`FormController`** implementation. This is because only **`FormController`** has the variable **`FormOperations`**.

Apart from Yes and No, the user might also click on the close button. This however yields the same value as No, namely 7.

If the form is navigated with the tab key, the user sees only the dialog with the confirmation prompt. However, users who use the navigation bar will also see a message saying that the record will not be altered.

Primary key from running number and year

When invoices are prepared, yearly balances are affected. This often leads to a desire to separate the invoice tables of a database by year and to begin a new table each year.

The following macro solution uses a different method. It automatically writes the value of the ID field into the table but also takes account of the Year field which exists in the table as a secondary primary key. So the following primary keys might occur in the table:

year	*ID*
2014	1
2014	2
2014	3
2015	1
2015	2

In this way an overview of the year is more easily obtained for documents.

```
Sub Current_Date_and_ID
    Dim oDatasource As Object
    Dim oConnection As Object
    Dim oSQL_Command As Object
    Dim stSql As String
```

```
        Dim oResult As Object
        Dim oDoc As Object
        Dim oDrawpage As Object
        Dim oForm As Object
        Dim oField1 As Object
        Dim oField2 As Object
        Dim oField3 As Object
        Dim inIDnew As Integer
        Dim inYear As Integer
        Dim unoDate
        oDoc = thisComponent
        oDrawpage = oDoc.drawpage
        oForm = oDrawpage.forms.getByName("MainForm")
        oField1 = oForm.getByName("fmt_year")
        oField2 = oForm.getByName("fmtID")
        oField3 = oForm.getByName("dat_date")
        If IsEmpty(oField2.getCurrentValue()) Then
            If IsEmpty(oField3.getCurrentValue()) Then
                unoDate = createUnoStruct("com.sun.star.util.Date")
                unoDate.Year = Year(Date)
                unoDate.Month = Month(Date)
                unoDate.Day = Day(Date)
                inYear = Year(Date)
            Else
                inYear = oField3.CurrentValue.Year
            End If
            oDatasource = ThisComponent.Parent.CurrentController
            If Not (oDatasource.isConnected()) Then
                oDatasource.connect()
            End If
            oConnection = oDatasource.ActiveConnection()
            oSQL_Command = oConnection.createStatement()
            stSql = "SELECT MAX( ""ID"" )+1 FROM ""orders"" WHERE ""year"" = '"
                + inYear + "'"
            oResult = oSQL_Command.executeQuery(stSql)
            While oResult.next
                inIDnew = oresult.getInt(1)
            Wend
            If inIDnew = 0 Then
                inIDnew = 1
            End If
            oField1.BoundField.updateInt(inYear)
            oField2.BoundField.updateInt(inIDnew)
            If IsEmpty(oField3.getCurrentValue()) Then
                oField3.BoundField.updateDate(unoDate)
            End If
        End If
    End Sub
```

All variables are declared. The form controls in the main form are accessed. The rest of the code runs only if the entry for the fmtID field is still empty. Then, if no date has been entered, a date structure is created so that the current date and year can be carried across into the relevant fields. Then a connection is made to the database, if it does not exist already. The highest value of the ID field for the current year is incremented by 1. If the result set is empty, it means there are no entries in the ID field. At this point 0 could be entered in the fmtID control, but numbering for orders should begin at 1 so the inIDnew variable is given the value 1.

The returned value for the year, the ID and the current date (if no date has been entered) are transferred to the form.

In the form, the fields for the primary keys ID and Year are write-protected. Consequently they can only be given values using this macro.

Database tasks expanded using macros

Making a connection to a database

```
oDataSource = ThisComponent.Parent.DataSource
If Not oDataSource.IsPasswordRequired Then
   oConnection = oDataSource.GetConnection("","")
```

Here it would be possible to provide a username and a password, if one were necessary. In that case the brackets would contain ("Username","Password"). Instead of including the username and a password in clear text, the dialog for password protection is called up:

```
Else
   oAuthentication = createUnoService("com.sun.star.sdb.InteractionHandler")
   oConnection = oDataSource.ConnectWithCompletion(oAuthentication)
End If
```

If however a form within the same Base file is accessing the database, you only need:

```
oDataSource = ThisComponent.Parent.CurrentController
If Not (oDataSource.isConnected()) Then
   oDataSource.connect()
End If
oConnection = oDataSource.ActiveConnection()
```

Here the database is known so a username and a password are not necessary, as these are already switched off in the basic HSQLDB configuration for internal version.

For forms outside Base, the connection is made through the first form:

```
oDataSource = Thiscomponent.Drawpage.Forms(0)
oConnection = oDataSource.activeConnection
```

Copying data from one database to another

The internal database is a single-user database. The records are stored inside the *.odb file. The exchange of data between different database files was not allowed for but is nevertheless possible using export and import.

But often *.odb files are set up to allow automatic data exchange between databases. The following procedure can be helpful here.

After the variables have been declared, the path to the current database is read from a button on the form. The database name is separated from the rest of the path. The target file for the records is also present in this folder. The name of this file is attached to the path to allow a connection to be made to the target database.

The connection to the source database is determined relative to the form that contains the button: **`ThisComponent.Parent.CurrentController`**. The connection to the external database is set up using the **`DatabaseContext`** and the path.

```
Sub DataCopy
   Dim oDatabaseContext As Object
   Dim oDatasource As Object
   Dim oDatasourceZiel As Object
   Dim oConnection As Object
   Dim oConnection Ziel As Object
   Dim oDB As Object
   Dim oSQL_Command As Object
   Dim oSQL_CommandTarget As Object
   Dim oResult As Object
   Dim oResultTarget As Object
   Dim stSql As String
   Dim stSqlTarget As String
   Dim inID As Integer
```

```
    Dim inIDTarget As Integer
    Dim stName As String
    Dim stTown As String
    oDB = ThisComponent.Parent
    stDir = Left(oDB.Location,Len(oDB.Location)-Len(oDB.Title))
    stDir = ConvertToUrl(stDir & "TargetDB.odb")
    oDatasource = ThisComponent.Parent.CurrentController
    If Not (oDatasource.isConnected()) Then
       oDatasource.connect()
    End If
    oConnection = oDatasource.ActiveConnection()
    oDatabaseContext = createUnoService("com.sun.star.sdb.DatabaseContext")
    oDatasourceTarget = oDatabaseContext.getByName(stDir)
    oConnectionTarget = oDatasourceTarget.GetConnection("","")
    oSQL_Command = oConnection.createStatement()
    stSql = "SELECT * FROM ""table"""
    oResult = oSQL_Command.executeQuery(stSql)
    While oResult.next
       inID = oResult.getInt(1)
       stName = oResult.getString(2)
       stTown = oResult.getString(3)
       oSQL_CommandTarget = oConnectionTarget.createStatement()
       stSqlTarget = "SELECT ""ID"" FROM ""table"" WHERE ""ID"" = '"+inID+"'"
       oResultTarget = oSQL_CommandZiel.executeQuery(stSqlTarget)
       inIDZiel = - 1
       While oResultTarget.next
          inIDTarget = oResultTarget.getInt(1)
       Wend
       If inIDTarget = - 1 Then
          stSqlTarget = "INSERT INTO ""table"" (""ID"",""name"",""town"") VALUES
             ('"+inID+"','"+stName+"','"+stTown+"')"
          oSQL_CommandTarget.executeUpdate(stSqlZiel)
       End If
    Wend
End Sub
```

The complete tables of the source database are read and inserted, line by line, into the tables of the target database using the connection that has been set up. Before the insertion, a check is made to see whether a value has been set for the primary key. If so, the record is not copied.

It can also be arranged that, instead of a new record being copied over, an existing record will be updated. In all cases, this makes certain that the target database contains records with the correct primary key of the source database.

Access to queries

It is easier to create queries in the graphical user interface than to transfer their text into macros, with the additional complication that duplicate double quotes are needed for all table and field names.

```
Sub aQueryContent
    Dim oDatabaseFile As Object
    Dim oQuery As Object
    Dim stQuery As String
    oDatabaseFile = ThisComponent.Parent.CurrentController.DataSource
    oQuery = oDatabaseFile.getQueryDefinitions()
    stQuery = oQuery.getByName("Query").Command
    MsgBox stQuery
End Sub
```

Here the content of a *.odb file is accessed from a form. The query is reached using **`getQueryDefinitions`**(). The SQL code for the query is in its **`Command`** field. This can then be used to utilize the command further within a macro.

When you are using the SQL code of the query, you must take care that the code does not refer to another query. That leads inevitably to the message that the (apparent) table from the database is

unknown. Because of this, it is simpler to create views from queries and then access the views in the macro.

Securing your database

It can sometimes happen, especially when a database is being created, that the ODB file is unexpectedly truncated. Frequent saving after editing is therefore useful, especially when using the Reports module.

When the database is in use, it can be damaged by operating system failure, if this occurs just as the Base file is being terminated. This is when the content of the database is being written into the file.

In addition, there are the usual suspects for files that suddenly refuse to open, such as hard drive failure. It does no harm therefore to have a backup copy which is as up-to-date as possible. The state of the data does not change as long as the ODB file remains open. For this reason, safety subroutines can be directly linked to the opening of the file. You simply copy the file using the backup path given in **Tools > Options > LibreOffice > Paths**. The macro begins to overwrite the oldest version after a specific number of copies (**inMax**).

```
Sub Databasebackup(inMax As Integer)
   Dim oPath As Object
   Dim oDoc As Object
   Dim sTitle As String
   Dim sUrl_End As String
   Dim sUrl_Start As String
   Dim i As Integer
   Dim k As Integer
   oDoc = ThisComponent
   sTitle = oDoc.Title
   sUrl_Start = oDoc.URL
   Do While sUrl_Start = ""
      oDoc = oDoc.Parent
      sTitle = oDoc.Title
      sUrl_Start = oDoc.URL
   Loop
```

If the macro is run when you launch the ODB file, sTitle and sUrl_Start will be correct. However, if the macro is carried out by a form, it must first determine whether a URL is available. If the URL is empty, a higher level (oDoc.Parent) for a value is looked up.

```
   oPath = createUnoService("com.sun.star.util.PathSettings")
   For i = 1 To inMax + 1
      If Not FileExists(oPath.Backup & "/" & i & "_" & sTitle) Then
         If i > inMax Then
            For k = 1 To inMax - 1 To 1 Step -1
            If FileDateTime(oPath.Backup & "/" & k & "_" & sTitle) <=
FileDateTime(oPath.Backup & "/" & k+1 & "_" & sTitle) Then
               If k = 1 Then
                     i = k
                     Exit For
               End If
            Else
               i = k + 1
               Exit For
            End If
            Next
         End If
         Exit For
      End If
   Next
   sUrl_End = oPath.Backup & "/" & i &"_" & sTitle
```

```
    FileCopy(sUrl_Start,sUrl_End)
End Sub
```

