LibreOffice 3.4 Basic Programmer's Guide

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Preface

This guide provides an introduction to programming with OpenOffice.org Basic. To get the most out of this book, you should be familiar with other programming languages. Extensive examples are provided to help you quickly develop your own OpenOffice.org Basic programs.

Note – Throughout this document, the OpenOffice.org installation directory is represented in syntax as *install-dir*.

◆ ◆ ◆ CHAPTER 1

OpenOffice.org BASIC Programming Guide

This guide provides an introduction to programming with OpenOffice.org Basic. To get the most out of this book, you should be familiar with other programming languages. Extensive examples are provided to help you quickly develop your own OpenOffice.org Basic programs.

This guide divides information about OpenOffice.org administration into several chapters. The first three chapters introduce you to OpenOffice.org Basic:

- The Language of OpenOffice.org Basic
- Runtime Library
- Introduction to the API

These chapters provide an overview of OpenOffice.org Basic and should be read by anyone who intends to write OpenOffice.org Basic programs. The remaining chapters describe the individual components of the OpenOffice.org API in more detail and can be read selectively as required:

- Working with Documents
- Text Documents
- Spreadsheet Documents
- Drawings and Presentations
- Charts (Diagrams)
- Databases
- Dialogs
- Forms

About OpenOffice.org Basic

The OpenOffice.org Basic programming language has been developed especially for OpenOffice.org and is firmly integrated in the Office package.

As the name suggests, OpenOffice.org Basic is a programming language from the Basic family. Anyone who has previously worked with other Basic languages — in particular with Visual Basic or Visual Basic for Applications (VBA) from Microsoft — will quickly become accustomed to OpenOffice.org Basic. Large sections of the basic constructs of OpenOffice.org Basic are compatible with Visual Basic.

The OpenOffice.org Basic programming language can be divided into four components:

- The language of OpenOffice.org Basic: Defines the elementary linguistic constructs, for example, for variable declarations, loops, and functions.
- The runtime library: Provides standard functions which have no direct reference to OpenOffice.org, for example, functions for editing numbers, strings, date values, and files.
- The OpenOffice.org API (Application Programming Interface): Permits access to OpenOffice.org

documents and allows these to be created, saved, modified, and printed.
- The Dialog Editor: Creates personal dialog windows and provides scope for the adding of control elements and event handlers.

Note – VBA : Compatibility between OpenOffice.org Basic and VBA relates to the OpenOffice.org Basic language as well as the runtime library. The OpenOffice.org API and the Dialog Editor are not compatible with VBA (standardizing these interfaces would have made many of the concepts provided in OpenOffice.org impossible).

Intended Users of OpenOffice.org Basic

The scope of application for OpenOffice.org Basic begins where the standard functions of OpenOffice.org end. Routine tasks can therefore be automated in OpenOffice.org Basic, links can be made to other programs — for example to a database server — and complex activities can be performed at the press of a button by using predefined scripts.

OpenOffice.org Basic offers complete access to all OpenOffice.org functions, supports all functions, modifies document types, and provides options for creating personal dialog windows.

Use of OpenOffice.org Basic

OpenOffice.org Basic can be used by any OpenOffice.org user without any additional programs or aids. Even in the standard installation, OpenOffice.org Basic has all the components needed to create its own Basic macros, including:

- The integrated development environment (IDE) which provides an editor for creating and testing macros.
- The interpreter, which is needed to run OpenOffice.org Basic macros.
- The interfaces to various OpenOffice.org applications, which allow for direct access to Office documents.

More Information

The components of the OpenOffice.org API that are discussed in this guide were selected based on their practical benefits for the OpenOffice.org Basic programmer. In general, only parts of the interfaces are discussed. For a more detailed picture, see the API reference.

The Developer's Guide describes the OpenOffice.org API in more detail than this guide, but is primarily intended for Java and C++ programmers. Anyone who is already familiar with OpenOffice.org Basic programming can find additional information in the Developer's Guide on OpenOffice.org Basic and OpenOffice.org programming.

Programmers who want to work directly with Java or C++ rather than OpenOffice.org Basic should consult the OpenOffice.org Developer's Guide instead of this guide. OpenOffice.org programming with Java or C++ is a considerably more complex process than programming with OpenOffice.org Basic.

◆ ◆ ◆ CHAPTER 2

The Language of OpenOffice.org BASIC

OpenOffice.org Basic belongs to the family of Basic languages. Many parts of OpenOffice.org Basic are identical to Microsoft Visual Basic for Applications and Microsoft Visual Basic. Anyone who has already worked with these languages can quickly become accustomed to OpenOffice.org Basic.

Programmers of other languages – such as Java, C++, or Delphi – should also find it easy to familiarize themselves with OpenOffice.org Basic. OpenOffice.org Basic is a fully-developed procedural programming language and no longer requires rudimentary control structures, such as `GoTo` and `GoSub`.

You can also benefit from the advantages of object-oriented programming since an interface in OpenOffice.org Basic enables you to use external object libraries. The entire OpenOffice.org API is based on these interfaces, which are described in more detail in the following chapters of this document.

This chapter provides an overview of the key elements and constructs of the OpenOffice.org Basic language, as well as the framework in which applications and libraries are oriented to OpenOffice.org Basic.

Overview of a Basic Program

OpenOffice.org Basic is an interpreter language. Unlike C++ or Delphi, the OpenOffice.org Basic compiler does not create executable or self-extracting files that are capable of running automatically. Instead, you execute an OpenOffice.org Basic program inside OpenOffice.org. The code is first checked for obvious errors and then executed line by line.

Program Lines

The Basic interpreter's line-oriented execution produces one of the key differences between Basic and other programming languages. Whereas the position of hard line breaks in the source code of Java, C++, or Delphi programs is irrelevant, each line in a Basic program forms a self-contained unit. Function calls, mathematical expressions, and other linguistic elements, such as function and loop headers, must be completed on the same line that they begin on.

If there is not enough space, or if this results in long lines, then several lines can be linked together by adding underscores _. The following example shows how four lines of a mathematical expression can be linked:

```
LongExpression = (Expression1 * Expression2) + _(Expression3 * Expression4) + _
(Expression5 * Expression6) + _(Expression7 * Expression8)
```

Note – The underscore must always be the last character in a linked line and cannot be followed by a space or a tab or a comment, otherwise the code generates an error.

In addition to linking individual lines, in OpenOffice.org Basic you can use colons to divide one line into several sections, so that there is enough space for several expressions. The assignments

```
a = 1 a = a + 1 a = a + 1
```

can be written as follows:

```
a = 1  :  a = a + 1  :  a = a + 1
```

Comments

In addition to the program code to be executed, an OpenOffice.org Basic program can also contain comments that explain the individual parts of the program and provide important information that can be helpful at a later point.

OpenOffice.org Basic provides two methods for inserting comments in the program code:

- All characters that follow an apostrophe are treated as comments:

```
Dim A    ' This is a comment for variable A
```

- The keyword `Rem`, followed by the comment:

```
Rem This comment is introduced by the keyword Rem.
```

A comment usually includes all characters up to the end of the line. OpenOffice.org Basic then interprets the following line as a regular instruction again. If comments cover several lines, each line must be identified as a comment:

```
Dim B     ' This comment for variable B is relatively long
          ' and stretches over several lines. The
          ' comment character must therefore be repeated
          ' in each line.
```

Markers

A OpenOffice.org Basic program can contain dozens, hundreds, or even thousands of **markers**, which are names for variables, constants, functions, and so on. When you select a name for a marker, the following rules apply:

- Markers can only contain Latin letters, numbers, and underscores (_).
- The first character of a marker must be a letter or an underscore.
- Markers cannot contain special characters, such as ä â î ß.
- The maximum length of a marker is 255 characters.
- No distinction is made between uppercase and lowercase characters. The `OneTestVariable` marker, for example, defines the same variable as `onetestVariable` and `ONETESTVARIABLE`.
  There is, however, one exception to this rule: a distinction is made between uppercase and lowercase characters for UNO-API constants. More information about UNO is presented in Introduction to the OpenOffice.org API.

Note – VBA : The rules for constructing markers are different in OpenOffice.org Basic than in VBA. For example, OpenOffice.org Basic only allows special characters in markers when using `Option Compatible`, since they can cause problems in international projects.

Here are a few examples of correct and incorrect markers:

```
Surname      ' Correct
Surname5     ' Correct (number 5 is not the first digit)
First Name   ' Incorrect (spaces are not permitted)
DéjàVu       ' Incorrect (letters such as é, à are not permitted)
5Surnames    ' Incorrect (the first character must not be a number)
First,Name   ' Incorrect (commas and full stops are not permitted)
```

Enclosing a variable name in square brackets allows names that might otherwise be disallowed; for example, spaces.

```
Dim [First Name] As String  'Space accepted in square brackets
  Dim [DéjàVu] As Integer     'Special characters in square brackets
  [First Name] = "Andrew"
  [DéjàVu] = 2
```

Working With Variables

Implicit Variable Declaration

Basic languages are designed to be easy to use. As a result, OpenOffice.org Basic enables the creation of a variable through simple usage and without an explicit declaration. In other words, a variable exists from the moment that you include it in your code. Depending on the variables that are already present, the following example declares up to three new variables:

```
a = b + c
```

Declaring variables implicitly is not good programming practice because it can result in the inadvertent introduction of a new variable through, for example, a typing error. Instead of producing an error message, the interpreter initializes the typing error as a new variable with a value of 0. It can be very difficult to locate errors of this kind in your code.

Explicit Variable Declaration

To prevent errors caused by an implicit declaration of variables, OpenOffice.org Basic provides a switch called:

```
Option Explicit
```

This must be listed in the first program line of each module and ensures that an error message is issued if one of the variables used is not declared. The `Option Explicit` switch should be included in all Basic modules.