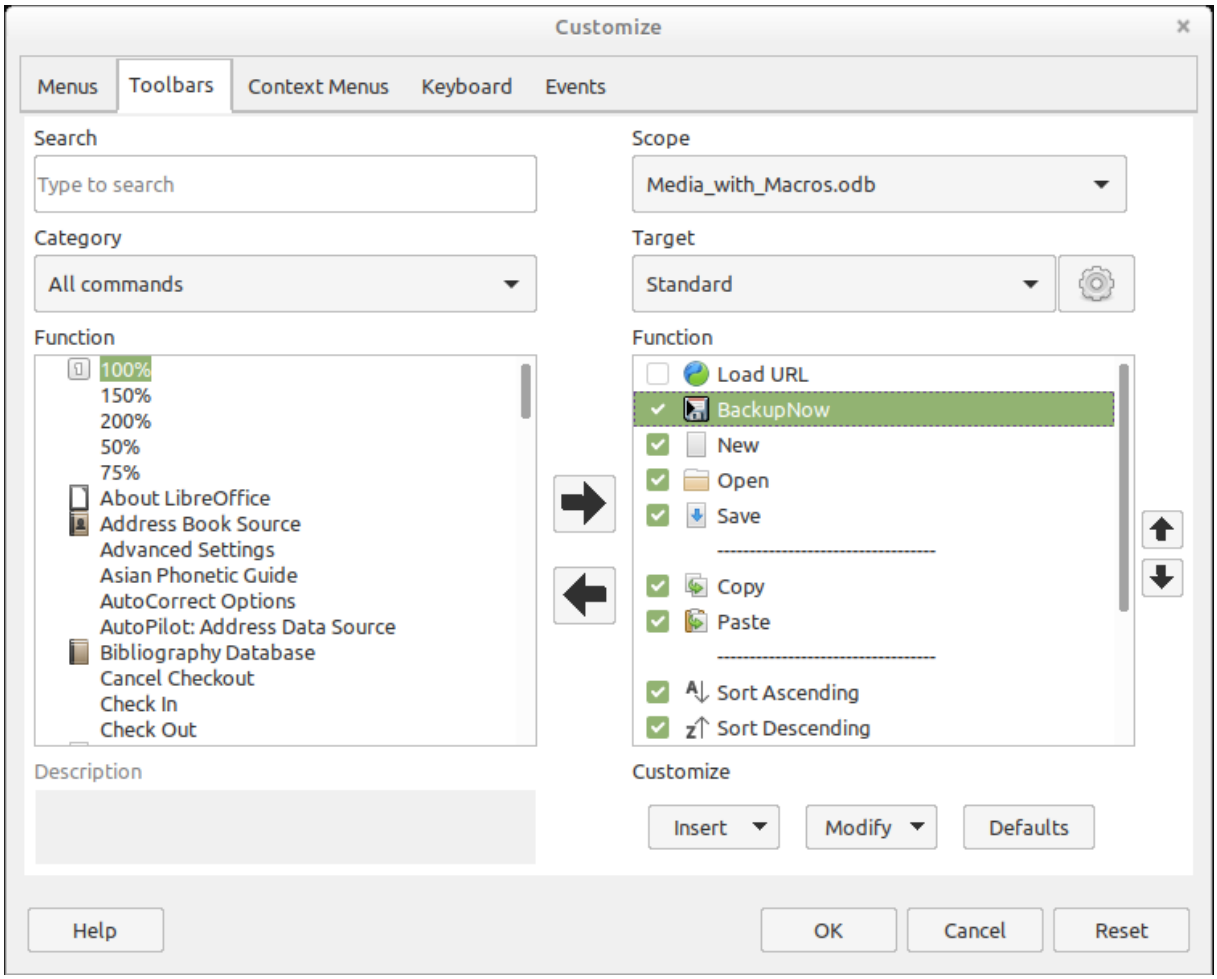
You can also do a backup while Base is running, provided that the data can be written back out of the cache into the file before the Databasebackup subroutine is carried out. It might be useful to do this, perhaps after a specific elapsed time or when an on-screen button is pressed. This cache-clearing is handled by the following subroutine:

```
Sub Write_data_out_of_cache
    Dim oData As Object
    Dim oDataSource As Object
    oData = ThisDatabaseDocument.CurrentController
    If Not ( oData.isConnected() ) Then oData.connect()
    oDataSource = oData.DataSource
    oDataSource.flush
End Sub
```

If all this is to be launched from a single button on a form, both procedures must be called by a further procedure:

```
Sub BackupNow
    Write_data_out_of_cache
    DatabaseBackup(10)
End Sub
```

Especially for a security macro, it might make sense to make the macro accessible via the database's toolbar. This is done in the main window of the Base file using **Tools > Customize > Toolbars**.

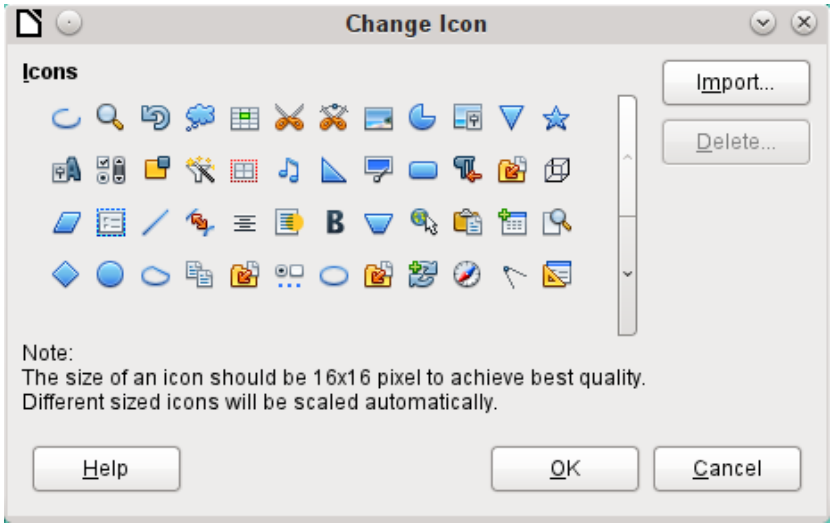


On the Customize dialog, under Scope, the command must be stored in the Base file, which in this case is `Media_with_Macros.odb`.

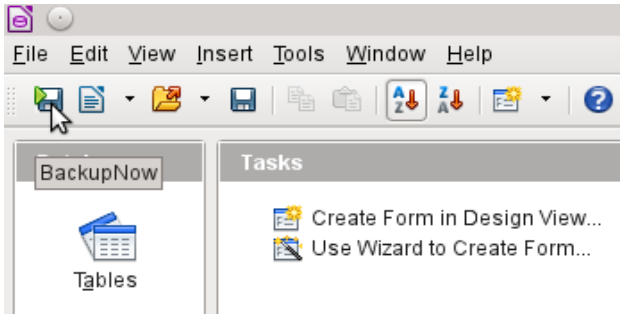
Under Target, select the Standard toolbar, which works in all parts of Base.

The dialog now shows relevant functions in the right-hand list. Select the procedure BackupNow.

The command is now available for use in the top-level toolbar. To assign an icon to the command, choose **Modify > Change icon** to open the following dialog.



Select a suitable icon. You can also create and add your own icon.



The icon now appears instead of the name of the procedure. The name becomes a tooltip.

To carry out the procedure, just click the icon on the toolbar.

Database compaction

This is simply a SQL command (**`SHUTDOWN COMPACT`**), which should be carried out now and again, especially after a lot of data has been deleted. The database stores new data, but still reserves the space for the deleted data. In cases where the data have been substantially altered, you therefore need to compact the database.

Note

Since LibreOffice version 3.6, this command is automatically carried out for the internal HSQLDB when the database is closed. Therefore this macro is no longer necessary for the internal database.

Once compaction is carried out, the tables are no longer accessible. The file must be reopened. Therefore this macro closes the form from which it is called. Unfortunately you cannot close the document itself without causing a recovery when it is opened again. Therefore this function is commented out.

```
Sub Database_compaction
   Dim stMessage As String
```

```
   oDataSource = ThisComponent.Parent.CurrentController  ' Accessible from
the form
   If Not (oDataSource.isConnected()) Then
      oDataSource.connect()
   End If
   oConnection = oDataSource.ActiveConnection()
   oSQL_Statement = oConnection.createStatement()
   stSql = "SHUTDOWN COMPACT" ' The database is being compacted and shut down
   oSQL_Statement.executeQuery(stSql)
   stMessage = "The database is being compacted." + Chr(13) + "The form will
now close."
   stMessage = stMessage + Chr(13) + "Following this, the database file
should be closed."
   stMessage = stMessage + Chr(13) + "The database can only be accessed after
reopening the database file."
   MsgBox stMessage
   ThisDatabaseDocument.FormDocuments.getByName( "Maintenance" ).close
   REM The closing of the database file causes a recovery operation when you
open it again.
'  ThisDatabaseDocument.close(True)
End Sub
```

Decreasing the table index for autovalue fields

If a lot of data is deleted from a table, users are often concerned that the sequence of automatically generated primary keys simply continues upwards instead of starting again at the highest current value of the key. The following subroutine reads the currently highest value of the ID field in a table and sets the next initial key value 1 higher than this maximum.

If the primary key field is not called ID, the macro must be edited accordingly.

```
Sub Table_index_down(stTable As String)
   REM This subroutine sets the automatically incrementing primary key field
mit the preset name of "ID" to the lowest possible value.
   Dim inCount As Integer
   Dim inSequence_Value As Integer
   oDataSource = ThisComponent.Parent.CurrentController  ' Accessible through
the  form
   If Not (oDataSource.isConnected()) Then
      oDataSource.connect()
   End If
   oConnection = oDataSource.ActiveConnection()
   oSQL_Statement = oConnection.createStatement()
   stSql = "SELECT MAX(""ID"") FROM """+stTable+"""  ' The highest value in
"ID" is determined
   oQuery_result = oSQL_Statement.executeQuery(stSql) ' Query is launched and
the return value stored in the variable oQuery_result
   If Not IsNull(oQuery_result) Then
      While oQuery_result.next
      inCount = oQuery_result.getInt(1)   ' First data field is read
      Wend  ' next record, in this case none as only one record exists
      If inCount = "" Then ' If the highest value is not a value, meaning the
table is empty, the highest value is set to -1
         inCount = -1
      End If
      inSequence_Value = inCount+1  ' The highest value is increased by 1
      REM A new command is prepared for the database. The ID will start
afresh from inCount+1.
      REM This statement has no return value, as no record is being read
      oSQL_statement = oConnection.createStatement()
      oSQL_statement.executeQuery("ALTER TABLE """ + stTable + """ ALTER
COLUMN ""ID"" RESTART WITH " + inSequence_Value + "")
```

```
    End If
End Sub
```

Printing from Base

The standard way of getting a printable document frrom Base is to use a report. Alternatively, tables and queries can be copied into Calc and prepared for printing there. Of course direct printing of a form from the screen is also possible.

Printing a report from an internal form

Normally the generation of reports is done from the Base user interface. A click on the report name launches the preparation of the report. It would be easier of course if the report could be launched directly from a form.

```
Sub Reportlaunch
    ThisDatabaseDocument.ReportDocuments.getByName("Report").open
End Sub
```

All the reports are accessed by name from their container **`ReportDocuments`**. They are opened with **`open`**. If a report is bound to a query that is filtered through the form, this method allows the current record to be printed.

Launching, formatting, directly printing, and closing a report

It would be even nicer if the report could be sent directly to the printer. The following combination of procedures adds a few little features. It first selects the active record in the form, reformats the report so that the text fields are set automatically for the correct height, and then launches the report. Finally the report is printed and optionally stored as a pdf. And all this happens almost completely in the background, as the report is switched to invisible directly after the form is opened and is closed again after printing. Suggestions for the various procedures were made by Andrew Pitonyak, Thomas Krumbein, and Lionel Elie Mamane.

```
Sub ReportStart(oEvent As Object)
    Dim oForm As Object
    Dim stSql As String
    Dim oDatasource As Object
    Dim oConnection As Object
    Dim oSQL_command As Object
    Dim oReport As Object
    Dim oReportView As Object
    oForm = oEvent.Source.model.parent
    stSql = "UPDATE ""Filter"" SET ""Integer"" = '" +
        oForm.getInt(oForm.findColumn("ID")) + "' WHERE ""ID"" = TRUE"
    oDatasource = ThisComponent.Parent.CurrentController
    If Not (oDatasource.isConnected()) Then
        oDatasource.connect()
    End If
    oConnection = oDatasource.ActiveConnection()
    oSQL_command = oConnection.createStatement()
    oSQL_command.executeUpdate(stSql)
    oReport = ThisDatabaseDocument.ReportDocuments.getByName("Reportname").open
    oReportView = oReport.CurrentController.Frame.ContainerWindow
    oReportView.Visible = False
    ReportLineHeightAuto(oReport)
End Sub
```

The ReportStart procedure is linked to a button in the form. Using this button, the primary key of the current record can be read. From the event that launches the macro, we can reach the form (**`oForm`**). The name of the primary key field is given here as **`"ID"`**. Using **`oForm.getInt(oForm.findColumn("ID"))`**, the key is read from the field as an integer. This value is stored in a filter table. The filter table controls a query to ensure that only the current record will be used for the report.

The report can be opened without reference to the form. It is then accessible as an object (**oReport**). The report window is made invisible. Unfortunately it cannot be invisible when it is called up, so it appears briefly, then is filled with the appropriate content in the background.

Next the ReportLineHeightAuto procedure is launched. This procedure is passed a reference to the open report as an argument.

The height of the record line can be set automatically at print time. If there is likely to be too much text in a particular field, the text is truncated and the remainder indicated by a red triangle. When this is not working, the following procedure will ensure that in all tables with the name Detail, automatic height control will be switched on.

```
Sub ReportLineHeightAuto(oReport As Object)
   Dim oTables As Object
   Dim oTable As Object
   Dim inT As Integer
   Dim inI As Integer
   Dim oRows As Object
   Dim oRow As Object
   oTables = oReport.getTextTables()
   For inT = 0 TO oTables.count() - 1
      oTable = oTables.getByIndex(inT)
      If Left$(oTable.name, 6) = "Detail" Then
         oRows = oTable.Rows
         For inI = 0 To oRows.count - 1
            oRow = oRows.getByIndex(inI)
            oRow.IsAutoHeight = True
         Next inI
      End If
   Next inT
   PrintCloseReport(oReport)
End Sub
```

When the report is created, care must be taken that all fields on the same line of the Detail section have the same height. Otherwise, the automatic height control can suddenly set a line to double height.

Once all tables with the name Detail have had automatic height control set, the report is sent to the printer by the PrintCloseReport procedure.