In its simplest form, the command for an explicit declaration of a variable is as follows:

```
Dim MyVar
```

This example declares a variable with the name `MyVar` and the type `variant`. A variant is a universal variable that can record all conceivable values, including strings, whole numbers, floating point figures, and Boolean values. Here are a few examples of Variant variables:

```
MyVar = "Hello World"      ' Assignment of a string
MyVar = 1                  ' Assignment of a whole number
MyVar = 1.0                ' Assignment of a floating point number
MyVar = True               ' Assignment of a Boolean value
```

The variables declared in the previous example can even be used for different variable types in the same program. Although this provides considerable flexibility, it is best to restrict a variable to one variable type. When OpenOffice.org Basic encounters an incorrectly defined variable type in a particular context, an error message is generated.

Use the following style when you make a type-bound variable declaration:

```
Dim MyVar As Integer   ' Declaration of a variable of the integer type
```

The variable is declared as an integer type and can record whole number values. You can also use the following style to declare an integer type variable:

```
Dim MyVar%          ' Declaration of a variable of the integer type
```

The Dim instruction can record several variable declarations:

```
Dim MyVar1, MyVar2
```

If you want to assign the variables to a permanent type, you must make separate assignments for each variable:

```
Dim MyVar1 As Integer, MyVar2 As Integer
```

If you do not declare the type for a variable, OpenOffice.org Basic assigns the variable a variant type. For example, in the following variable declaration, `MyVar1` becomes a variant and `MyVar2` becomes an integer:

```
Dim MyVar1, MyVar2 As Integer
```

The following sections list the variable types that are available in OpenOffice.org Basic and describe how they can be used and declared.

Strings

Strings, together with numbers, form the most important basic types of OpenOffice.org Basic. A string consists of a sequence of consecutive individual characters. The computer saves the strings internally as a sequence of numbers where each number represents one specific character.

From a Set of ASCII Characters to Unicode

Character sets match characters in a string with a corresponding code (numbers and characters) in a table that describes how the computer is to display the string.

The ASCII Character Set

The ASCII character set is a set of codes that represent numbers, characters, and special symbols by one byte. The 0 to 127 ASCII codes correspond to the alphabet and to common symbols (such as periods, parentheses, and commas), as well as some special screen and printer control codes. The ASCII character set is commonly used as a standard format for transferring text data between computers.

However, this character set does not include a range of special characters used in Europe, such as â, ä, and î, as well as other character formats, such as the Cyrillic alphabet.

The ANSI Character Set

Microsoft based its Windows product on the American National Standards Institute (ANSI) character set, which was gradually extended to include characters that are missing from the ASCII character set.

Code Pages

The ISO 8859 character sets provide an international standard. The first 128 characters of the ISO character set correspond to the ASCII character set. The ISO standard introduces new character sets (**code pages**) so that more languages can be correctly displayed. However, as a result, the same character value can represent different characters in different languages.

Unicode

Unicode increases the length of a character to four bytes and combines different character sets to create a standard to depict as many of the world's languages as possible. Version 2.0 of Unicode is now supported by many programs — including OpenOffice.org and OpenOffice.org Basic.

String Variables

OpenOffice.org Basic saves strings as string variables in Unicode. A string variable can store up to 65535 characters. Internally, OpenOffice.org Basic saves the associated Unicode value for every character. The working memory needed for a string variable depends on the length of the string.

Example declaration of a string variable:

```
Dim Variable As String
```

You can also write this declaration as:

```
Dim Variable$
```

Note – VBA : When porting VBA applications, ensure that the maximum allowed string length in OpenOffice.org Basic is observed (65535 characters).

Specification of Explicit Strings

To assign an explicit string to a string variable, enclose the string in quotation marks (").

```
Dim MyString As String
MyString = " This is a test"
```

To split a string across two lines of code, add an ampersand sign (the concatenation operator) and the underscore continuation character at the end of the first line:

```
Dim MyString As String
MyString =   "This string is so long that it " & _
             "has been split over two lines."
```

To include a quotation mark (") in a string, enter it twice at the relevant point:

```
Dim MyString As String
MyString = "a ""-quotation mark."    ' produces a "-quotation mark
```

Numbers

OpenOffice.org Basic supports five basic types for processing numbers:

- Integer
- Long Integer
- Single
- Double
- Currency

Integer Variables

Integer variables can store any whole number between **-32768** and **32767**. An integer variable can take up to two bytes of memory. The type declaration symbol for an integer variable is `%`. Calculations that use integer

variables are very fast and are particularly useful for loop counters. If you assign a floating point number to an integer variable, the number is rounded up or down to the next whole number.

Example declarations for integer variables:

```
Dim Variable As Integer
Dim Variable%
```

Long Integer Variables

Long integer variables can store any whole number between **–2147483648** and **2147483647**. A long integer variable can takes up to four bytes of memory. The type declaration symbol for a long integer is `&`. Calculations with long integer variables are very fast and are particularly useful for loop counters. If you assign a floating point number to a long integer variable, the number is rounded up or down to the next whole number.

Example declarations for long integer variables:

```
Dim Variable as Long
Dim Variable&
```

Single Variables

Single variables can store any positive or negative floating point number between **3.402823 x 10^{38}** and **1.401298 x 10^{-45}**. A single variable can take up to four bytes of memory. The type declaration symbol for a single variable is `!`.

Originally, single variables were used to reduce the computing time required for the more precise double variables. However, these speed considerations no longer apply, reducing the need for single variables.

Example declarations for single variables:

```
Dim Variable as Single
Dim Variable!
```

Double Variables

Double variables can store any positive or negative floating point numbers between **1.79769313486232 x 10^{308}** and **4.94065645841247 x 10^{-324}**. A double variable can take up to eight bytes of memory. Double variables are suitable for precise calculations. The type declaration symbol is `#`.

Example declarations of double variables:

```
Dim Variable As Double
Dim Variable#
```

Currency Variables

Currency variables differ from the other variable types by the way they handle values. The decimal point is fixed and is followed by four decimal places. The variable can contain up to 15 numbers before the decimal point. A currency variable can store any value between **-922337203685477.5808** and **+922337203685477.5807** and takes up to eight bytes of memory. The type declaration symbol for a currency variable is `@`.

Currency variables are mostly intended for business calculations that yield unforeseeable rounding errors due to the use of floating point numbers.

Example declarations of currency variables:

```
Dim Variable As Currency
Dim Variable@
```

Warning – The handling of Basic Currency type is not reliable. Issue 31001 Issue 54049 Issue 91121 Issue 107277 are still not corrected on OpenOffice.org version 3.1.1.

Floats

The types single, double and currency are often collectively referred to as floats, or floating-point number types. They can contain numerical values with decimal fractions of various length, hence the name: The decimal point seems to be able to 'float' through the number.

You can declare variables of the type float. The actual variable type (single, long, currency) is determined the moment a value is assigned to the variable:

```
Dim A As Float
A = 1210.126
```

Specification of Explicit Numbers

Numbers can be presented in several ways, for example, in decimal format or in scientific notation, or even with a different base than the decimal system. The following rules apply to numerical characters in OpenOffice.org Basic:

Whole Numbers

The simplest method is to work with whole numbers. They are listed in the source text without a comma separating the thousand figure:

```
Dim A As Integer
Dim B As Float

A = 1210
B = 2438
```

The numbers can be preceded by both a plus (+) or minus (-) sign (with or without a space in between):

```
Dim A As Integer
Dim B As Float

A = + 121
B = - 243
```

Decimal Numbers

When you type a decimal number, use a period (.) as the decimal point. This rule ensures that source texts can be transferred from one country to another without conversion.

```
Dim A As Integer
Dim B As Integer
Dim C As Float

A = 1223.53      ' is rounded
B = - 23446.46   ' is rounded
C = + 3532.76323
```

You can also use plus (+) or minus (-) signs as prefixes for decimal numbers (again with or without spaces).

If a decimal number is assigned to an integer variable, OpenOffice.org Basic rounds the figure up or down.

Exponential Writing Style

OpenOffice.org Basic allows numbers to be specified in the exponential writing style, for example, you can write `1.5e-10` for the number 1.5 x 10^{-10} (0.00000000015). The letter "e" can be lowercase or uppercase with or without a plus sign (+) as a prefix.

Here are a few correct and incorrect examples of numbers in exponential format:

```
Dim A As Double

A = 1.43E2    ' Correct
A = + 1.43E2  ' Correct (space between plus and basic number)
A = - 1.43E2  ' Correct (space between minus and basic number)
A = 1.43E-2   ' Correct (negative exponent)
A = 1.43E -2  ' Incorrect (spaces not permitted within the number)
A = 1,43E-2   ' Incorrect (commas not permitted as decimal points)
A = 1.43E2.2  ' Incorrect (exponent must be a whole number)
```

Note, that in the first and third incorrect examples that no error message is generated even though the variables return incorrect values. The expression

```
A = 1.43E -2
```

is interpreted as 1.43 minus 2, which corresponds to the value -0.57. However, the value 1.43 x 10^{-2} (corresponding to 0.0143) was the intended value. With the value

```
A = 1.43E2.2
```

OpenOffice.org Basic ignores the part of the exponent after the decimal point and interprets the expression as

```
A = 1.43E2
```

Hexadecimal Values

In the hexadecimal system (base 16 system), a 2-digit number corresponds to precisely one byte. This allows numbers to be handled in a manner which more closely reflects machine architecture. In the hexadecimal system, the numbers 0 to 9 and the letters A to F are used as numbers. An A stands for the decimal number 10, while the letter F represents the decimal number 15. OpenOffice.org Basic lets you use whole numbered hexadecimal values, so long as they are preceded by `&H`.

```
Dim A As Long
A = &HFF ' Hexadecimal value FF, corresponds to the decimal value 255
A = &H10 ' Hexadecimal value 10, corresponds to the decimal value 16
```

Octal Values

OpenOffice.org Basic also understands the octal system (base 8 system), which uses the numbers 0 to 7. You must use whole numbers that are preceded by `&O`.

```
Dim A As Long
A = &O77 ' Octal value 77, corresponds to the decimal value 63
A = &O10 ' Octal value 10, corresponds to the decimal value 8
```

Boolean Values

Boolean variables can only contain one of two values: `True` or `False`. They are suitable for binary specifications that can only adopt one of two statuses. A Boolean value is saved internally as a two-byte integer value, where 0 corresponds to the False and any other value to True. There is no type declaration symbol for Boolean variables. The declaration can only be made using the supplement `As Boolean`.