The Props array contains the values that are associated with a printer in a document. For the print command, the name of the default printer is important. The report should remain open until the printing is actually completed. This is ensured by giving the printer name and the “Wait until I’m finished” (**Wait**) command as arguments.

```
Sub PrintCloseReport(oReport As Object)
   Dim Props
   Dim stPrinter As String
   Props = oReport.getPrinter()
   stPrinter = Props(0).value
   Dim arg(1) As New com.sun.star.beans.PropertyValue
   arg(0).name = "Name"
   arg(0).value = "<" & stPrinter & ">"
   arg(1).name = "Wait"
   arg(1).value = True
   oReport.print(arg())
   oReport.close(true)
End Sub
```

Only when the print has been completely sent to the printer is the document closed.

For printer settings, see the Printer and print settings section from the wiki.

If, instead of (or in addition to) a print-out, you want a pdf of the document as a security copy, the **storeToURL()** method can be used:

```
Sub ReportPDFstore(oReport As Object)
   Dim stUrl As String
   Dim arg(0) As New com.sun.star.beans.PropertyValue
   arg(0).name = "FilterName"
   arg(0).value = "writer_pdf_Export"
   stUrl = "file:///...."
   oReport.storeToURL(stUrl, arg())
End Sub
```

The URL must of course be a complete URL address. Better still, this address should be linked to a permanent record of the printed document such as an invoice number. Otherwise it could happen that a security file could simply be overwritten by the next print.

Printing reports from an external form

There are problems when external forms are being used. The reports lie within the *.odb file and are not available using the datasource browser.

```
Sub Reportstart(oEvent As Object)
   Dim oFeld As Object
   Dim oForm As Object
   Dim oDocument As Object
   Dim oDocView As Object
   Dim Arg()
   oField = oEvent.Source.Model
   oForm = oField.Parent
   sURL = oForm.DataSourceName
   oDocument = StarDesktop.loadComponentFromURL(sURL, "_blank", 0, Arg() )
   oDocView = oDocument.CurrentController.Frame.ContainerWindow
   oDocView.Visible = False
   oDocument.getCurrentController().connect
   Wait(100)
   oDocument.ReportDocuments.getByName("Report").open
   oDocument.close(True)
End Sub
```

The report is launched from a button on the external form. The button tells the form the path to the *.odb file: **`oForm.DataSourceName`**. Then the file is opened using **`loadComponentFromUrl`**. The file should remain in the background, so the document view is accessed and the interface is set to **`Visible = False`**. Ideally this should have been done directly using the argument list **`Arg()`**, but tests show that this does not give the correct result.

The report cannot be called up immediately from the opened document as the connection is not yet ready. The report appears with a gray background and then LibreOffice crashes. A short wait of 100 milliseconds solves this problem. Practical tests are necessary to determine the minimum waiting time. Now the report is launched. As the report will be in a separate text file, the open *.odb file can be closed again. The **`oDocument.close(True)`** method passes this instruction to the *.odb file. The file will only be closed when it is no longer active, i.e. no more records are to be passed to the report.

A similar access can be launched from forms within the *.odb file, but in this case the document should not be closed.

You can obtain good quality prints significantly faster than with the Report Builder by using macros combined with the mailmerge function or text fields.

Doing a mail merge from Base

Sometimes a report is simply inadequate to produce good-quality letters to addressees. The text fields in a report are of very limited use in practice. Instead, a mail merge letter can be created in Writer. It is not however necessary to open Writer first, do all the entry and customization there and then print. You can do all that directly from Base, using a macro.

```
Sub MailmergePrint
   Dim oMailMerge As Object
```

```
    Dim aProps()
    oMailMerge = CreateUnoService("com.sun.star.text.MailMerge")
```

The name given for the data source is the one under which the database is registered in LibreOffice. This name need not be identical with the file name. The registered name in this example is Addresses.

```
    oMailMerge.DataSourceName = "Addresses"
```

The path to the mailmerge file must be formatted according to the conventions of your operating system, in this example an absolute path in a Linux system.

```
    oMailMerge.DocumentURL = ConvertToUrl("home/user/Dokuments/mailmerge.odt")
```

The type of command is set out. 0 stands for a table, 1 for a query and 2 for a direct SQL command.

```
    oMailMerge.CommandType = 1
```

Here a query has been chosen with the name MailmergeQuery.

```
    oMailMerge.Command = "MailmergeQuery"
```

A filter is used to determine which records are to be used for the mailmerge print. This filter might, for example, be specified using a form control and passed from Base to the macro. Using the primary key of a record could cause a single document to be printed.

In this example, the field Gender in the MailmergeQuery is selected and then searched for records that have ‘m’ in this field.

```
    oMailMerge.Filter = """Gender""='m'"
```

Available output types are Printer (1), File (2) and Mail (3). Here for test purposes, an output file is chosen. This file is stored on the given path. For each mailmerge record there will be one print. To distinguish this print, the surname field is incorporated into the filename.

```
    oMailMerge.OutputType = 2
    oMailMerge.OutputUrl = ConvertToUrl("home/user/Documents")
    oMailMerge.FileNameFromColumn = True
    oMailMerge.Filenameprefix = "Surname"
    oMailMerge.execute(aProps())
End Sub
```

If the filter is provided with its data via the form, this provides a way of doing mailmerges without opening Writer.

Printing via text fields

Using **Insert > Field > More Fields > Functions > Placeholder**, a model can be created in Writer for a document that is to be printed in the future. The placeholders should be provided with the same names as the fields in the database table or query underlying the form from which the macro is called.

For the simple case, the type to choose for the placeholder is Text.

The path to the model must be provided in the macro. A new document Unknown1.odt is created. The macro fills the placeholders with the contents of the current record from the query. The open document can then be edited as required.

The example database `Example_database_mailmerge_direct.odb` shows how a complete invoice can be produced with the help of text fields and access to a prepared table within the model document. Unlike the invoices created with the Report Builder, this type of invoice creation does not have height limitations for the fields from the table. All text is displayed.

Here is part of the code, mainly supplied by DPunch:
http://de.openoffice.info/viewtopic.php?f=8&t=45868#p194799

```
Sub Filling_Textfields
    oForm = thisComponent.Drawpage.Forms.MainForm
```

```
If oForm.RowCount = 0 Then
   MsgBox "No available record for printing"
   Exit Sub
End If
```

The main form is activated. The button that launches the macro could also be used to find the form. Then the macro establishes that the form actually contains printable data.

```
oColumns = oForm.Columns
oDB = ThisComponent.Parent
```

Direct access to the URL from the form is not possible. It must be done using the higher-level reference to the database.

```
stDir = Left(oDB.Location,Len(oDB.Location)-Len(oDB.Title))
```

The database title is separated from the URL.

```
stDir = stDir & "Beispiel_Textfelder.ott"
```

The model is found and opened

```
Dim args(0) As New com.sun.star.beans.PropertyValue
args(0).Name = "AsTemplate"
args(0).Value = True
oNewDoc = StarDesktop.loadComponentFromURL(stDir,"_blank",0,args)
```

The text fields are written in.

```
oTextfields = oNewDoc.Textfields.createEnumeration
Do While oTextfields.hasMoreElements
   oTextfield = oTextfields.nextElement
   If oTextfield.supportsService("com.sun.star.text.TextField.JumpEdit") Then
      stColumnname = oTextfield.PlaceHolder
```

Placeholder represents the text field.

```
         If oColumns.hasByName(stColumnname) Then
```

If the name of the text field is the same as the column name in the underlying dataset, the content of the database is transferred to the field in the text document.

```
            inIndex = oForm.findColumn(stColumnname)
            oTextfield.Anchor.String = oForm.getString(inIndex)
         End If
      End If
   Loop
End Sub
```

Calling applications to open files

This procedure allows a single click in a text field to call up the program that is linked to the filename suffix in the operating system. In this way internet links can be followed or an email program launched for a specific address stored in the database.

For this section see also the example database `Example_Mail_File_activate.odb`.

```
Sub Website_Mail_activate
   Dim oDoc As Object
   Dim oDrawpage As Object
   Dim oForm As Object
   Dim oField As Object
   Dim oShell As Object
   Dim stField As String
   oDoc = thisComponent
   oDrawpage = oDoc.Drawpage
   oForm = oDrawpage.Forms.getByName("form")
   oField = oForm.getByName("url_mail")
```

The content of the named field is read. This could be a web address beginning with **'http://'**, an email address beginning with **'@'** or a path to a document (for example an externally stored image or PDF file).

```
stFeld = oField.Text
If stField = "" Then
   Exit Sub
End If
```

If the field is empty, the macro exits immediately. During data entry, it often happens that fields are accessed using the mouse, but clicking the field for the purpose of writing into it for the first time should not lead to the macro code being executed.

Now the field is searched for a **'@'** character. This would indicate an email address. The email program should be launched to send mail to this address.

```
If InStr(stField,"@") Then
   stField = "mailto:"+stField
```

If there is no **'@'**, the term is converted into a URL. If this starts with **'http://'**, we are not dealing with a file in the local filesystem but with an Internet resource that must be looked up with a web browser. Otherwise the path will begin with the term **'file:///'**.

```
Else
   stFeld = convertToUrl(stField)
End If
```

Now the program assigned by the operating system to such files is searched for. For the keyword **'mailto:'** this is the mail program, for **'http://'** the browser, and otherwise the system must decide using the filename suffix.

```
   oShell = createUnoService("com.sun.star.system.SystemShellExecute")
   oShell.execute(stField,,0)
End Sub
```

Calling a mail program with predefined content

The previous example can be extended to launch a mail program with a predefined subject and content.

For this section see also the example database `Example_Mail_File_activate.odb`.

The mail program is launched using **'mailto:recipient?subject= &body= &cc= &bcc= '**. The last two entries are not present in the form. Attachments are not provided for in the definition of **'mailto'** but sometimes **'attachment='** works .

```
Sub Mai*l_activate
   Dim oDoc As Object
   Dim oDrawpage As Object
   Dim oForm As Object
   Dim oField1 As Object
   Dim oField2 As Object
   Dim oField3 As Object
   Dim oField4 As Object
   Dim oShell As Object
   Dim stField1 As String
   Dim stField2 As String
   Dim stField3 As String
   Dim stField4 As String
   oDoc = thisComponent
   oDrawpage = oDoc.Drawpage
   oForm = oDrawpage.Forms.getByName("form")
   oField1 = oForm.getByName("mail_to")
   oField2 = oForm.getByName("mail_subject")
```

```
    oField3 = oForm.getByName("mail_body")
    stField1 = oField1.Text
    If stField1 = "" Then
       MsgBox "Missing email address." & Chr(13) &
          "Email program would not be activated" , 48, "Send Email"
       Exit Sub
    End If
```

The conversion to URL is necessary to prevent special characters and line breaks from interfering with the call. This does however prefix the term **'file:///'** to the path. These 8 characters at the beginning are not transferred.

```
    stField2 = Mid(ConvertToUrl(oFeld2.Text),9)
    stField3 = Mid(ConvertToUrl(oFeld3.Text),9)
```

In contrast to a simple program launch, the details of the mail invocation are given here as part of the execute call.

```
    oShell = createUnoService("com.sun.star.system.SystemShellExecute")
    oShell.execute("mailto:" + stField1 + "?subject=" + stField2 + "&body=" +
stField3,,0)
End Sub
```

Note

Sending email with the help of a mail program can also be done using the following code, but the actual content of the email cannot be inserted this way.

```
Dim attachs(0)
oMailer = createUnoService("com.sun.star.system.SimpleSystemMail")
oMailProgramm = oMailer.querySimpleMailClient()
oNewmessage = oMailProgramm.createSimpleMailMessage()
oNeemessage.setRecipient(stField1)
oNewmessage.setSubject(stField2)
attachs(0) = "file:///..."
oNeueNachricht.setAttachement(attachs())
oMailprogramm.sendSimpleMailMessage(oNeuenachricht, 0 )
```

For possible parameters, see:
http://api.libreoffice.org/docs/idl/ref/interfacecom_1_1sun_1_1star_1_1system_1_1XSimpleMailMessage.html

Changing the mouse pointer when traversing a link

This is normal on the Internet and Base recreates it: the mouse pointer traverses a link and changes into a pointing hand. The link text might also change its properties, becoming blue and underlined. The resemblance to an Internet link is perfect. Any user will expect a click to open an external program.

For this section see the example database `Example_Mail_File_activate.odb`.

This short procedure should be bound to the textbox's **'Mouse inside'** event

```
Sub Mouse_pointer(Event As Object)
    REM See also Standardlibraries: Tools → ModuleControls → SwitchMousePointer
    Dim oPointer As Object
    oPointer = createUnoService("com.sun.star.awt.Pointer")
    oPointer.setType(27)'Types see com.sun.star.awt.SystemPointer
    Event.Source.Peer.SetPointer(oPointer)
End Sub
```

Showing forms without a toolbar

New Base users are often irritated that a toolbar exists but is not usable within a form. These toolbars can be removed in various ways. The best ways in all LibreOffice versions are the two described below.

Window sizes and toolbars are usually controlled by a macro that is launched from a form document using **Tools > Customize > Events > Open Document**. This refers to the whole document, not an individual main or subform.

Forms without a toolbar in the window

The size of a window can be varied. Using the appropriate button it can also be closed. These tasks are carried out by your system's window manager. The position and size of a window on the screen can be supplied by a macro when the program starts.

```
Sub Hide_toolbar
   Dim oFrame As Object
   Dim oWin As Object
   Dim oLayoutMng As Object
   Dim aElements()
   oFrame = StarDesktop.getCurrentFrame()
```

The form title is to be shown in the window's title bar.

```
   oFrame.setTitle "My Form"
   oWin = oFrame.getContainerWindow()
```

The window is maximized. This is not the same thing as full-screen mode, since the taskbar is still visible and the window has a title bar, which can be used to change its size or close it..

```
   oWin.IsMaximized = true
```

It is possible to create a window with a specific size and position. This is carried out with **`'oWin.setPosSize(0,0,600,400,15)'`**. Here the window appears at the top left corner of the screen with a width of 600 pixels and a height of 400. The last number indicates that all pixels are given. It is called **`'Flag'`**. **`'Flag'`** is calculated from the sum of the following values: x=1, y=2, breadth=4, height=8. As x, y, breadth and height are all given, **`'Flag'`** has the size 1+2+4+8=15.

```
   oLayoutMng = oFrame.LayoutManager
   aElements = oLayoutMng.getElements()
   For i = LBound(aElements) To UBound(aElements)
      If aElements(i).ResourceURL =
         "private:resource/toolbar/formsnavigationbar" Then
      Else
         oLayoutMng.hideElement(aElements(i).ResourceURL)
      End If
   Next
End Sub
```

In the case of a form navigation bar, nothing is to be done. The form must after all remain usable in cases where a navigation bar control has not been built in (which would cause the navigation bar to be hidden anyway). Only toolbars other than the navigation bar should be hidden. For this reason there is no action for this case.

If the toolbars are not restored directly after leaving the form, they will still be hidden. They can of course be restored using **View > Toolbars**. But it would be rather annoying if the standard toolbar (**View > Toolbars > Standard**) or the status bar (**View > Status Bar**) was missing.

This procedure restores (**`'showElement'`**) the toolbars from their hidden state (**`'hideElement'`**). The comments contain the bars whose absence is most likely to be noticed.

```
Sub Show_toolbar
   Dim oFrame As Object
   Dim oLayoutMng As Object
```

```
    Dim aElements()
    oFrame = StarDesktop.getCurrentFrame()
    oLayoutMng = oFrame.LayoutManager
    aElements = oLayoutMng.getElements()
    For i = LBound(aElements) To UBound(aElements)
       oLayoutMng.showElement(aElements(i).ResourceURL)
    Next
    ' important elements which may be absent:
    '  "private:resource/toolbar/standardbar"
    '  "private:resource/statusbar/statusbar"
End Sub
```

The macros are bound to: **Tools > Customize > Events > Open Document > Hide_toolbar** and **Close Document > Show_toolbar**.

Unfortunately the toolbars often fail to come back. In the worst cases, it can be helpful not to read out those elements that the layout manager already knows, but first to create particular toolbars and then show them:

```
Sub Hide_toolbar
    Dim oFrame As Object
    Dim oLayoutMng As Object
    Dim i As Integer
    Dim aElements(5) As String
    oFrame = StarDesktop.getCurrentFrame()
    oLayoutMng = oFrame.LayoutManager
    aElements(0) = "private:resource/menubar/menubar"
    aElements(1) = "private:resource/statusbar/statusbar"
    aElements(2) = "private:resource/toolbar/formsnavigationbar"
    aElements(3) = "private:resource/toolbar/standardbar"
    aElements(4) = "private:resource/toolbar/formdesign"
    aElements(5) = "private:resource/toolbar/formcontrols"
    For Each i In aElemente()
       IF Not(oLayoutMng.requestElement(i)) Then
          oLayoutMng.createElement(i)
       End If
    oLayoutMng.showElement(i)
    Next i
End Sub
```

The toolbars that are to be created are named explicitly. If a corresponding toolbar is not available to the layout manager, it is created using **`createElement`** and then displayed using **`showElement`**.

Forms in full-screen mode

In full-screen mode, the whole screen is covered by the form. There is no taskbar or other elements which might show if other programs are running.

```
Function Fullscreen(boSwitch As Boolean)
    Dim oDispatcher As Object
    Dim Props(0) As New com.sun.star.beans.PropertyValue
    oDispatcher = createUnoService("com.sun.star.frame.DispatchHelper")
    Props(0).Name = "FullScreen"
    Props(0).Value = boSwitch
    oDispatcher.executeDispatch(ThisComponent.CurrentController.Frame,
       ".uno:FullScreen", "", 0, Props())
End Function
```

This function is launched using the following procedure. In the procedure, the previous procedure also runs simultaneously to remove the toolbars – otherwise the toolbar will appear and the full-screen mode can be switched off using it. This is also a toolbar, although it has only one symbol.

```
Sub Fullscreen_on
```

```
    Fullscreen(true)
    Hide_toolbar
End Sub
```

You exit from full-screen mode by pressing the **'ESC'** key. If instead, a specific button is to be used for this command, the following line can be used:

```
Sub Fullscreen_off
    Fullscreen(false)
    Show_toolbar
End Sub
```

Launching forms directly from the opening of the database

When the toolbars are gone or a form is to be shown in full-screen mode, the database file must launch the form directly when it opens. Unfortunately a simple command to open a form will not work, as the database connection does not yet exist when the file is opened.

The following macro is launched from **Tools > Customize > Events > Open Document**. Use the option **Save in > Databasefile.odb**.

```
Sub Form_Directstart
    Dim oDatasource As Object
    oDatasource = ThisDatabaseDocument.CurrentController
    If Not (oDatasource.isConnected()) Then
        oDatasource.connect()
    End If
    ThisDatabaseDocument.FormDocuments.getByName("Formname").open
End Sub
```

First a connection to the database must be made. The controller is part of **`ThisDatabaseDocument`**, just as the form is. Then the form can be launched and can read its data out of the database.

Accessing a MySQL database with macros

All the macros shown up to now have been part of an internal HSQLDB database. When working with external databases, a few changes and extensions are necessary.

MySQL code in macros

When the internal database is being accessed, tables and fields must be enclosed in duplicate double quotes, compared with the SQL:

```
SELECT "Field" FROM "Table"
```

As these SQL commands must be prepared inside macros, the double quotes must be masked:

```
stSQL = "SELECT ""Field"" FROM ""Table"""
```

MySQL queries use a different form of masking:

```
SELECT `Field` FROM `Database`.`Table`
```

Inside the macro code, this form of masking appears as:

```
stSql = "SELECT `Field` FROM `Database`.`Table`"
```

Temporary tables as individual intermediate storage

In the previous chapter, a one-line table was frequently used for searching or filtering tables. This will not work in a multi-user system, as other users would then be dependent on someone else's filter value. Temporary tables in MySQL are only accessible to the user of the active connection, so these tables can be accessed for searching and filtering.

Naturally such tables cannot be created in advance. They must be created when the Base file is opened. Therefore the following macro should be bound to the opening of the *.odb file.

```
Sub CreateTempTable
    oDatasource = thisDatabaseDocument.CurrentController
    If Not (oDatasource.isConnected()) Then oDatasource.connect()
    oConnection = oDatasource.ActiveConnection()
    oSQL_Statement = oConnection.createStatement()
    stSql = "CREATE TEMPORARY TABLE IF NOT EXISTS `Searchtmp` (`ID` INT PRIMARY KEY,
        `Name` VARCHAR(50))"
    oSQL_Statement.executeUpdate(stSql)
End Sub
```

When the *.odb file is first opened, there is no connection to an external MySQL database. The connection must be created. Then a temporary table with the necessary fields can be set up.

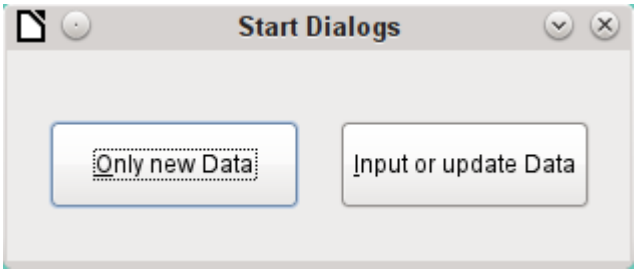
Dialogs

In Base you can use dialogs rather than forms for data entry, data modification, or database maintenance. Dialogs can be directly customized for the current application environment, but naturally they are not as comfortably defined in advance as forms are. Here is a short introduction ending in a quite complicated example for use in database maintenance.

Launching and ending dialogs

First the dialog must be created on the appropriate computer. This is done using **Tools > Macros > Organize Dialogs > Database filename > Standard > New**. The dialog apears with a continuous gray surface and a titlebar with a close icon. This empty dialog can now be called up and then closed again.

When the dialog is clicked, there is a possibility under general properties to set a size and position. Also the content of the title Start Dialogs can be entered.



The toolbar at the bottom edge of the window contains various form controls. From this, two buttons have been selected for our dialog, allowing it to launch other dialogs. The editing of content and the binding of macros to events is carried out in the same way as for buttons in forms.

The positioning of variable declarations for dialogs requires special care. The dialog is declared as a global variable so that it can be accessed by different procedures. In this case, the dialog is called oDialog0 because there will be further dialogs with higher sequence numbers.

```
Dim oDialog0 As Object
```

First the library for the dialog is loaded. It is in the Standard directory, if no other name was chosen when the dialog was created. The dialog itself can be reached in this library by using the name Dialog0. **`Execute()`** launches the dialog.

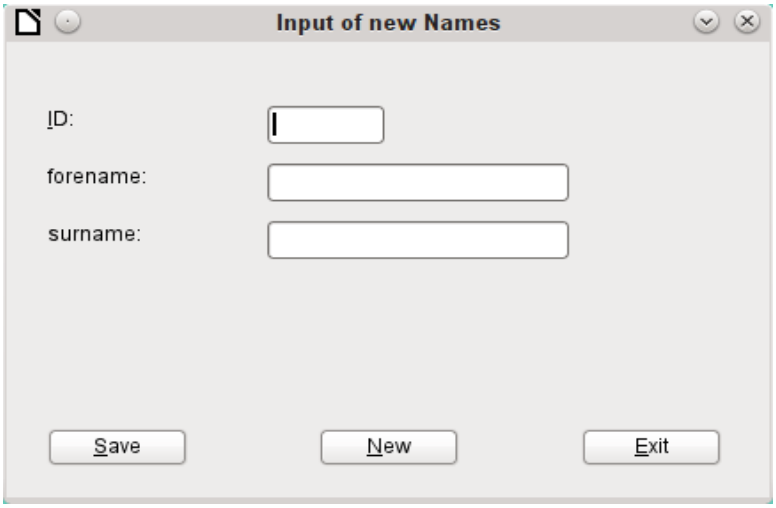
```
Sub Dialog0Start
    DialogLibraries.LoadLibrary("Standard")
    oDialog0 = createUnoDialog(DialogLibraries.Standard.Dialog0)
    oDialog0.Execute()
End Sub
```

In principle, a dialog can be closed using the Close button on the frame. However, if you want another specific button for this, the command **`EndExecute()`** should be used within the procedure.

```
Sub Dialog0Ende
   oDialog0.EndExecute()
End Sub
```

Within this framework, any number of dialogs can be launched and closed again.

Simple dialog for entering new records



This dialog is a first step for the following dialog for editing records. First the basic approach to managing tables is clarified. Here we are dealing with the storage of records with new primary keys or the complete new entry of records. How far a little dialog like this can suffice for input into a particular database depends on the requirements of the user.

```
Dim oDialog1 As Object
```

directly creates a global variable for the dialog at the top level of the module before all procedures.

The dialog is opened and closed in the same way as for the previous dialog. Only the name is changed from Dialog0 to Dialog1. The procedure for closing the dialog is bound to the Exit button.

The New button is used to clear all controls in the dialog from earlier entries, using the DatafieldsClear procedure.

```
Sub DatafieldsClear
   oDialog1.getControl("NumericField1").Text = ""
   oDialog1.getControl("TextField1").Text = ""
   oDialog1.getControl("TextField2").Text = ""
End Sub
```

Each control that has been inserted into a dialog is accessible by name. The user interface will ensure that names are not duplicated, which is not the case with controls in a form.

The **`getControl`** method is used with the name of the control. Numeric fields too have a **`Text`** property which can be used here. That is the only way a numeric field can be emptied. Empty text exists but there is no such thing as an empty number. Instead a 0 must be written in the primary key field.