Example declaration of a Boolean variable:

```
Dim Variable As Boolean
```

Date and Time

Date variables can contain date and time values. When saving date values, OpenOffice.org Basic uses an internal format that permits comparisons and mathematical operations on date and time values. There is no type declaration symbol for date variables. The declaration can only be made using the supplement `As Date`.

Example declaration of a date variable:

```
Dim Variable As Date
```

Arrays

In addition to simple variables (scalars), OpenOffice.org Basic also supports arrays (data fields). A data field contains several variables, which are addressed through an index.

Defining Arrays

Arrays can be defined as follows:

Simple Arrays

An array declaration is similar to that of a simple variable declaration. However, unlike the variable declaration, the array name is followed by parentheses which contain the specifications for the number of elements. The expression Dim MyArray(3) declares an array that has four variables of the variant data type, namely `MyArray(0)`, `MyArray(1)`, `MyArray(2)`, and `MyArray(3)`.

You can also declare type-specific variables in an array. For example, the following line declares an array with four integer variables:

```
Dim MyInteger(3) As Integer
```

In the previous examples, the index for the array always begins with the standard start value of zero. As an alternative, a validity range with start and end values can be specified for the data field declaration. The following example declares a data field that has six integer values and which can be addressed using the indexes 5 to 10:

```
Dim MyInteger(5 To 10) As Integer
```

The indexes do not need to be positive values. The following example also shows a correct declaration, but with negative data field limits:

```
Dim MyInteger(-10 To -5) As Integer
```

It declares an integer data field with 6 values that can be addressed using the indexes -10 to -5.

There are no practical limits on the indexes or on the number of elements in an array, so long as there is enough memory:

```
Dim s(-53000 to 89000) As String
s(-52000) = "aa"
s(79999) = "bb"
print s(-52000), s(79999)
```

Note – VBA : Other limit values sometimes apply for data field indexes in VBA. The same also applies to the maximum number of elements possible per dimension. The values valid there can be found in the relevant VBA documentation.

Specified Value for Start Index

The start index of a data field usually begins with the value 0. Alternatively, you can change the start index for all data field declarations to the value 1 by using the call:

```
Option Base 1
```

The call must be included in the header of a module if you want it to apply to all array declarations in the module. However, this call does not affect the UNO sequences that are defined through the OpenOffice.org API whose index always begins with 0. To improve clarity, you should avoid using Option Base 1.

The number of elements in an array is not affected if you use `Option Base 1`, only the start index changes. The declaration

```
Option Base 1
' ...
Dim MyInteger(3)
```

creates 4 integer variables which can be described with the expressions `MyInteger(1)`, `MyInteger(2)`, `MyInteger(3)`, and `MyInteger(4)`.

Note – VBA : In OpenOffice.org Basic, the expression `Option Base 1` does not affect the number of elements in an array as it does in VBA. It is, rather, the start index which moves in OpenOffice.org Basic. While the declaration `MyInteger(3)` creates three integer values in VBA with the indexes 1 to 3, the same declaration in OpenOffice.org Basic creates four integer values with the indexes 1 to 4. By using `Option Compatible`, OpenOffice.org Basic behaves like VBA.

Multi-Dimensional Data Fields

In addition to single dimensional data fields, OpenOffice.org Basic also supports work with multi-dimensional data fields. The corresponding dimensions are separated from one another by commas. The example Dim MyIntArray(5, 5) As Integer defines an integer array with two dimensions, each with 6 indexes (can be addressed through the indexes 0 to 5). The entire array can record a total of 6 x 6 = 36 integer values.

You can define hundreds of dimensions in OpenOffice.org Basic Arrays; however, the amount of available memory limits the number of dimensions you can have.

Dynamic Changes in the Dimensions of Data Fields

The previous examples are based on data fields of a specified dimension. You can also define arrays in which the dimension of the data fields dynamically changes. For example, you can define an array to contain all of the words in a text that begin with the letter A. As the number of these words is initially unknown, you need to be able to subsequently change the field limits. To do this in OpenOffice.org Basic, use the following call:

```
ReDim MyArray(10)
```

Note – VBA : Unlike VBA, where you can only dimension dynamic arrays by using `Dim MyArray()`, OpenOffice.org Basic lets you change both static and dynamic arrays using `ReDim`.

The following example changes the dimension of the initial array so that it can record 11 or 21 values:

```
Dim MyArray(4) As Integer ' Declaration with five elements
' ...
ReDim MyArray(10) As Integer ' Increase to 11 elements
' ...
ReDim MyArray(20) As Integer ' Increase to 21 elements
```

When you reset the dimensions of an array, you can use any of the options outlined in the previous sections. This includes declaring multi-dimensional data fields and specifying explicit start and end values. When the dimensions of the data field are changed, all contents are lost. If you want to keep the original values, use the `Preserve` command:

```
Dim MyArray(10) As Integer ' Defining the initial
' dimensions
' ...
ReDim Preserve MyArray(20) As Integer ' Increase in
' data field, while
' retaining content
```

When you use `Preserve`, ensure that the number of dimensions and the type of variables remain the same.

Note – VBA : Unlike VBA, where only the upper limit of the last dimension of a data field can be changed through `Preserve`, OpenOffice.org Basic lets you change other dimensions as well.

If you use `ReDim` with `Preserve`, you must use the same data type as specified in the original data field declaration.

Determining the Dimensions of Data Fields

Functions LBound() and UBound() return respectively the lowest permitted index value and the highest permitted index value of an array. This is useful when an array has changed its dimensions.

```
Dim MyArray(10) As Integer
' ... some instructions
Dim n As Integer
n = 47 ' could be the result of a computation
Redim MyArray(n) As Integer
MsgBox(LBound(MyArray))  ' displays : 0
MsgBox(UBound(MyArray))  ' displays : 47
```

For a multi-dimensional array you need to specify the position (1 to n) of the index you want to know the permitted lower and upper values:

```
Dim MyArray(10, 13 to 28) As Integer
MsgBox(LBound(MyArray, 2))  ' displays : 13
MsgBox(UBound(MyArray, 2))  ' displays : 28
```

Empty arrays

In some cases, especially when dealing with the API, you need to declare an empty array. Such array is declared without dimension, but may later be filled by an API function or with a Redim statement:

```
Dim s() As String ' declare an empty array
' --- later in the program ...
Redim s(13) As String
```

You cannot assign a value to an empty array, since it does not contain any elements.

The "signature" of an empty array is that UBound() returns -1 and LBound() returns 0:

```
Dim MyArray() As Integer
MsgBox(LBound(MyArray))  ' displays : 0
MsgBox(UBound(MyArray))  ' displays : -1
```

Some API functions return an array containing elements (indexed from zero) or return an empty array. Use UBound() to check if the returned array is empty.

Defining values for arrays

Values for the Array fields can be stored like this:

```
MyArray(0) = "somevalue"
```

Accessing Arrays

Accessing values in an array works like this:

```
MsgBox("Value:" & MyArray(0))
```

Array Creation, value assignment and access example

And example containing all steps that show real array usage:

```
Sub TestArrayAxess        Dim MyArray(3)        MyArray(0) = "lala"        MsgBox("Value:"
& MyArray(0))End Sub
```

Scope and Life Span of Variables

A variable in OpenOffice.org Basic has a limited life span and a limited scope from which it can be read and used in other program fragments. The amount of time that a variable is retained, as well as where it can be accessed from, depends on its specified location and type.

Local Variables

Variables that are declared in a function or a procedure are called local variables:

```
Sub Test
  Dim MyInteger As Integer
  ' ...
End Sub
```

Local variables only remain valid as long as the function or the procedure is executing, and then are reset to zero. Each time the function is called, the values generated previously are not available.

To keep the previous values, you must define the variable as `Static`:

```
Sub Test
  Static MyInteger As Integer
  ' ...
End Sub
```

Note – VBA : Unlike VBA, OpenOffice.org Basic ensures that the name of a local variable is not used simultaneously as a global and a private variable in the module header. When you port a VBA application to OpenOffice.org Basic, you must change any duplicate variable names.

Public Domain Variables

Public domain variables are defined in the header section of a module by the keyword `Dim`. These variables are available to all of the modules in their library:

Module A:

```
Dim A As Integer
Sub Test
  Flip
  Flop
End Sub

Sub Flip
 A = A + 1
End Sub
```

Module B:

```
Sub Flop
  A = A - 1
End Sub
```

The value of variable `A` is not changed by the `Test` function, but is increased by one in the `Flip` function and decreased by one in the `Flop` function. Both of these changes to the variable are global.

You can also use the keyword `Public` instead of `Dim` to declare a public domain variable:

```
Public A As Integer
```

A public domain variable is only available so long as the associated macro is executing and then the variable is reset.

Global Variables

In terms of their function, global variables are similar to public domain variables, except that their values are retained even after the associated macro has executed. Global variables are declared in the header section of a module using the keyword `Global`:

```
Global A As Integer
```

Private Variables

`Private` variables are only available in the module in which they are defined. Use the keyword `Private` to define the variable:

```
Private MyInteger As Integer
```

If several modules contain a `Private` variable with the same name, OpenOffice.org Basic creates a different variable for each occurrence of the name. In the following example, both module `A` and `B` have a `Private` variable called `C`. The `Test` function first sets the `Private` variable in module `A` and then the `Private` variable in module `B`.

Module A:

```
Private C As Integer

Sub Test
  SetModuleA      ' Sets the variable C from module A
  SetModuleB      ' Sets the variable C from module B
  ShowVarA        ' Shows the variable C from module A (= 10)
  ShowVarB        ' Shows the variable C from module B (= 20)
End Sub

Sub SetModuleA
  C = 10
End Sub

Sub ShowVarA
  MsgBox C        ' Shows the variable C from module A.
End Sub
```

Module B:

```
Private C As Integer

Sub SetModuleB
```

```
  C = 20
End Sub

Sub ShowVarB
  MsgBox C        ' Shows the variable C from module B.
End Sub
```

Keep in mind that ShowVarB only shows the expected value of C (20) because Sub Test is keeping it in scope. If the calls to SetModuleB and ShowVarB are independent, e.g. SetModuleB is triggered from one toolbar button and ShowVarB is triggered from another toolbar button, then ShowVarB will display a C value of 0 since module variables are reset after each macro completion.

Constants

Constants are values which may be used but not changed by the program.

Defining Constants

In OpenOffice.org Basic, use the keyword `Const` to declare a constant.

```
Const A = 10
```

You can also specify the constant type in the declaration:

```
Const B As Double = 10
```

Scope of Constants

Constants have the same scope as variables (see Scope and Life Span of Variables), but the syntax is slightly different. A `Const` definition in the module header is available to the code in that module. To make the definition available to other modules, add the `Public` keyword.

```
Public Const one As Integer = 1
```

Predefined Constants

OpenOffice.org Basic predefines several constants. Among the most useful are:

- `True` and `False`, for Boolean assignment statements
- `PI` as a type `Double` numeric value

```
Dim bHit as Boolean
bHit = True

Dim dArea as Double, dRadius as Double
' ... (assign a value to dRadius)
dArea = PI * dRadius * dRadius
```

Operators

OpenOffice.org Basic understands common mathematical, logical, and comparison operators.

Mathematical Operators

Mathematical operators can be applied to all numbers types, whereas the + operator can also be used to concatenate strings.

`+`	Addition of numbers and date values, concatenation of strings
`&`	Concatenation of strings
`-`	Subtraction of numbers and date values
`*`	Multiplication of numbers
`/`	Division of numbers
`\`	Division of numbers with a whole number result (rounded)
`^`	Raising the power of numbers
`MOD`	modulo operation (calculation of the remainder of a division)

Note – Although you can use the + operator to concatenate strings, the Basic interpreter can become confused when concatenating a number to a string. The & operator is safer when dealing with strings because it assumes that all arguments should be strings, and converts the arguments to strings if they are not strings.

Logical Operators

Logical operators allow you to do operations on elements according to the rules of Boolean algebra. If the operators are applied to Boolean values, the operation provides the result required directly. If used in conjunction with integer and long integer values, the operation is done at the bit level.

`AND`	And operator
`OR`	Or operator
`XOR`	Exclusive Or operator
`NOT`	Negation
`EQV`	Equivalent test (both parts `True` or `False`)
`IMP`	Implication (if the first expression is true, then the second must also be true)

Comparison Operators

Comparison operators can be applied to all elementary variable types (numbers, date details, strings, and Boolean values).

`=`	Equality of numbers, date values and strings
`<>`	Inequality of numbers, date values and strings
`>`	Greater than check for numbers, date values and strings
`>=`	Greater than or equal to check for numbers, date values and strings

<	Less than check for numbers, date values and strings
<=	Less than or equal to check for numbers, date values and strings

Note – VBA : OpenOffice.org Basic does not support the VBA `Like` comparison operator.

Branching

Use branching statements to restrict the execution of a code block until a particular condition is satisfied.

If...Then...Else

The most common branching statement is the `If` statement as shown in the following example:

```
If A > 3 Then
  B = 2
End If
```

The `B = 2` assignment only occurs when value of variable `A` is greater than three. A variation of the `If` statement is the `If/Else` clause:

```
If A > 3 Then
  B = 2
Else
  B = 0
End If
```

In this example, the variable `B` is assigned the value of 2 when `A` is greater than 3, otherwise `B` is assigned the value of 0.

For more complex statements, you can cascade the `If` statement, for example:

```
If A = 0 Then
  B = 0
ElseIf A < 3 Then
  B = 1
Else
  B = 2
End If
```

If the value of variable `A` equals zero, `B` is assigned the value 0. If `A` is less than 3 (but not equal to zero), then `B` is assigned the value 1. In all other instances (that is, if `A` is greater than or equal to 3), `B` is assigned the value 2.

A complete If statement may be written on a single line, with a simpler syntax. The first example of this page may be written as:

```
If A > 3 Then  B = 2
```

The second example of this page may be written as:

```
If A > 3 Then  B = 2  Else  B = 0
```

Select...Case

The `Select...Case` instruction is an alternative to the cascaded `If` statement and is used when you need to check a value against various conditions:

```
Select Case DayOfWeek
  Case 1:
```

```
    NameOfWeekday = "Sunday"
  Case 2:
    NameOfWeekday = "Monday"
  Case 3:
    NameOfWeekday = "Tuesday"
  Case 4:
    NameOfWeekday = "Wednesday"
  Case 5:
    NameOfWeekday = "Thursday"
  Case 6:
    NameOfWeekday = "Friday"
  Case 7:
    NameOfWeekday = "Saturday"
End Select
```

In this example, the name of a weekday corresponds to a number, so that the `DayOfWeek` variable is assigned the value of 1 for `Sunday`, 2 for `Monday` value, and so on.

The `Select` command is not restricted to simple 1:1 assignments — you can also specify comparison operators or lists of expressions in a `Case` branch. The following example lists the most important syntax variants:

```
Select Case Var
  Case 1 To 5
    ' ... Var is between the numbers 1 and 5 (including the values 1 and 5).
  Case > 100
    ' ... Var is greater than 100
  Case 6, 7, 8
    ' ... Var is 6, 7 or 8
  Case 6, 7, 8, > 15, < 0
    ' ... Var is 6, 7, 8, greater than 15, or less than 0
  Case Else
    ' ... all other instances
End Select
```

Now consider a misleading (advanced) example, and a common error:

```
Select Case Var
  Case Var = 8
    ' ... Var is 0
  Case Else
    ' ... all other instances
End Select
```

The statement (Var = 8) evaluates to TRUE if Var is 8, and FALSE otherwise. TRUE is -1 and FALSE is 0. The Select Case statement evaluates the expression, which is TRUE or FALSE, and then compares that value to Var. When Var is 0, there is a match. If you understand the last example, then you also know why this example does not do what it appears

```
Select Case Var
  Case Var > 8 And Var < 11
    ' ... Var is 0
  Case Else
    ' ... all other instances
End Select
```

Loops

A loop executes a code block for the number of passes that are specified. You can also have loops with an undefined number of passes.

For...Next

The `For...Next` loop has a fixed number of passes. The loop counter defines the number of times that the loop is to be executed. In the following example, variable `I` is the loop counter, with an initial value of 1. The counter is incremented by 1 at the end of each pass. When variable I equals 10, the loop stops.

```
Dim I
```

```
For I = 1 To 10
  ' ...  Inner part of loop
Next I
```

If you want to increment the loop counter by a value other than 1 at the end of each pass, use the `Step` function:

```
Dim I
For I = 1 To 10 Step 0.5
  ' ... Inner part of loop
Next I
```

In the preceding example, the counter is increased by 0.5 at the end of each pass and the loop is executed 19 times.

You can also use negative step values:

```
Dim I
For I = 10 To 1 Step -1
  ' ... Inner part of loop
Next I
```

In this example, the counter begins at 10 and is reduced by 1 at the end of each pass until the counter is 1.

The `Exit For` instruction allows you to exit a `For` loop prematurely. In the following example, the loop is terminated during the fifth pass:

```
Dim I
For I = 1 To 10
  If I = 5 Then
    Exit For
  End If
  ' ... Inner part of loop
Next I
```

For Each

The `For Each...Next` loop variation in VBA is supported in OpenOffice.org Basic. `For Each` loops do not use an explicit counter like a `For...Next` loop does. A `For Each` loop says "do this to everything in this set", rather than "do this n times". For example:

```
Const d1 = 2
Const d2 = 3
Const d3 = 2
Dim i
Dim a(d1, d2, d3)
For Each i In a()
    ' ... Inner part of loop
Next i
```

The loop will execute 36 times.

Do...Loop

The `Do...Loop` is not linked to a fixed number of passes. Instead, the `Do...Loop` is executed until a certain condition is met. There are four versions of the `Do...Loop`. In the first two examples, the code within the loop may not be executed at all ("do 0 times" logic). In the latter examples, the code will be executed at least once. (In the following examples, `A > 10` represents any condition):

1 The `Do While...Loop` version

```
Do While A > 10
   ' ... loop body
Loop
```

checks whether the condition after the `While` is **true** before every pass and only then executes the loop.

2 The `Do Until...Loop` version

```
Do Until A > 10
  ' ... loop body
Loop
```

executes the loop as long as the condition after the `Until` evaluates to **false**.

3 The `Do...Loop While` version

```
Do
  ' ... loop body
Loop While A > 10
```

only checks the condition after the first loop pass and terminates if the condition after the `While` evaluates to **false**.

4 The `Do...Loop Until` version

```
Do
  ' ... loop body
Loop Until A > 10
```

also checks its condition after the first pass, but terminates if the condition after the `Until` evaluates to **true**.