The **Save** button launches the Data1Save procedure:

```
Sub Data1Save
   Dim oDatasource As Object
   Dim oConnection As Object
   Dim oSQL_Command As Object
   Dim loID As Long
```

```
    Dim stForename As String
    Dim stSurname As String
    loID = oDialog1.getControl("NumericField1").Value
    stForename = oDialog1.getControl("TextField1").Text
    stSurname = oDialog1.getControl("TextField2").Text
    If loID > 0 And stSurname <> "" Then
       oDatasource = thisDatabaseDocument.CurrentController
       If Not (oDatasource.isConnected()) Then
          oDatasource.connect()
       End If
       oConnection = oDatasource.ActiveConnection()
       oSQL_Command = oConnection.createStatement()
       stSql = "SELECT ""ID"" FROM ""name"" WHERE ""ID"" = '"+loID+"'"
       oResult = oSQL_Command.executeQuery(stSql)
       While oResult.next
          MsgBox ("The value for field 'ID' already exist",16,
             "Duplicate Value")
          Exit Sub
       Wend
       stSql = "INSERT INTO ""name"" (""ID"", ""forename"", ""surname"")
          VALUES ('"+loID+"','"+stForename+"','"+stSurname+"')"
       oSQL_Command.executeUpdate(stSql)
       DatafieldsClear
    End If
End Sub
```

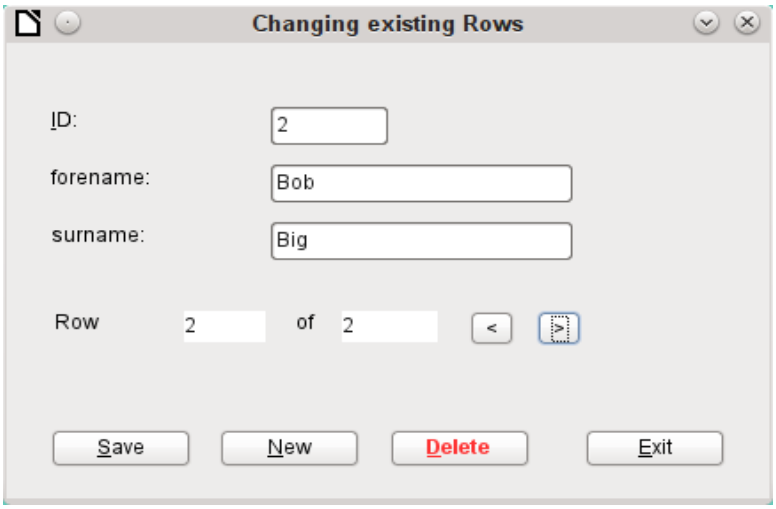
As in the DatafieldsClear procedure, the entry fields are accessed. This time the access is for reading only. Only if the ID field has an entry greater than 0 and the Surname field also contains text will the record be passed on. A null value for the ID can be excluded because a numeric variable for integer numbers is always initialized to 0. An empty field is therefore stored with a zero value.

If both fields have been supplied with content, a connection is made to the database. As the controls are not in a form, the database connection must be made using **`thisDatabaseDocument.CurrentController`**.

First the database is queried to see if a record with the given primary key already exists. If this query produces a result, a message box appears containing a Stop symbol (code: **16**) and the message “Duplicate record entry”. Then the procedure exits with **`Exit SUB`**.

If the query finds no record with the same primary key, the new record is inserted into the database using the insert command. Then the DatafieldsClear procedure is called to provide a new empty form.

Dialog for editing records in a table



This dialog clearly offers more possibilities than the previous one. Here all records can be displayed and you can navigate through them, create new ones or delete records. Naturally the code is much more complicated.

The Exit button is bound to the procedure, modified for Dialog2, which was described in the previous dialog for entering new records. Here the remaining buttons and their functions are described.

Data entry in the dialog is restricted in that the ID field must have a minimum value of 1. This limitation has to do with the handling of variables in Basic: numeric variables are by definition initialized to 0. Therefore if numeric values from empty fields and those from fields containing 0 are read out, Basic can detect no difference between them. This means that if a 0 were to be used in the ID field, it would have to be read first as text and perhaps converted to a number later.

The dialog is loaded under the same conditions as before. However the loading procedure is made dependent on a zero value for the variable passed by the DataLoad procedure.

```
Sub DataLoad(loID As Long)
   Dim oDatasource As Object
   Dim oConnection As Object
   Dim oSQL_Command As Object
   Dim stForename As String
   Dim stSurname As String
   Dim loRow As Long
   Dim loRowMax As Long
   Dim inStart As Integer
   oDatasource = thisDatabaseDocument.CurrentController
   If Not (oDatasource.isConnected()) Then
      oDatasource.connect()
   End If
   oConnection = oDatasource.ActiveConnection()
   oSQL_Command = oConnection.createStatement()
   If loID < 1 Then
      stSql = "SELECT MIN(""ID"") FROM ""name"""
      oResult = oSQL_Command.executeQuery(stSql)
      While oResult.next
         loID = oResult.getInt(1)
      Wend
      inStart = 1
   End If
```

The variables are declared. The database connection for the dialog is established as described above. At the beginning, **`loID`** is **`0`**. This case provides the lowest primary key value allowed by

SQL. The corresponding record will later be displayed in the dialog. At the same time the **inStart** variable is set to 1, so that the dialog can be launched later. If the table does not contain any records, **loID** will remain **0**. In that case, there will be no need to search for the number and contents of any corresponding records.

Only if **loID** is greater than 0 will a query test to see which records are available in the database. Then a second query will count all records that are to be displayed. The third query gives the position of the current record by counting all records with the current primary key or less.

```
        If loID > 0 Then
            stSql = "SELECT * FROM ""name"" WHERE ""ID"" = '"+loID+"'"
            oResult = oSQL_Command.executeQuery(stSql)
            While oResult.next
                loID = oResult.getInt(1)
                stForename = oResult.getString(2)
                stSurname = oResult.getString(3)
            Wend
            stSql = "SELECT COUNT(""ID"") FROM ""name"""
            oResult = oSQL_Command.executeQuery(stSql)
            While oResult.next
                loRowMax = oResult.getInt(1)
            Wend
            stSql = "SELECT COUNT(""ID"") FROM ""name"" WHERE ""ID"" <= '"+loID+"'"
            oResult = oSQL_Command.executeQuery(stSql)
            While oResult.next
                loRow = oResult.getInt(1)
            Wend
            oDialog2.getControl("NumericField1").Value = loID
            oDialog2.getControl("TextField1").Text = stForename
            oDialog2.getControl("TextField2").Text = stSurname
        End If
        oDialog2.getControl("NumericField2").Value = loRow
        oDialog2.getControl("NumericField3").Value = loRowMax
        If loRow = 1 Then
            ' previous Row
            oDialog2.getControl("CommandButton4").Model.enabled = False
        Else
            oDialog2.getControl("CommandButton4").Model.enabled = True
        End If
        If loRow <= loRowMax Then
            ' next Row | new Row | delete
            oDialog2.getControl("CommandButton5").Model.enabled = True
            oDialog2.getControl("CommandButton2").Model.enabled = True
            oDialog2.getControl("CommandButton6").Model.enabled = True
        Else
            oDialog2.getControl("CommandButton5").Model.enabled = False
            oDialog2.getControl("CommandButton2").Model.enabled = False
            oDialog2.getControl("CommandButton6").Model.enabled = False
        End If
        IF inStart = 1 Then
            oDialog2.Execute()
        End If
    End Sub
```

The retrieved values are transferred to the dialog fields. The entries for the current record number and the total number of records retrieved are always written in, replacing the default numeric value of 0.

The navigation buttons (CommandButton5 and CommandButton4) are only usable when it is possible to reach the corresponding record. Otherwise they are temporarily deactivated with **enabled = False**. The same is true for the New and Delete buttons. They should not be available when the number of the displayed row is higher than the maximum number of rows that was determined. This is the default setting of this dialog when entering records.

If possible, the dialog should only be launched when it is to be created directly from a starting file using **`DataLoad(0)`**. That is why the special variable **`inStart`** is given the value 1 at the beginning of the procedure.

The < button is used to navigate to the previous record. Therefore this button is active only when the record displayed is not the first in the list. Navigation requires the primary key for the current record to be read from the field NumericField1.

Here there are two possible cases:

1) You are moving forward to a new entry, so the corresponding field has no value. In this case, **`loID`** has the default value which, according to the definition of an integer variable, is 0.
2) Otherwise **`loID`** will contain a value that is greater than 0. Then a query can determine the ID value directly below the current one.

```
Sub PreviousRow
    Dim loID As Long
    Dim loIDnew As Long
    loID = oDialog2.getControl("NumericField1").Value
    oDatasource = thisDatabaseDocument.CurrentController
    If Not (oDatasource.isConnected()) Then
        oDatasource.connect()
    End If
    oConnection = oDatasource.ActiveConnection()
    oSQL_Command = oConnection.createStatement()
    If loID < 1 Then
        stSql = "SELECT MAX(""ID"") FROM ""name"""
    Else
        stSql = "SELECT MAX(""ID"") FROM ""name"" WHERE ""ID"" < '"+loID+"'"
    End If
    oResult = oSQL_Command.executeQuery(stSql)
    While oResult.next
        loIDnew = oResult.getInt(1)
    Wend
    If loIDnew > 0 Then
        DataLoad(loIDnew)
    End If
End Sub
```

If the ID field is empty, the display should change to the highest value of the primary key number. If, on the other hand, the ID field refers to a record, the previous value of ID should be returned.

The result of this query is used to run the DataLoad procedure again with the corresponding key value.

The > button is used to navigate to the next record. This possibility should exist only when the dialog has not been emptied for the entry of a new record. This will naturally be the case when the dialog is launched and also with an empty table.

A value in NumericField1 is mandatory. Starting from this value, SQL can determine which primary key is the next highest in the table. If the query's result set is empty because there is no corresponding record, the value for **`loIDnew = 0`**. Otherwise the content of the next record is read using DataLoad.

```
Sub NextRow
    Dim loID As Long
    Dim loIDnew As Long
    loID = oDialog2.getControl("NumericField1").Value
    oDatasource = thisDatabaseDocument.CurrentController
    If Not (oDatasource.isConnected()) Then
        oDatasource.connect()
    End If
    oConnection = oDatasource.ActiveConnection()
    oSQL_Command = oConnection.createStatement()
```

```
    stSql = "SELECT MIN(""ID"") FROM ""name"" WHERE ""ID"" > '"+loID+"'"
    oResult = oSQL_Command.executeQuery(stSql)
    While oResult.next
       loIDnew = oResult.getInt(1)
    Wend
    If loIDnew > 0 Then
       DataLoad(loIDnew)
    Else
       Datafields2Clear
    End If
End Sub
```

If when navigating to the next record, there is no further record, the navigation key launches the following procedure Datafields2Clear, which serves to prepare for the input of a new record.

The Datafields2Clear procedure does not just empty the data fields themselves. The position of the current record is set to one higher than the maximum record number, making it clear that the record currently being worked on is not yet included in the database.

As soon as Datafields2Clear has been launched, the possibility of jumping to the previous record is activated, Jumps to a following record, and the use of the procedures for New and Delete are deactivated.

```
Sub Datafields2Clear
    loRowMax = oDialog2.getControl("NumericField3").Value
    oDialog2.getControl("NumericField1").Text = ""
    oDialog2.getControl("TextField1").Text = ""
    oDialog2.getControl("TextField2").Text = ""
    oDialog2.getControl("NumericField2").Value = loRowMax + 1
    oDialog2.getControl("CommandButton4").Model.enabled = True  ' Previous record
    oDialog2.getControl("CommandButton5").Model.enabled = False ' Next record
    oDialog2.getControl("CommandButton2").Model.enabled = False ' New record
    oDialog2.getControl("CommandButton6").Model.enabled = False ' Delete
End Sub
```

Saving records should only be possible when the ID and Surname fields contain entries. If this condition is met, the procedure tests whether this is a new record. This makes use of the record pointer which is set for new records to be one higher than the maximum number of records

For new records, checks are made to ensure that the save operation will be successful. If the number used for the primary key has been used before, a warning is displayed. If the associated question is answered with Yes, the existing record with this number is overwritten. Otherwise, the save will be aborted. If there are no existing entries in the database (**`loRowMax = 0`**), this test is unnecessary and the new record can be saved directly. For a new record, the number of records is incremented by 1 and the entries are cleared for the next record.