As in the `For...Next` loop, the `Do...Loop` also provides a terminate command. The `Exit Do` command can exit at loop at any point within the loop.

```
Do
  If A = 4 Then
    Exit Do
  End If
  ' ... loop body
Loop While A > 10
```

In some cases the loop may only terminate when a condition is met within the loop. Then you can use the "perpetual" Do Loop:

```
Do
  ' ... some internal calculations
  If A = 4 Then    Exit Do
  ' ... other instructions
Loop
```

While...Wend

The `While...Wend` loop construct works exactly the same as the `Do While...Loop`, but with the disadvantage that there is no `Exit` command available. The following two loops produce identical results:

```
Do While A > 10
   ' ... loop body
Loop

While A > 10
   ' ... loop body
Wend
```

Programming Example: Sorting With Embedded Loops

There are many ways to use loops, for example, to search lists, return values, or execute complex mathematical tasks. The following example is an algorithm that uses two loops to sort a list by names.

```
Sub Sort
  Dim Entry(1 To 10) As String
  Dim Count As Integer
  Dim Count2 As Integer
  Dim Temp As String

  Entry(1) = "Patty"
  Entry(2) = "Kurt"
  Entry(3) = "Thomas"
  Entry(4) = "Michael"
  Entry(5) = "David"
```

```
  Entry(6) = "Cathy"
  Entry(7) = "Susie"
  Entry(8) = "Edward"
  Entry(9) = "Christine"
  Entry(10) = "Jerry"

  For Count = 1 To 9
    For Count2 = Count + 1 To 10
      If Entry(Count) > Entry(Count2) Then
        Temp = Entry(Count)
        Entry(Count) = Entry(Count2)
        Entry(Count2) = Temp
      End If
    Next Count2
  Next Count

  For Count = 1 To 10
    Print Entry(Count)
  Next Count

End Sub
```

The values are interchanged as pairs several times until they are finally sorted in ascending order. Like bubbles, the variables gradually migrate to the right position. For this reason, this algorithm is also known as a Bubble Sort.

Procedures and Functions

Procedures and functions form pivotal points in the structure of a program. They provide the framework for dividing a complex problem into various sub-tasks.

Procedures

A **procedure** executes an action without providing an explicit value. Its syntax is

```
Sub Test
  ' ... here is the actual code of the procedure
End Sub
```

The example defines a procedure called `Test` that contains code that can be accessed from any point in the program. The call is made by entering the procedure name at the relevant point of the program.

Functions

A **function**, just like a procedure, combines a block of programs to be executed into one logical unit. However, unlike a procedure, a function provides a return value.

```
Function Test
  ' ... here is the actual code of the function
  Test = 123
End Function
```

The return value is assigned using simple assignment. The assignment does not need to be placed at the end of the function, but can be made anywhere in the function.

The preceding function can be called within a program as follows:

```
Dim A
A = Test
```

The code defines a variable `A` and assigns the result of the `Test` function to it.

The return value can be overwritten several times within the function. As with classic variable assignment,

the function in this example returns the value that was last assigned to it.

```
Function Test
  Test = 12
  ' ...
  Test = 123
End Function
```

In this example, the return value of the function is 123.

If nothing is assigned, the function returns a `zero` value (number 0 for numerical values and a blank for strings).

The return value of a function can be any type. The type is declared in the same way as a variable declaration:

```
Function Test As Integer
  ' ... here is the actual code of the function
End Function
```

If the return type is not specified (see first example of this page), the function returns a variant.

Terminating Procedures and Functions Prematurely

In OpenOffice.org Basic, you can use the `Exit Sub` and `Exit Function` commands to terminate a procedure or function prematurely, for example, for error handling. These commands stop the procedure or function and return the program to the point at which the procedure or function was called up.

The following example shows a procedure which terminates implementation when the `ErrorOccured` variable has the value `True`.

```
Sub Test
  Dim ErrorOccured As Boolean
  ' ...
  If ErrorOccured Then
    Exit Sub
  End If
  ' ...
End Sub
```

Passing Parameters

Functions and procedures can receive one or more parameters. Essential parameters must be enclosed in parentheses after the function or procedure names. The following example defines a procedure that expects an integer value `A` and a string `B` as parameters.

```
Sub Test (A As Integer, B As String)
  ' ...
End Sub
```

Parameters are normally passed by **Reference** in OpenOffice.org Basic. Changes made to the variables are retained when the procedure or function is exited:

```
Sub Test
  Dim A As Integer
  A = 10
  ChangeValue(A)
  ' The parameter A now has the value 20
End Sub

Sub ChangeValue(TheValue As Integer)
  TheValue = 20
End Sub
```

In this example, the value `A` that is defined in the `Test` function is passed as a parameter to the `ChangeValue` function. The value is then changed to 20 and passed to `TheValue`, which is retained when the function is exited.

You can also pass a parameter as a **value** if you do not want subsequent changes to the parameter to affect the value that is originally passed. To specify that a parameter is to be passed as a value, ensure that the `ByVal` keyword precedes the variable declaration in the function header.

In the preceding example, if we replace the `ChangeValue` function then the superordinate variable A remains unaffected by this change. After the call for the `ChangeValue` function, variable `A` retains the value 10.

```
Sub ChangeValue(ByVal TheValue As Integer)
  TheValue = 20
End Sub
```

Note – VBA : The method for passing parameters to procedures and functions in OpenOffice.org Basic is virtually identical to that in VBA. By default, the parameters are passed by reference. To pass parameters as values, use the `ByVal` keyword. In VBA, you can also use the keyword `ByRef` to force a parameter to be passed by reference. OpenOffice.org Basic recognizes but ignores this keyword, because this is already the default procedure in OpenOffice.org Basic.

Optional Parameters

Functions and procedures can only be called up if all the necessary parameters are passed during the call.

OpenOffice.org Basic lets you define parameters as **optional**, that is, if the corresponding values are not included in a call, OpenOffice.org Basic passes an empty parameter. In the following example the `A` parameter is obligatory, whereas the `B` parameter is optional.

```
Sub Test(A As Integer, Optional B As Integer)
  ' ...
End Sub
```

The `IsMissing` function checks whether a parameter has been passed or is left out.

```
Sub Test(A As Integer, Optional B As Integer)
  Dim B_Local As Integer
  ' Check whether B parameter is actually present
  If Not IsMissing (B) Then
    B_Local = B      ' B parameter present
  Else
    B_Local = 0      ' B parameter missing -> default value 0
  End If
  ' ... Start the actual function
End Sub
```

The example first tests whether the `B` parameter has been passed and, if necessary, passes the same parameter to the internal `B_Local` variable. If the corresponding parameter is not present, then a default value (in this instance, the value 0) is passed to `B_Local` rather than the passed parameter.

Note – VBA : The `ParamArray` keyword present in VBA is not supported in OpenOffice.org Basic.

Recursion

A recursive procedure or function is one that has the ability to call itself until it detects that some base condition has been satisfied. When the function is called with the base condition, a result is returned.

The following example uses a recursive function to calculate the factorial of the numbers `42`, `-42`, and `3.14`:

```
Sub Main
  Msgbox CalculateFactorial(  42 )    ' Displays 1,40500611775288E+51
  Msgbox CalculateFactorial( -42 )    ' Displays "Invalid number for factorial!"
  Msgbox CalculateFactorial( 3.14 )   ' Displays "Invalid number for factorial!"
End Sub

Function CalculateFactorial( Number )
```

```
  If Number < 0 Or Number <> Int( Number ) Then
    CalculateFactorial = "Invalid number for factorial!"
  ElseIf Number = 0 Then
    CalculateFactorial = 1
  Else
    ' This is the recursive call:
    CalculateFactorial = Number * CalculateFactorial( Number - 1 )
  Endif
End Function
```

The example returns the factorial of the number `42` by recursively calling the `CalculateFactorial` function until it reaches the base condition of `0! = 1`.

Note – The recursion levels are set at different levels based on the software platform. For Windows the recursion level is 5800. For Solaris and Linux, an evaluation of the stacksize is performed and the recursion level is calculated.

Error Handling

Correct handling of error situations is one of the most time-consuming tasks of programming. OpenOffice.org Basic provides a range of tools for simplifying error handling.

The On Error Instruction

The `On Error` instruction is the key to any error handling:

```
Sub Test
  On Error Goto ErrorHandler
  ' ... undertake task during which an error may occur
  Exit Sub
  ErrorHandler:
    ' ... individual code for error handling
End Sub
```

The `On Error Goto ErrorHandler` line defines how OpenOffice.org Basic proceeds in the event of an error. The `Goto ErrorHandler` ensures that OpenOffice.org Basic exits the current program line and then executes the `ErrorHandler:` code.

The Resume Command

The `Resume Next` command continues the program from the line that follows where the error occurred in the program after the code in the error handler has been executed:

```
ErrorHandler:
  ' ... individual code for error handling
  Resume Next
```

Use the `Resume Proceed` command to specify a jump point for continuing the program after error handling:

```
ErrorHandler:
  ' ... individual code for error handling
  Resume Proceed

Proceed:
  ' ... the program continues here after the error
```

The term Proceed is a label. It could be for example, A247. The syntax for label names is the same as for variable names.

To continue a program without an error message when an error occurs, use the following format:

```
Sub Test
```

```
  On Error Resume Next
  ' ... perform task during which an error may occur
End Sub
```

Use the `On Error Resume Next` command with caution as its effect is global.

Queries Regarding Error Information

In error handling, it is useful to have a description of the error and to know where and why the error occurred:

- The `Err` variable contains the number of errors that has occurred.
- The `Error$` variable contains a description of the error.
- The `Erl` variable contains the line number where the error occurred.

The call MsgBox "Error " & Err & ": " & Error$ & " (line : " & Erl & ")" shows how the error information can be displayed in a message window.

Note – VBA : Whereas VBA summarizes the error messages in a statistical object called `Err`, OpenOffice.org Basic provides the `Err, Error$`, and `Erl` variables.

The status information remains valid until the program encounters a `Resume` or `On Error` command, whereupon the information is reset.

Note – VBA : In VBA, the `Err.Clear` method of the `Err` object resets the error status after an error occurs. In OpenOffice.org Basic, this is accomplished with the `On Error` or `Resume` commands.

Tips for Structured Error Handling

Both the definition command, `On Error`, and the return command, `Resume`, are variants of the `Goto` construct.

If you want to cleanly structure your code to prevent generating errors when you use this construct, you should not use jump commands without monitoring them.

Care should be taken when you use the `On Error Resume Next` command as this dismisses all open error messages.

The best solution is to use only one approach for error handling within a program - keep error handling separate from the actual program code and do not jump back to the original code after the error occurs.

The following code is an example of an error handling procedure:

```
Sub Example
  ' Define error handler at the start of the function
  On Error Goto ErrorHandler
    ' ... Here is the actual program code
  On Error Goto 0           ' Deactivate error handling
    ' End of regular program implementation
  Exit Sub

 ' Start point of error handling
 ErrorHandler:
   ' Check whether error was expected
    If Err = ExpectedErrorNo Then
      ' ... Process error
    Else
      ' ... Warning of unexpected error
    End If
 On Error Goto 0            ' Deactivate error handling
End Sub
```

This procedure begins with the definition of an error handler, followed by the actual program code. At the end of the program code, the error handling is deactivated by the `On Error Goto 0` call and the procedure implementation is ended by the `Exit Sub` command (not to be confused with `End Sub`).

The example first checks if the error number corresponds to the expected number (as stored in the imaginary `ExpectedErrorNo` constant) and then handles the error accordingly. If another error occurs, the system outputs a warning. It is important to check the error number so that unanticipated errors can be detected.

The `On Error Goto 0` call at the end of the code resets the status information of the error (the error code in the `Err` system variables) so that an error occurring at a later date can be clearly recognized.

Other Instructions

Type...End Type

A *struct* is a collection of data fields, that can be manipulated as a single item. In older terms, you may think of a struct as a record, or part of a record.

The API often uses pre-defined structs, but these are *UNO structs*, a highly-specialized kind of struct.

Definition

With the `Type...End Type` statements, you can define your own (non-UNO) structs:

```
Type aMenuItem                          'assign the name of the type
    'Define the data fields within the struct. Each
    ' definition looks like a Dim statement, without the "Dim".
    aCommand as String
    aText as String
End Type                        'close the definition
```

Instance

The `Type` definition is only a pattern or template, not a set of actual variables. To make an *instance* of the type, actual variables that can be read and stored, use the `Dim as New` statement:

```
Dim maItem as New aMenuItem
```

Scope

As shown in the example below, the `Type` definition may be written at the start of a module (before the first `Sub` or `Function`). The definition will then be available to all routines in the module.

As of OpenOffice.org Version 3.0, unlike variables, there is no way to make the definition accessible outside of the module.

An instance of the new type *is* a variable, and follows the usual rules for variable scope (see Scope and Life Span of Variables).

An example of how to use the definition, and how to reference the fields within an instance, appears in the section on `With...End With`.

With...End With

Qualifiers

In general, Basic does not look inside a container, such as an `Object`, to see what names might be defined there. If you want to use such a name, you must tell Basic where to look. You do that by using the name of the object as a *qualifier*. Write it before the inner name, and separate it by a period:

```
MyObject.SomeName
```

Since containers may hold other containers, you may need more than one qualifier. Write the qualifiers in order, from outer to inner:

```
OuterObject.InnerObject.FarInsideObject.SomeName
```

These names may also be described as, "concatenated with the dot-operator ('.')".

The With Alternative

The `With...End With` bracketing statements provide an alternative to writing out all the qualifiers, every time - and some of the qualifiers in the API can be quite long. You specify the qualifiers in the `With` statement. Until Basic encounters the `End With` statement, it looks for *partly-qualified* names: names that begin with a period (unary dot-operator). The compiler uses the qualifiers from the `With` as though they were written in front of the partly-qualified name.

Example 1: A User-defined Struct

This example shows how you may define and use a struct, and how to reference the items within it, both with and without `With`. Either way, the names of the data fields (from the `Type` definition) must be qualified by the name of the instance (from the `Dim` statement).

```
Type aMenuItem
    aCommand as String
    aText as String
End Type

Sub Main
    'Create an instance of the user-defined struct.
    ' Note the keyword, "New".
    Dim maItem as New aMenuItem
    With maItem
        .aCommand = ".uno:Copy"
        .aText = "~Copy"
    End With

    MsgBox     "Command: " & maItem.aCommand & Chr(13) _
             & "Text: " & maItem.aText
End Sub
```

Example 2: Case statement

In Cells and Ranges, the following example has the qualifiers in the `Case` statements written out completely, for clarity. You can write it more easily, this way:

```
Dim Doc As Object
Dim Sheet As Object
Dim Cell As Object

Doc = ThisComponent
Sheet = Doc.Sheets(0)
Cell = Sheet.getCellByPosition(1,1)        'Cell "B2" (0-based!)
```

```
Cell.Value = 1000

With com.sun.star.table.CellContentType
  Select Case Cell.Type
    Case .EMPTY
      MsgBox "Content: Empty"
    Case .VALUE
      MsgBox "Content: Value"
    Case .TEXT
      MsgBox "Content: Text"
    Case .FORMULA
     MsgBox "Content: Formula"
  End Select
End With
```

Notice that the `With` construct must be entirely outside of the `Select` construct.

◆ ◆ ◆ CHAPTER 3

Runtime Library

The following sections present the central functions of the runtime library:

Conversion Functions

In many situations, circumstances arise in which a variable of one type has to be changed into a variable of another type.

Implicit and Explicit Type Conversions

The easiest way to change a variable from one type to another is to use an assignment.

```
Dim A As String
Dim B As Integer

B = 101
A = B
```

In this example, variable `A` is a string, and variable `B` is an integer. OpenOffice.org Basic ensures that variable `B` is converted to a string during assignment to variable `A`. This conversion is much more elaborate than it appears: the integer `B` remains in the working memory in the form of a two-byte long number. `A`, on the other hand, is a string, and the computer saves a one- or two-byte long value for each character (each number). Therefore, before copying the content from `B` to `A`, `B` has to be converted into `A`'s internal format.

Unlike most other programming languages, Basic performs type conversion automatically. However, this may have fatal consequences. Upon closer inspection, the following code sequence

```
Dim A As String
Dim B As Integer
Dim C As Integer

B = 1
C = 1
A = B + C
```

which at first glance seems straightforward, ultimately proves to be something of a trap. The Basic

interpreter first calculates the result of the addition process and then converts this into a string, which, as its result, produces the string 2.

If, on the other hand, the Basic interpreter first converts the start values `B` and `C` into a string and applies the plus operator to the result, it produces the string `11`.

The same applies when using variant variables:

```
Dim A
Dim B
Dim C

B = 1
C = "1"
A = B + C
```

Since variant variables may contain both numbers and strings, it is unclear whether variable `A` is assigned the number 2 or the string 11.

The error sources noted for implicit type conversions can only be avoided by careful programming; for example, by not using the variant data type.

To avoid other errors resulting from implicit type conversions, OpenOffice.org Basic offers a range of conversion functions, which you can use to define when the data type of an operation should be converted:

`CStr(Var)`

converts any data type into a string.

`CInt(Var)`

converts any data types into an integer value.

`CLng(Var)`

converts any data types into a long value.

`CSng(Var)`

converts any data types into a single value.

`CDbl(Var)`

converts any data types into a double value.

`CBool(Var)`

converts any data types into a Boolean value.

`CDate(Var)`

converts any data types into a date value.

You can use these conversion functions to define how OpenOffice.org Basic should perform these type conversion operations:

```
Dim A As String
Dim B As Integer
Dim C As Integer

B = 1
C = 1
A = CStr(B + C)          ' B and C are added together first, then
                         ' converted to the string "2"
A = CStr(B) + CStr(C)    ' B and C are converted into a string,then
                         ' combined to produce the string "11"
```

During the first addition in the example, OpenOffice.org Basic first adds the integer variables and then converts the result into a chain of characters. `A` is assigned the string `2`. In the second instance, the integer variables are first converted into two strings and then linked with one another by means of the assignment. `A` is therefore assigned the string `11`.

The numerical `CSng` and `CDbl` conversion functions also accept decimal numbers. The symbol defined in the corresponding country-specific settings must be used as the decimal point symbol. Conversely, the `CStr`

methods use the currently selected country-specific settings when formatting numbers, dates and time details.

The `Val` function is different from the `Csng, Cdbl` and `Cstr` methods. It converts a string into a number; however it always expects a period to be used as the decimal point symbol.

```
Dim A As String
Dim B As Double

A = "2.22"
B = Val(A)      ' Is converted correctly regardless of the
                ' country-specific settings
```

Checking the Content of Variables

In some instances, the date cannot be converted:

```
Dim A As String
Dim B As Date

A = "test"
B = A            ' Creates error message
```

In the example shown, the assignment of the `test` string to a date variable makes no sense, so the Basic interpreter reports an error. The same applies when attempting to assign a string to a Boolean variable:

```
Dim A As String
Dim B As Boolean

A = "test"
B = A            ' Creates error message
```

Again, the basic interpreter reports an error.

These error messages can be avoided by checking the program before an assignment, in order to establish whether the content of the variable to be assigned matches the type of the target variable. OpenOffice.org Basic provides the following test functions for this purpose:

`IsNumeric(Value)`

checks whether a value is a number.

`IsDate(Value)`

checks whether a value is a date.

`IsArray(Value)`

checks whether a value is an array.