Existing records are simply overwritten with an update command.

```
Sub Data2Save(oEvent As Object)
    Dim oDatasource As Object
    Dim oConnection As Object
    Dim oSQL_Command As Object
    Dim oDlg As Object
    Dim loID As Long
    Dim stForename As String
    Dim stSurname As String
    Dim inMsg As Integer
    Dim loRow As Long
    Dim loRowMax As Long
    Dim stSql As String
    oDlg = oEvent.Source.getContext()
    loID = oDlg.getControl("NumericField1").Value
    stForename = oDlg.getControl("TextField1").Text
    stSurname = oDlg.getControl("TextField2").Text
    If loID > 0 And stSurname <> "" Then
       oDatasource = thisDatabaseDocument.CurrentController
```

```
        If Not (oDatasource.isConnected()) Then
            oDatasource.connect()
        End If
        oConnection = oDatasource.ActiveConnection()
        oSQL_Command = oConnection.createStatement()
        loRow = oDlg.getControl("NumericField2").Value
        loRowMax = oDlg.getControl("NumericField3").Value
        If loRowMax < loRow Then
            If loRowMax > 0 Then
                stSql = "SELECT ""ID"" FROM ""name"" WHERE ""ID"" = '"+loID+"'"
                oResult = oSQL_Command.executeQuery(stSql)
                While oResult.next
                    inMsg = MsgBox ("The value for field 'ID' already exist." &
                        CHR(13) & "Should the row be updated?",20,
                        "Duplicate Value")
                    If inMsg = 6 Then
                        stSql = "UPDATE ""name"" SET ""forename""='"+stForename+"',
                            ""surname""='"+stSurname+"' WHERE ""ID"" = '"+loID+"'"
                        oSQL_Command.executeUpdate(stSql)
                        DataLoad(loID)   ' With update a row has been rewritten. Rowcount
                            must be resetted
                    End If
                    Exit Sub
                Wend
            End If
            stSql = "INSERT INTO ""name"" (""ID"", ""forename"", ""surname"") VALUES
                ('"+loID+"','"+stForename+"','"+stSurname+"')"
            oSQL_Command.executeUpdate(stSql)
            oDlg.getControl("NumericField3").Value = loRowMax + 1
                ' After instert one row is added
            Datafields2Clear
                ' After insert would be moved to next insert
        Else
            stSql = "UPDATE ""name"" SET ""forename""='"+stForename+"',
                ""surname""='"+stSurname+"' WHERE ""ID"" = '"+loID+"'"
            oSQL_Command.executeUpdate(stSql)
        End If
    End If
End Sub
```

The delete procedure is provided with a supplementary question to prevent accidental deletions. Since this button is deactivated when the entry fields are empty, an empty NumericField1 should never occur. Therefore the check condition **`IF loID > 0`** can be omitted.

Deletion causes the number of records to be decremented by 1. This must be corrected using **`loRowMax - 1`**. Then the record following the current one is displayed.

```
Sub DataDelete(oEvent As Object)
    Dim oDatasource As Object
    Dim oConnection As Object
    Dim oSQL_Command As Object
    Dim oDlg As Object
    Dim loID As Long
    oDlg = oEvent.Source.getContext()
    loID = oDlg.getControl("NumericField1").Value
    If loID > 0 Then
        inMsg = MsgBox ("Should current data be deleted?",20,
            "Delete current row")
        If inMsg = 6 Then
            oDatasource = thisDatabaseDocument.CurrentController
            If Not (oDatasource.isConnected()) Then
                oDatasource.connect()
            End If
            oConnection = oDatasource.ActiveConnection()
            oSQL_Command = oConnection.createStatement()
            stSql = "DELETE FROM ""name"" WHERE ""ID"" = '"+loID+"'"
            oSQL_Command.executeUpdate(stSql)
            loRowMax = oDlg.getControl("NumericField3").Value
```

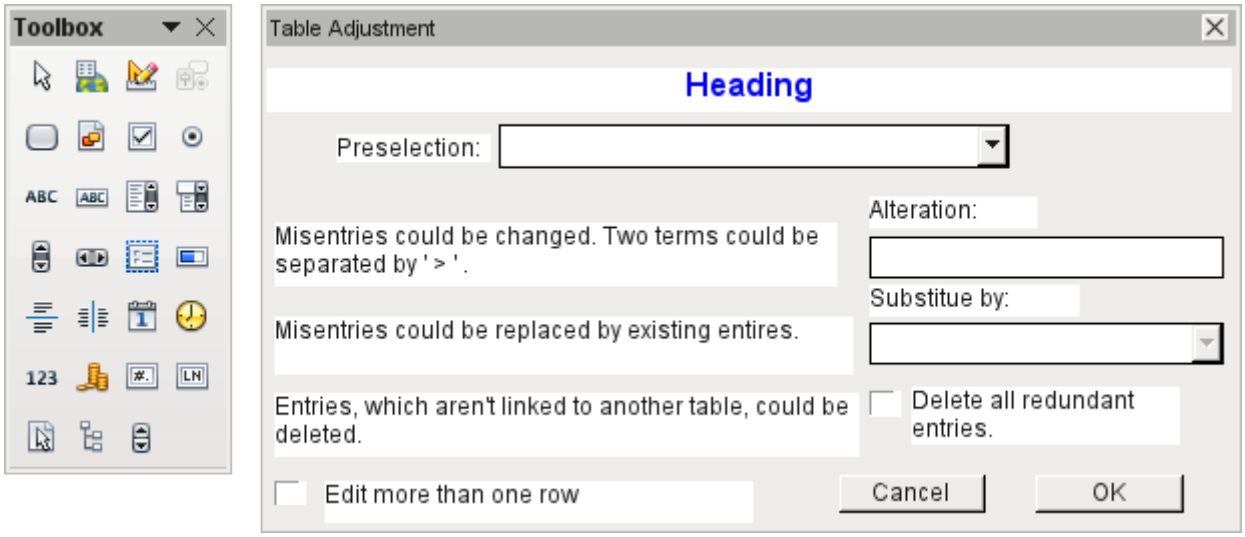
```
            oDlg.getControl("NumericField3").Value = loRowMax - 1
            NextRow
        End If
    ELSE
        MsgBox ("No row deleted." & CHR(13) &
            "No data selected.",64,"Delete impossible")
    End If
End Sub
```

This little dialog has shown that the use of macro code can provide a basis for processing records. Access via forms is much easier, but a dialog can be very flexible in adapting to the requirements of the program. However it is not suitable for the quick creation of a database interface.

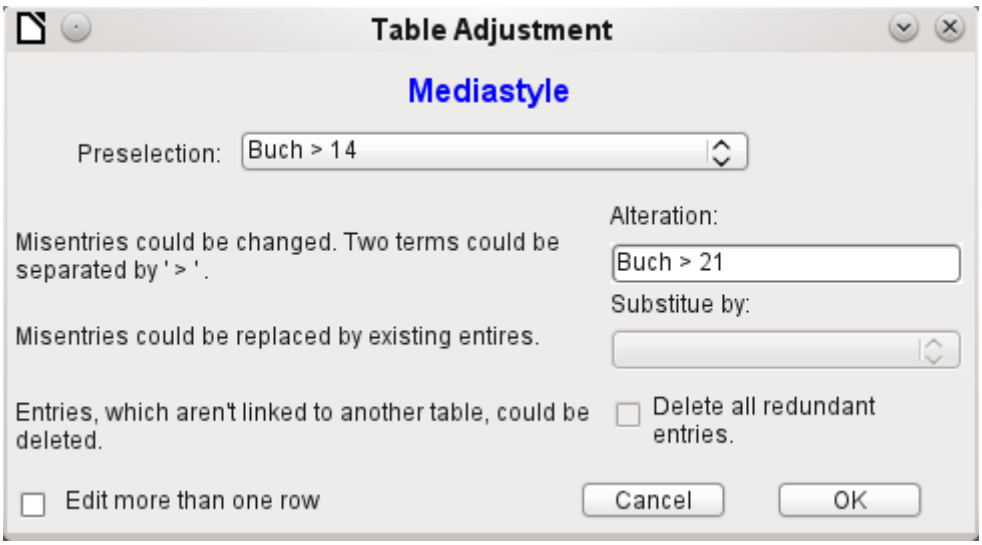
Using a dialog to clean up bad entries in tables

Input errors in fields are often only noticed later. Often it is necessary to modify identical entries in several records at the same time. It is awkward to have to do this in normal table view, especially when several records must be edited, as each record requires an individual entry to be made.

Forms can use macros to do this kind of thing, but to do it for several tables, you would need identically constructed forms. Dialogs can do the job. A dialog can be supplied at the beginning with the necessary data for appropriate tables and can be called up by several different forms.



Dialogs are saved along with the modules for macros. Their creation is similar to that of a form. Very similar control fields are available. Only the table control of forms is absent as a special entry possibility.



The appearance of dialog controls is determined by the settings for the graphical user interface.

The dialog shown above serves in the example database to edit tables which are not used directly as the basis of a form. So, for example, the media type is accessible only through a listbox (in the macro version it becomes a combobox). In the macro version, the field contents can be expanded by new content but an alteration of existing content is not possible. In the version without macros, alterations are carried out using a separate table control.

While alterations in this case are easy to carry out without macros, it is quite difficult to change the media type of many media at once. Suppose the following types are available: "Book, bound", "Book, hard-cover", "Paperback", and "Ringfile". Now it turns out, after the database has been in use for a long time, that more active contemporaries foresaw similar additional media types for printed works. The task of differentiating them has become excessive. We therefore wish to reduce them, preferably to a single term. Without macros, the records in the media table would have to be found (using a filter) and individually altered. If you know SQL, you can do it much better using a SQL command. You can change all the records in the Media table with a single entry. A second SQL command then removes the now surplus media types which no longer have any link to the Media table. Precisely this method is applied using this dialog's Replace With box – only the SQL command is first adapted to the Media Type table using a macro that can also edit other tables.

Often entries slip into a table which with hindsight can be changed in the form, and so are no longer needed. It does no harm simply to delete such orphaned entries, but they are quite hard to find using the graphical user interface. Here again a suitable SQL command is useful, coupled with a delete instruction. This command for affected tables is included in the dialog under Delete all superfluous entries.

If the dialog is to be used to carry out several changes, this is indicated by the Edit multiple records checkbox. Then the dialog will not simply terminate when the OK button is clicked.

The macro code for this dialog can be seen in full in the example database. Only excerpts are explained below.

```
Sub Table_purge(oEvent As Object)
```

The macro should be launched by entering into the Additional information section for the relevant buttons:

```
0: Form, 1: Subform, 2: SubSubform, 3: Combobox or table control, 4: Foreign
key field in a form, empty for a table control, 5: Table name of auxiliary
table, 6: Table field1 of auxiliary table, 7: Table field2 of auxiliary
table, or 8: Table name of auxiliary table for table field2
```

The entries in this area are listed at the beginning of the macro as comments. The numbers bound to them are transferred and the relevant entry is read from an array. The macro can edit listboxes, which have two entries, separated by **">"**. These two entries can also come from different tables and be brought together using a query, as for instance in the Postcode table, which has only the foreign key field Town_ID for the town, requiring the Town table to display the names of towns.

```
Dim aForeignTable(0, 0 to 1)
Dim aForeignTable2(0, 0 to 1)
```

Among the variables defined at the beginning are two arrays. While normal arrays can be created by the **`Split()`** command during execution of the subroutine, two-dimensional arrays must be defined in advance. Two-dimensional arrays are necessary to store several records from one query when the query itself refers to more than one field. The two arrays declared above must be able to interpret queries that refer to two table fields. Therefore they are defined for two different contents by using 0 to 1 for the second dimension.

```
stTag = oEvent.Source.Model.Tag
aTable() = Split(stTag, ", ")
For i = LBound(aTable()) To UBound(aTable())
   aTable(i) = trim(aTable(i))
Next
```

The variables provided are read. The sequence is that set up in the comment above. There is a maximum of nine entries, and you need to declare if an eighth entry for the table field2 and a nineth entry for a second table exist.

If values are to be removed from a table, it is first necessary to check that they do not exist as foreign keys in some other table. In simple table structures a given table will have only one foreign key connection to another table. However, in the given example database, there is a Town table which is used for both the place of publication of media and the town for addresses. Thus the primary key of the Town table is entered twice into different tables. These tables and foreign key names can naturally also be entered using the Additional Information field. It would be nicer though if they could be provided universally for all cases. This can be done using the following query.

```
   stSql = "SELECT ""FKTABLE_NAME"", ""FKCOLUMN_NAME"" FROM
""INFORMATION_SCHEMA"".""SYSTEM_CROSSREFERENCE"" WHERE ""PKTABLE_NAME"" = '"
+ aTable(5) + "'"
```

In the database, the INFORMATION_SCHEMA area contains all information about the tables of the database, including information about foreign keys. The tables that contain this information can be accessed using "INFORMATION_SCHEMA"."SYSTEM_CROSSREFERENCE". KTABLE_NAME" gives the table that provides its primary key for the connection. FKTABLE_NAME gives the table that uses this primary key as a foreign key. Finally FKCOLUMN_NAME gives the name of the foreign key field.