These functions are especially useful when querying user input. For example, you can check whether a user has typed a valid number or date.

```
If IsNumeric(UserInput) Then
  ValidInput = UserInput
Else
  ValidInput = 0
  MsgBox "Error message."
End If
```

In the previous example, if the `UserInput` variable contains a valid numerical value, then this is assigned to the `ValidInput` variable. If `UserInput` does not contain a valid number, `ValidInput` is assigned the value `0` and an error message is returned.

While test functions exist for checking numbers, date details and arrays in OpenOffice.org Basic, a corresponding function for checking Boolean values does not exist. The functionality can, however, be imitated by using the `IsBoolean` function:

```
Function IsBoolean(Value As Variant) As Boolean
  On Error Goto ErrorIsBoolean:
  Dim Dummy As Boolean
  Dummy = Value
```

```
  IsBoolean = True
  On Error Goto 0
  Exit Sub

  ErrorIsBoolean:
  IsBoolean = False
  On Error Goto 0
End Function
```

The `IsBoolean` function defines an internal `Dummy` help variable of the Boolean type and tries to assign this to the transferred value. If assignment is successful, the function returns `True`. If it fails, a runtime error is produced, the error handler intercepts the error, and the function returns `False`.

Note – VBA : If a string in OpenOffice.org Basic contains a non-numerical value and if this is assigned to a number, OpenOffice.org Basic does not produce an error message, but stops converting the string at the first invalid character. This procedure differs from VBA. There, an error is triggered and program implementation terminated if a corresponding assignment is executed.

Strings

Working with Sets of Characters

When administering strings, OpenOffice.org Basic uses the set of Unicode characters. The `Asc` and `Chr` functions allow the Unicode value belonging to a character to be established and/or the corresponding character to be found for a Unicode value. The following expressions assign the various Unicode values to the code variable:

```
Code = Asc("A")          ' Latin letter A (Unicode-value 65)
Code = Asc("€")          ' Euro character (Unicode-value 8364)
Code = Asc("Л")          ' Cyrillic letter Л (Unicode-value 1083)
```

Conversely, the expression MyString = Chr(13) ensures that the `MyString` string is initialized with the value of the number `13`, which stands for a hard line break.

The `Chr` command is often used in Basic languages to insert control characters in a string. The assignment MyString = Chr(9) + "This is a test" + Chr(13) therefore ensures that the text is preceded by a tab character (Unicode-value 9) and that a hard line break (Unicode-value 13) is added after the text.

Accessing Parts of a String

OpenOffice.org Basic provides three functions that return partial strings, plus a length function:

`Left(MyString, Length)`

returns the first `Length` characters of `MyString`.

`Right(MyString, Length)`

returns the last `Length` characters of `MyString`.

`Mid(MyString, Start, Length)`

returns first `Length` characters of `MyString` as of the `Start` position.

`Len(MyString)`

returns the number of characters in `MyString`.

Here are a few example calls for the named functions:

```
Dim MyString As String
```

```
Dim MyResult As String
Dim MyLen As Integer

MyString = "This is a small test"
MyResult = Left(MyString,5)      ' Provides the string "This "
MyResult = Right(MyString, 5)    ' Provides the string " test"
MyResult = Mid(MyString, 8, 5)   ' Provides the string " a sm"
MyLen = Len(MyString)            ' Provides the value 20
```

Search and Replace

OpenOffice.org Basic provides the `InStr` function for searching for a partial string within another string:

```
ResultString = InStr (MyString, SearchString)
```

The `SearchString` parameter specifies the string to be searched for within `MyString`. The function returns a number that contains the position at which the `SearchString` first appears within `MyString`; a return value of zero indicates no match. If you want to find other matches for the string, the function also provides the opportunity to specify an optional start position from which OpenOffice.org Basic begins the search. In this case, the syntax of the function is:

```
ResultString = InStr(StartPosition, MyString, SearchString)
```

In the previous examples, `InStr` ignores uppercase and lowercase characters. To change the search so that `InStr` is case sensitive, add the parameter `0`, as shown in the following example:

```
ResultString = InStr(MyString, SearchString, 0)
```

Using the previous functions for editing strings, programmers can search for and replace one string in another string:

```
Function Replace(Source As String, Search As String, NewPart As String)
  Dim Result As String
  Dim StartPos As Long
  Dim CurrentPos As Long

  Result = ""
  StartPos = 1
  CurrentPos = 1

  If Search = "" Then
    Result = Source
  Else
    Do While CurrentPos <> 0
      CurrentPos = InStr(StartPos, Source, Search)
      If CurrentPos <> 0 Then
        Result = Result + Mid(Source, StartPos, _
        CurrentPos - StartPos)
        Result = Result + NewPart
        StartPos = CurrentPos + Len(Search)
      Else
        Result = Result + Mid(Source, StartPos, Len(Source))
      End If               ' Position <> 0
    Loop
  End If

  Replace = Result
End Function
```

The function searches through the transferred `Search` string in a loop by means of `InStr` in the original term `Source`. If it finds the search term, it takes the part before the expression and writes it to the `Result` return buffer. It adds the `NewPart` section at the point of the search term `Search`. If no more matches are found for the search term, the function establishes the part of the string still remaining and adds this to the return buffer. It returns the string produced in this way as the result of the replacement process.

Since replacing parts of character sequences is one of the most frequently used functions, the `Mid` function in OpenOffice.org Basic has been extended so that this task is performed automatically. The following example replaces three characters with the string `is` from the sixth position of the `MyString` string.

```
Dim MyString As String

MyString = "This was my text"
Mid(MyString, 6, 3, "is")
```

Warning – When it is used with 4 arguments, to replace a sub-string in a string, `Mid` is an **instruction**, not a function : it does not return any value !

Formatting Strings

The `Format` function formats numbers as a string. To do this, the function expects a `Format` expression to be specified, which is then used as the template for formatting the numbers. Each place holder within the template ensures that this item is formatted correspondingly in the output value. The five most important place holders within a template are the zero (`0`), pound sign (`#`), period (`.`), comma (`,`) and dollar sign (`$`) characters.

The `0` character within the template ensures that a number is always placed at the corresponding point. If a number is not provided, 0 is displayed in its place.

A `.` stands for the decimal point symbol defined by the operating system in the country-specific settings.

The example below shows how the `0` and `.` characters can define the digits after the decimal point in an expression:

```
MyFormat = "0.00"
MyString = Format(-1579.8, MyFormat)     ' Provides "-1579,80"
MyString = Format(1579.8, MyFormat)      ' Provides "1579,80"
MyString = Format(0.4, MyFormat)         ' Provides "0,40"
MyString = Format(0.434, MyFormat)       ' Provides "0,43"
```

In the same way, zeros can be added in front of a number to achieve the desired length:

```
MyFormat = "0000.00"
MyString = Format(-1579.8, MyFormat)     ' Provides "-1579,80"
MyString = Format(1579.8, MyFormat)      ' Provides "1579,80"
MyString = Format(0.4, MyFormat)         ' Provides "0000,40"
MyString = Format(0.434, MyFormat)       ' Provides "0000,43"
```

A `,` represents the character that the operating system uses for a thousands separator, and the `#` stands for a digit or place that is only displayed if it is required by the input string.

```
MyFormat = "#,##0.00"
MyString = Format(-1579.8, MyFormat)     ' Provides "-1.579,80"
MyString = Format(1579.8, MyFormat)      ' Provides "1.579,80"
MyString = Format(0.4, MyFormat)         ' Provides "0,40"
MyString = Format(0.434, MyFormat)       ' Provides "0,43"
```

In place of the `$` place holder, the `Format` function displays the relevant currency symbol defined by the system (this example assumes a European locale has been defined):

```
MyFormat = "#,##0.00 $"
MyString = Format(-1579.8, MyFormat)     ' Provides "-1.579,80 €"
MyString = Format(1579.8, MyFormat)      ' Provides "1.579,80 €"
MyString = Format(0.4, MyFormat)         ' Provides "0,40 €"
MyString = Format(0.434, MyFormat)       ' Provides "0,43 €"
```

The format instructions used in VBA for formatting date and time details can also be used:

```
sub main
    dim myDate as date
    myDate = "01/06/98"
    TestStr = Format(myDate, "mm-dd-yyyy") ' 01-06-1998
    MsgBox TestStr
end sub
```

Date and Time

OpenOffice.org Basic provides the `Date` data type, which saves the date and time details in binary format.

Specification of Date and Time Details within the Program Code

You can assign a date to a date variable through the assignment of a simple string:

```
Dim MyDate As Date
MyDate = "24.1.2002"
```

This assignment can function properly because OpenOffice.org Basic automatically converts the date value defined as a string into a date variable. This type of assignment, however, can cause errors, date and time values are defined and displayed differently in different countries.

Since OpenOffice.org Basic uses the country-specific settings of the operating system when converting a string into a date value, the expression shown previously only functions correctly if the country-specific settings match the string expression.

To avoid this problem, the `DateSerial` function should be used to assign a fixed value to a date variable:

```
Dim MyVar As Date
MyDate = DateSerial (2001, 1, 24)
```

The function parameter must be in the sequence: year, month, day. The function ensures that the variable is actually assigned the correct value regardless of the country-specific settings

The `TimeSerial` function formats time details in the same way that the `DateSerial` function formats dates:

```
Dim MyVar As Date
MyDate =  TimeSerial(11, 23, 45)
```

Their parameters should be specified in the sequence: hours, minutes, seconds.

Extracting Date and Time Details

The following functions form the counterpart to the `DateSerial` and `TimeSerial` functions:

`Day(MyDate)`

returns the day of the month from `MyDate`.

`Month(MyDate)`

returns the month from `MyDate`.

`Year(MyDate)`

returns the year from `MyDate`.

`Weekday(MyDate)`

returns the number of the weekday from `MyDate`.