The table that provides its primary key for use as a foreign key is in the previously created array at position 6. A the count begins with 0, the value is read from the array using **`aTable(5)`**.

```
inCount = 0
stForeignIDTab1Tab2 = "ID"
stForeignIDTab2Tab1 = "ID"
stAuxiltable = aTable(5)
```

Before the reading of the arrays begins, some default values must be set. These are the index for the array in which the values from the auxiliary table will be written, the default primary key if we do not need the foreign key for a second table, and the default auxiliary table, linked to the main table, for postcode and town, the Postcode table.

When two fields are linked for display in a listbox, they can, as described above, come from two different tables. For the display of Postcode and town the query is:

```
SELECT "Postcode"."Postcode" || ' > ' || "Town"."Town" FROM
"Postcode", "Town" WHERE "Postcode"."Town_ID" = "Town"."ID"
```

The table for the first field (Postcode), is linked to the second table by a foreign key. Only the information from these two tables and the Postcode and Town fields is passed to the macro. All primary keys are by default called ID in the example database. The foreign key of Town in Postcode must therefore be determined using the macro.

In the same way the macro must access each table with which the content of the listbox is connected by a foreign key.

```
oQuery_result = oSQL_Statement.executeQuery(stSql)
If Not IsNull(oQuery_result) Then
   While oQuery_result.next
      ReDim Preserve aForeignTable(inCount,0 to 1)
```

The array must be freshly dimensioned each time. In order to preserve the existing contents, they are backed up using (Preserve).

```
      aForeignTables(inCount,0) = oQuery_result.getString(1)
```

Reading the first field with the name of the table which contains the foreign key. The result for the Postcode table is the Address table.

```
      aForeignTables(inCount,1) = oQuery_result.getString(2)
```

Reading the second field with the name of the foreign key field. The result for the Postcode table is the field Postcode_ID in the Address table.

In cases where a call to the subroutine includes the name of a second table, the following loop is run. Only when the name of the second table occurs as the foreign key table for the first table is the default entry changed. In our case this does not occur, as the Town table has no foreign key from the Postcode table. The default entry for the auxiliary table therefore remains Postcode; finally the combination of postcode and town is a basis for the Address table, which contains a foreign key from the Postcode table.

```
            If UBound(aTable()) = 8 Then
               If aTable(8) = aForeignTable(inCount,0) Then
                  stForeignIDTab2Tab1 = aForeignTable(inCount,1)
                  stAuxiltable = aTable(8)
               End If
            End If
            inCount = inCount + 1
```

As further values may need to be read in, the index is incremented to redimension the arrays. Then the loop ends.

```
         Wend
      End If
```

If, when the subroutine is called, a second table name exists, the same query is launched for this table:

```
      If UBound(aTable()) = 8 Then
```

It runs identically except that the loop tests whether perhaps the first table name occurs as a foreign key table name. That is the case here: the Postcode table contains the foreign key Town_ID from the Town table. This foreign key is now assigned to the variable stForeignIDTab1Tab2, so that the relationship between the tables can be defined.

```
            If aTable(5) = aForeignTable2(inCount,0) Then
               stForeignIDTab1Tab2 = aForeignTable2(inCount,1)
            End If
```

After a few further settings to ensure a return to the correct form after running the dialog (determining the line number of the form, so that we can jump back to that line number after a new read), the loop begins, which recreates the dialog when the first action is completed but the dialog is required to be kept open for further actions. The setting for repetition takes place using the corresponding checkbox.

```
      Do
```

Before the dialog is launched, first of all the content of the listboxes is determined. Care must be taken if the listboxes represent two table fields and perhaps even are related to two different tables.

```
         If UBound(aTable()) = 6 Then
```

The listbox relates to only one table and one field, as the argument array ends at Tablefield1 of the auxiliary table.

```
            stSql = "SELECT """ + aTable(6) + """ FROM """ + aTable(5) + """
ORDER BY """ + aTable(6) + """"
         ElseIf UBound(aTable()) = 7 Then
```

The listbox relates to two table fields but only one table, as the argument array ends at Tablefield2 of the auxiliary table.

```
            stSql = "SELECT """ + aTable(6) + """||' > '||""" + aTable(7) + """
FROM """ + aTable(5) + """ ORDER BY """ + aTable(6) + """"
         Else
```

The listbox is based on two table fields from two tables. This query corresponds to the example with the postcode and the town.

```
            stSql = "SELECT """ + aTable(5) + """."""" + aTable(6) + """||' >
'||""" + aTable(8) + """."""" + aTable(7) + """ FROM """ + aTable(5) + """,
""" + aTable(8) + """ WHERE """ + aTable(8) + """."""" + stForeignIDTab2Tab1 +
""" = """ + aTable(5) + """."""" + stForeignIDTab1Tab2 + """ ORDER BY """ +
aTable(6) + """"
         End If
```

Here we have the first evaluation to determine the foreign keys. The variables stForeignIDTab2Tab1 and stForeignIDTab1Tab2 start with the value ID. For stForeignIDTab1Tab2 evaluation of the previous query yields a different value, namely the value of Town_ID. In this way the previous query construction yields exactly the content already formulated for postcode and town – only enhanced by sorting.

Now we must make contact with the listboxes, to supply them with the content returned by the queries. These listboxes do not yet exist, since the dialog itself has not yet been created. This dialog is created first in memory, using the following lines, before it is actually drawn on the screen.

```
         DialogLibraries.LoadLibrary("Standard")
         oDlg = CreateUnoDialog(DialogLibraries.Standard.Dialog_Table_purge)
```

Next come the settings for the fields of the dialog. Here, for example, is the listbox which is to be supplied with the results of the above query:

```
         oCtlList1 = oDlg.GetControl("ListBox1")
         oCtlList1.addItems(aContent(),0)
```

Access to the fields of the dialog is accomplished by using **`GetControl`** with the appropriate name. In dialogs it is not possible for two fields to use the same name as this would create problems when evaluating the dialog.

The listbox is supplied with the contents of the query, which have been stored in the array aContent() . The listbox contains only the content to be displayed as a field, so only the position 0 is filled.

After all fields with the desired content have been filled, the dialog is launched.

```
         Select Case oDlg.Execute()
         Case 1 'Case 1 means the "OK" button has been clicked
         Case 0 'If it was the "Cancel" button
            inRepetition = 0
         End Select
      Loop While inRepetition = 1
```

The dialog runs repeatedly as long as the value of "inRepetition" is 1. This is set by the corresponding checkbox.

Here, in brief, is the content after the "OK" button is clicked:

```
      Case 1
         stInhalt1 = oCtlList1.getSelectedItem() 'Read value from Listbox1 ...
         REM ... and determine the corresponding ID-value.
```

The ID value of the first listbox is stored in the variable "inLB1".

```
         stText = oCtlText.Text  ' Read the field value.
```

If the text field is not empty, the entry in the text field is handled. Neither the listbox for a replacement value nor the checkbox for deleting all orphaned records are considered. This is made clear by the fact that text entry sets these other fields to be inactive.

```
         If stText <> "" Then
```

If the text field is not empty, the new value is written in place of the old one using the previously read ID field in the table. There is the possibility of two entries, as is also the case in the listbox. The separator is >. For two entries in different tables, two UPDATE-commands must be launched, which are created here simultaneously and forwarded, separated by a semicolon.

```
         ElseIf oCtlList2.getSelectedItem() <> "" Then
```

If the text field is empty and the listbox 2 contains a value, the value from listbox 1 must be replaced by the value in listbox 2. This means that all records in the tables for which the records in the listboxes are foreign keys must be checked and, if necessary, written with an altered foreign key.

```
stInhalt2 = oCtlList2.getSelectedItem()
REM Read value from listbox.
REM Determine ID for the value of the listbox.
```

The ID value of the second listbox is stored in the variable inLB2. Here too, things develop differently depending on whether one or two fields are contained in the listbox, and also on whether one or two tables are the basis of the listbox content.

The replacement process depends on which table is defined as the table which supplies the foreign key for the main table. For the obove example, this is the Postcode table, as the Postcode_ID is the foreign key which is forwarded through Listbox 1 and Listbox 2.

```
If stAuxilTable = aTable(5) Then
   For i = LBound(aForeignTables()) To UBound(aForeignTables())
```

Replacing the old ID value by the new ID value becomes problematic in n:m-relationships, as in such cases, the same value can be assigned twice. That might be what you want, but it must be prevented when the foreign key forms part of the primary key. So in the table rel_Media_Author a medium cannot have the same author twice because the primary key is constructed from Media_ID and Author_ID. In the query, all key fields are searched which collectively have the property UNIQUE or were defined as foreign keys with the UNIQUE property using an index.

So if the foreign key has the UNIQUE property and is already represented there with the desired future inLB2, that key cannot be replaced.

```
stSql = "SELECT ""COLUMN_NAME"" FROM
""INFORMATION_SCHEMA"".""SYSTEM_INDEXINFO"" WHERE ""TABLE_NAME"" = '" +
aForeignTables(i,0) + "' AND ""NON_UNIQUE"" = False AND ""INDEX_NAME"" =
(SELECT ""INDEX_NAME"" FROM ""INFORMATION_SCHEMA"".""SYSTEM_INDEXINFO"" WHERE
""TABLE_NAME"" = '" + aForeignTables(i,0) + "' AND ""COLUMN_NAME"" = '" +
aForeignTables(i,1) + "')"
```

' "NON_UNIQUE" = False ' gives the names of columns that are UNIQUE. However not all column names are needed but only those which form an index with the foreign key field. This is handled by the Subselect with the same table names (which contain the foreign key) and the names of the foreign key fields.

If now the foreign key is present in the set, the key value can only be replaced if other fields are used to define the corresponding index as UNIQUE. You must take care when carrying out replacements that the uniqueness of the index combination is not compromised.

```
If aForeignTables(i,1) = stFieldname Then
   inUnique = 1
Else
   ReDim Preserve aColumns(inCount)
   aColumns(inCount) = oQuery_result.getString(1)
   inCount = inCount + 1
End If
```

All column names, apart from the known column names for foreign key fields as Index with the UNIQUE property, are stored in the array. As the column name of the foreign key field also belongs to the group, it can be used to determine whether uniqueness is to be checked during data modification.

```
If inUnique = 1 Then
   stSql = "UPDATE """ + aForeignTables(i,0) + """ AS ""a"" SET """ +
aForeignTables(i,1) + """='" + inLB2 + "' WHERE """ + aForeignTables(i,1) +
"""='" + inLB1 + "' AND ( SELECT COUNT(*) FROM """ + aForeignTables(i,0) +
""" WHERE """ + aForeignTables(i,1) + """='" + inLB2 + "' )"
```

```
      If inCount > 0 Then
         stFieldgroup = Join(aColumns(), """||  ||""")
```

If there are several fields, apart from the foreign key field, which together form a UNIQUE index, they are combined here for a SQL grouping. Otherwise only aColumns(0) appears as stFieldgroup.

```
         stFieldname = ""
         For ink = LBound(aColumns()) To UBound(aColumns())
            stFieldname = stFieldname + " AND """ + aColumns(ink) + """ =
""a"."""" + aColumns(ink) + """ "
```

The SQL parts are combined for a correlated subquery.

```
         Next ink
      stSql = Left(stSql, Len(stSql) - 1)
```

The previous query ends with a bracket. Now further content is to be added to the subquery, so this closure must be removed again. After that, the query is expanded with the additional conditions.

```
      stSql = stSql + stFeldbezeichnung + "GROUP BY (""" + stFeldgruppe + """) ) < 1"
   End If
```

If the foreign key has no connection with the primary key or with a UNIQUE index, it does not matter if content is duplicated.

```
   Else
      stSql = "UPDATE """ + aForeignTables(i,0) + """ SET """ +
   aForeignTables(i,1) + """='" + inLB2 + "' WHERE """ + aForeignTables(i,1) +
   """='" + inLB1 + "'"
   End If
   oSQL_Statement.executeQuery(stSql)
   NEXT
```

The update is carried out for as long as different connections to other tables occur; that is, as long as the current table is the source of a foreign key in another table. This is the case twice over for the Town table: in the Media table and in the Postcode table.

Afterwards the old value can be deleted from listbox 1, as it no longer has any connection to other tables.

```
   stSql = "DELETE FROM """ + aTable(5) + """ WHERE ""ID""='" + inLB1 + "'"
   oSQL_Statement.executeQuery(stSql)
```

In some cases, the same method must now be carried out for a second table that has supplied data for the listboxes. In our example, the first table is the Postcode table and the second is the Town table.

If the text field is empty and listbox 2 also contains nothing, we check if the relevant checkbox indicates that all surplus entries are to be deleted. This means the entries which are not bound to other tables by a foreign key.

```
   ElseIf oCtlCheck1.State = 1 Then
      stCondition = ""
      If stAuxilTable = aTable(5) Then
         For i = LBound(aForeignTables()) To UBound(aForeignTables())
            stCondition = stCondition + """ID"" NOT IN (SELECT """ +
   aForeignTables(i,1) + """ FROM """ + aForeignTables(i,0) + """) AND "
         Next
      Else
         For i = LBound(aForeignTables2()) To UBound(aForeignTables2())
            stCondition = stCondition + """ID"" NOT IN (SELECT """ +
   aForeignTables2(i,1) + """ FROM """ + aForeignTables2(i,0) + """) AND "
         Next
      End If
```

The last AND must be removed, since otherwise the delete instruction would end with AND.

```
        stCondition = Left(stCondition, Len(stCondition) - 4) '
        stSql = "DELETE FROM """ + stAuxilTable + """ WHERE " + stCondition + ""
        oSQL_Statement.executeQuery(stSql)
```

As the table has already been purged once, the table index can be checked and optionally corrected downwards. See the subroutine described in one of the previous sections.

```
    Table_index_down(stAuxilTable)
```

Afterwards, if necessary the listbox in the form from which the Table_purge dialog was called can be updated. In some cases, the whole form needs to be reread. For this purpose, the current record is determined at the beginning of the subroutine so that after the form has been refreshed, the current record can be reinstated.

```
        oDlg.endExecute() 'End dialog ...
        oDlg.Dispose() '... and remove from storage
    End Sub
```

Dialogs are terminated with the endExecute() command and completely removed from memory with Dispose().

Writing macros with Access2Base

Versions of LibreOffice from 4.2 onwards have integrated Access2Base. This library introduces a Basic layer with its specific API (Application Programming Interface) between the user's code and the usual UNO interface. The provided API does not bring in itself new functionalities but, in many cases, it is more readable, concise, and easier to use than UNO.

The API looks very much like that designed by Microsoft for the Access software. Base and Access have a lot in common, but certainly not their native programming styles. Access2Base fills the gap.

An English language documentation with examples can be found at http://www.access2base.com/access2base.html

To briefly illustrate how Access2Base hides the complexity of UNO:

- The (Access2Base simple) *Value* property of a control has in UNO as equivalents, depending on the control type or its location in a form, a grid control or a dialog: *CurrentValue, Date, EffectiveValue, HiddenValue, ProgressValue, RefValue, ScrollValue, SpinValue, State, StringItemList, Text, Time, ValueItemList* or … *Value*.
- To get the N first records of a table or a query into a Basic array, one method is simply to use the *GetRows(N)* method on a *Recordset* object. Compare with the *getString, getNull, getDouble, getLong, …* methods in UNO that you should apply on fields depending on their type and the used database system.

There are two main categories of objects handled by Access2Base, targeting either:

- The User Interface. Typical such object classes are: Form, SubForm, Dialog, Control, CommandBar, CommandBarControl and Event. Their methods are invoked usually from a Base application.
- The Database accesses. Typical such object classes are: Database, TableDef, QueryDef, Recordset and Field. Their methods are invoked either from a Base application or from any other LibreOffice application.

Traditionally, the Access2Base API is invoked from the Basic language. As from LibreOffice 6.4, a gateway provides access to the API from Python scripts as well, without any limitation vs. Basic. One may integrate seamlessly Basic and Python scripts in the same application, even by sharing the same object instances.

In the next paragraphs, every example will be given both in Basic and in Python. They are strictly equivalent.

To access the library from a Base application, attach the next procedure to the *OpenDocument* event of your Base file:

(BASIC)

```
Sub DBOpen(Optional oEvent As Object)
   If GlobalScope.BasicLibraries.hasByName("Access2Base") then
      GlobalScope.BasicLibraries.loadLibrary("Access2Base")
   End If
   Call Application.OpenConnection(ThisDatabaseDocument)
End Sub
```

(PYTHON)

```
from access2base import *
def DBOpen(event = None):
        Application.OpenConnection()
g_exportedScripts = (DBOpen, )
```

Alternatively, to gain access to the database from a non-Base application, run:

(BASIC)

```
Function DBOpen() As Object
   If GlobalScope.BasicLibraries.hasByName("Access2Base") then
      GlobalScope.BasicLibraries.loadLibrary("Access2Base")
   End If
   Set myDb = Application.OpenDatabase(" … database file name … ")
End Function
```

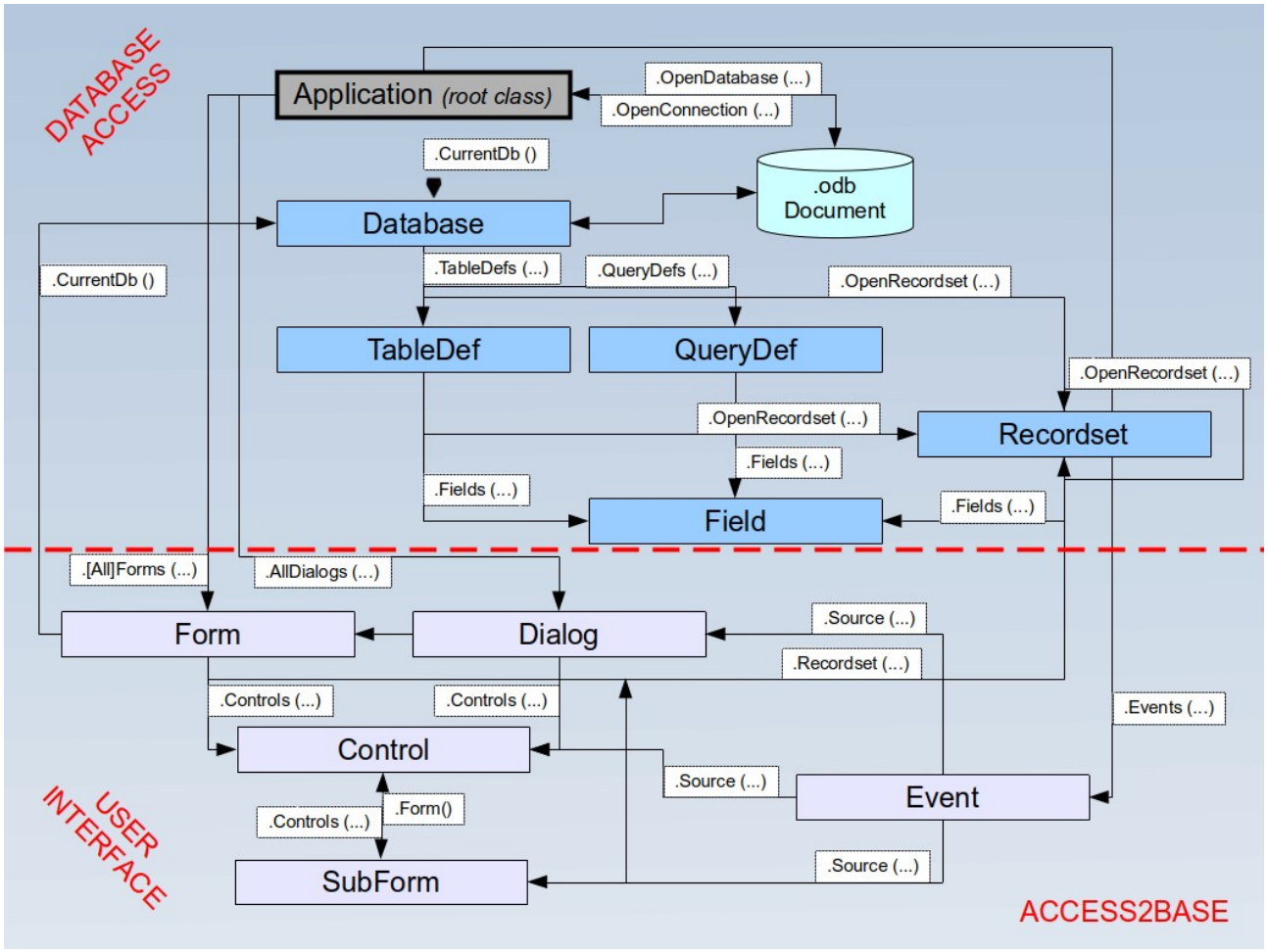
(PYTHON)

```
from access2base import *
def DBOpen():
   return Application.OpenDatabase(‘ … database file name … ‘)
```

It is not the intent of this book to replicate the documentation of the above-mentioned website. We will restrict this document to a summary of the main concepts of the API.

The Object Model

Below, starting from the *Application root object*, is a scheme describing the navigation through the most used objects:



As an example, to help reading the scheme:

- **Application** is the principal out of two root objects.
- The *CurrentDb*() and *OpenDatabase*() methods deliver a **Database** object.
- The *Database.TableDefs*() collection lists all tables stored in the database. Each table is represented by a **TableDef** object instance.
- The *TableDef.Fields*() collection lists all fields present in the database table. Each field is represented by a **Field** object instance.
- Fields can also be the children of stored queries (**QueryDef**s) or from data sets (**Recordset**s), with the same attributes.

A few examples

Print a list of table and field names

(BASIC)

```
Sub ScanTables()
Dim oDatabase As Object, oTable As Object, oField As Object
Dim i As Integer, j As Integer
   Set oDatabase = Application.CurrentDb()
   With odatabase
      For i = 0 To .TableDefs.Count - 1
         Set oTable = .TableDefs(i) '  Get each individual table definition
         DebugPrint oTable.Name
         For j = 0 To oTable.Fields.Count - 1
```

```
            Set oField = oTable.Fields(j) '  Get each individual field
            DebugPrint "", oField.Name, oField.TypeName
         Next j
      Next i
   End With
End Sub
```

(PYTHON)

```
def ScanTables():
   oDatabase = Application.OpenDatabase("/home/somedir/TT NorthWind.odb")
   for oTable in oDatabase.TableDefs():
      DebugPrint(oTable.Name)
      for oField in oTable.Fields():
         DebugPrint(“”, oField.Name, oField.TypeName)
```

Store the data produced by a query into a Basic array or a Python tuple

(BASIC)

```
Sub LoadQuery()
Dim oRecords As Object, vData As Variant
   Set oRecords = Application.CurrentDb().OpenRecordset("myQuery")
   vData = oRecords.GetRows(1000)
   orecords.mClose()
End Sub
```

(PYTHON)

```
def LoadQuery():
   oRecords= Application.CurrentDb().Openrecordset(“myQuery”)
   vData = orecords.GetRow(1000)
   oRecords.Close()
```

Set default values in form entries

To specify that after each record entry some control is prefilled with the last value set, assign the next routine to the *After Record Change* event of the form:

(BASIC)

```
Sub SetDefaultNewRec(poEvent As Object)
Dim oForm As Object, oControl As Object
   Set oForm = Application.Events(poEvent).Source  '  Get the current form
   Set oControl = oForm.Controls("txtCountry")
   oControl.DefaultValue = oControl.Value
End Sub
```

(PYTHON)

```
def SetDefaultNewRec(poEvent):
   oForm = Application.Events(poEvent).Source
   oControl = oForm.Controls(“txtCountry”)
   oControl.DefaultValue = oControl.Value
```

Database functions

A collection of functions is provided to shorten to one single line the access to database values: *DLookup, DMax, DMin, Dsum*. They all accept the same arguments: a field name or an expression based on field names, a table or query name, and a SQL-where clause without the *WHERE* keyword. For example:

(BASIC)

```
Function Lookup(psField As String, psSearchField As String, psSearchValue As
String) As Variant
   Lookup = Application.DLookup(psField, "myTable", _
               psSearchField & "='" & psSearchValue & "'")
```

```
   End Function
```

(PYTHON)

```
   def Lookup(psField, psSearchField, psSearchValue):
      return Application.Dlookup(psField, “myTable”
         , psSearchField + “=’” + psSearchValue + “’”)
```

Special commands

The *DoCmd* (2nd root class) proposes a set of convenient functions allowing to execute in one Basic statement complex although frequent and practical actions. To name a few:

CopyObject	Copy a table or a query within the same database or between two databases.
OpenSQL	Execute a given SQL SELECT statement and display the result in a datasheet.
OutputTo	Store the data from a table or a query in an HTML file. Store the actual content of a form into a PDF file.
SelectObject	Activate the given window (form, report, …)
SendObject	Send by mail with the given form in attachment.

The “Basic” object in Python

From Python an additional object has been introduced in the Access2Base gateway, simply called “Basic”, to let execute by the Basic run-time a number of well-known Basic built-in function. They are invoked exactly with the same arguments and behave strictly in the same manner in both environments. Among them:

- System functions: Basic.ConvertToUrl and Basic.ConvertFromUrl, Basic.GlobalScope, Basic.CreateUnoService.
- User interface functions: Basic.MsgBox, Basic.InputBox
- Date functions: Basic.DateAdd, Basic.DateDiff
- Introspection of UNO objects: Basic.Xray