`Hour(MyTime)`

returns the hours from `MyTime`.

`Minute(MyTime)`

returns the minutes from `MyTime`.

`Second(MyTime)`

returns the seconds from `MyTime`.

These functions extract the date or time sections from a specified `Date` variable. The following example checks whether the date saved in `MyDate` is in the year 2003.

```
Dim MyDate As Date
' ... Initialization of MyDate

If Year(MyDate) = 2003 Then
  ' ... Specified date is in the year 2003
End If
```

In the same way, the following example checks whether `MyTime` is between 12 and 14 hours.

```
Dim MyTime As Date
' ... Initialization of MyTime

If Hour(MyTime) >= 12 And Hour(MyTime) < 14 Then
  ' ... Specified time is between 12 and 14 hours
End If
```

The `Weekday` function returns the number of the weekday for the transferred date:

```
Dim MyDate As Date
Dim MyWeekday As String
' ... initialize MyDate

Select Case WeekDay(MyDate)
  case 1
    MyWeekday = "Sunday"
  case 2
    MyWeekday = "Monday"
  case 3
    MyWeekday = "Tuesday"
  case 4
    MyWeekday = "Wednesday"
  case 5
    MyWeekday = "Thursday"
  case 6
    MyWeekday = "Friday"
  case 7
    MyWeekday = "Saturday"
End Select
```

Note – Sunday is considered the first day of the week.

Retrieving System Date and Time

The following functions are available in OpenOffice.org Basic to retrieve the system time and system date:

`Date`

returns the present date as a string. The format depends on localization settings.

`Time`

returns the present time as a string.

`Now`

returns the present point in time (date and time) as a combined value of type `Date`.

Files and Directories

Working with files is one of the basic tasks of an application. The OpenOffice.org API provides you with a whole range of objects with which you can create, open and modify Office documents. These are presented in detail in the Introduction to the OpenOffice.org API. Regardless of this, in some instances you will have to directly access the file system, search through directories or edit text files. The runtime library from OpenOffice.org Basic provides several fundamental functions for these tasks.

Note – Some DOS-specific file and directory functions are no longer provided in OpenOffice.org, or their function is only limited. For example, support for the `ChDir`, `ChDrive` and `CurDir` functions is not provided. Some DOS-specific properties are no longer used in functions that expect file properties as parameters (for example, to differentiate from concealed files and system files). This change became necessary to ensure the greatest possible level of platform independence for OpenOffice.org.

Administering Files

Compatibility Mode

The `CompatibilityMode` statement and function provide greater compatibility with VBA, by changing the operation of certain functions. The effect on any particular function is described with that function, below.

As a statement, `CompatibilityMode( value )` takes a Boolean value to set or clear the mode. As a function, `CompatibilityMode()` returns the Boolean value of the mode.

```
CompatibilityMode( True ) 'set mode
CompatibilityMode( False) 'clear mode

Dim bMode as Boolean
bMode = CompatibilityMode()
```

Searching Through Directories

The `Dir` function in OpenOffice.org Basic is responsible for searching through directories for files and sub-directories. When first requested, a string containing the path of the directories to be searched must be assigned to `Dir` as its first parameter. The second parameter of `Dir` specifies the file or directory to be searched for. OpenOffice.org Basic returns the name of the first directory entry found. To retrieve the next entry, the `Dir` function should be requested without parameters. If the `Dir` function finds no more entries, it returns an empty string.

The following example shows how the `Dir` function can be used to request all files located in one directory. The procedure saves the individual file names in the `AllFiles` variable and then displays this in a message box.

```
Sub ShowFiles
  Dim NextFile As String
  Dim AllFiles As String

  AllFiles = ""
  NextFile = Dir("C:\", 0)

  While NextFile  <> ""
    AllFiles = AllFiles & Chr(13) &  NextFile
    NextFile = Dir
  Wend

  MsgBox AllFiles
End Sub
```

The `0` (zero) used as the second parameter in the `Dir` function ensures that `Dir` only returns the names of files and directories are ignored. The following parameters can be specified here:

- `0` : returns normal files
- `16` : sub-directories

The following example is virtually the same as the preceding example, but the `Dir` function transfers the value 16 as a parameter, which returns the sub-directories of a folder rather than the file names.

```
Sub ShowDirs
  Dim NextDir As String
  Dim AllDirs As String

  AllDirs = ""
  NextDir = Dir("C:\", 16)

  While NextDir <> ""
    AllDirs = AllDirs & Chr(13) &  NextDir
    NextDir = Dir
  Wend

  MsgBox AllDirs
End Sub
```

Note – VBA : When requested in OpenOffice.org Basic, the `Dir` function, using the parameter 16, only returns the sub-directories of a folder. In VBA, the function also returns the names of the standard files so that further checking is needed to retrieve the directories only. When using the `CompatibilityMode ( true )` function, OpenOffice.org Basic behaves like VBA and the Dir function, using parameter 16, returns sub-directories and standard files.

Note – VBA : The options provided in VBA for searching through directories specifically for files with the **concealed**, **system file**, **archived**, and **volume name** properties does not exist in OpenOffice.org Basic because the corresponding file system functions are not available on all operating systems.

Note – VBA : The path specifications listed in `Dir` may use the * and ? place holders in both VBA and OpenOffice.org Basic. In OpenOffice.org Basic, the * place holder may however only be the last character of a file name and/or file extension, which is not the case in VBA.

Creating and Deleting Directories

OpenOffice.org Basic provides the `MkDir` function for creating directories.

```
MkDir ("C:\SubDir1")
```

This function creates directories and sub-directories. All directories needed within a hierarchy are also created, if required. For example, if only the `C:\SubDir1` directory exists, then a call

```
MkDir ("C:\SubDir1\SubDir2\SubDir3\")
```

creates both the `C:\SubDir1\SubDir2` directory and the `C:\SubDir1\SubDir2\SubDir3` directory.

The `RmDir` function deletes directories.

```
RmDir ("C:\SubDir1\SubDir2\SubDir3\")
```

If the directory contains sub-directories or files, these are **also deleted.** You should therefore be careful when using `RmDir`.

Note – VBA : In VBA, the `MkDir` and `RmDir` functions only relate to the current directory. In OpenOffice.org Basic on the other hand, `MkDir` and `RmDir` can be used to create or delete levels of directories.

Note – VBA : In VBA, `RmDir` produces an error message if a directory contains a file. In OpenOffice.org Basic, the directory **and all its files** are deleted. If you use the `CompatibilityMode ( true )` function, OpenOffice.org Basic will behave like VBA.

Copying, Renaming, Deleting and Checking the Existence of Files

The following call creates a copy of the `Source` file under the name of `Destination`:

```
FileCopy(Source, Destination)
```

With the help of the following function you can rename the `OldName` file with `NewName`. The `As` keyword syntax, and the fact that a comma is not used, goes back to the roots of the Basic language.

```
Name OldName As NewName
```

The following call deletes the `Filename` file. If you want to delete directory (including its files) use the `RmDir` function.

```
Kill(Filename)
```

The `FileExists` function can be used to check whether a file exists:

```
If FileExists(Filename) Then
  MsgBox "file exists."
End If
```

Reading and Changing File Properties

When working with files, it is sometimes important to be able to establish the file properties, the time the file was last changed and the length of the file.

The following call returns some properties about a file.

```
Dim Attr As Integer
Attr = GetAttr(Filename)
```

The return value is provided as a bit mask in which the following values are possible:

- 1 : read-only file
- 16 : name of a directory

The following example determines the bit mask of the `test.txt` file and checks whether this is read-only whether it is a directory. If neither of these apply, `FileDescription` is assigned the "normal" string.

```
Dim FileMask As Integer
Dim FileDescription As String

FileMask = GetAttr("test.txt")

If (FileMask AND 1) > 0 Then
  FileDescription = FileDescription & " read-only "
End IF

If (FileMask AND 16) > 0 Then
  FileDescription = FileDescription & " directory "
End IF

If FileDescription = "" Then
  FileDescription = " normal "
End IF

MsgBox FileDescription
```

Note – VBA : The flags used in VBA for querying the **concealed**, **system file,archived** and **volume name** file properties are not supported in OpenOffice.org Basic because these are Windows-specific and are not or are only partially available on other operating systems.

The `SetAttr` function permits the properties of a file to be changed. The following call can therefore be used to provide a file with read-only status:

```
SetAttr("test.txt", 1)
```

An existing read-only status can be deleted with the following call:

```
SetAttr("test.txt", 0)
```

The date and time of the last amendment to a file are provided by the `FileDateTime` function. The date is formatted here in accordance with the country-specific settings used on the system.

```
FileDateTime("test.txt")   ' Provides date and time of the last file amendment.
```

The `FileLen` function determines the length of a file in bytes (as long integer value).

```
FileLen("test.txt")      ' Provides the length of the file in bytes
```

Writing and Reading Text Files

OpenOffice.org Basic provides a whole range of methods for reading and writing files. The following explanations relate to working with text files (**not** text documents).

Writing Text Files

Before a text file is accessed, it must first be opened. To do this, a free **file handle** is needed, which clearly identifies the file for subsequent file access.

The `FreeFile` function is used to create a free file handle:

```
FileNo = FreeFile
```

`FileNo` is an integer variable that receives the file handle. The handle is then used as a parameter for the `Open` instruction, which opens the file.

To open a file so that it can be written as a text file, the `Open` call is:

```
Open Filename For Output As #FileNo
```

`Filename` is a string containing the name of the file. `FileNo` is the handle created by the `FreeFile` function.

Once the file is opened, the `Print` instruction can create the file contents, line by line:

```
Print #FileNo, "This is a test line."
```

`FileNo` also stands for the file handle here. The second parameter specifies the text that is to be saved as a line of the text file.

Once the writing process has been completed, the file must be closed using a `Close` call:

```
Close #FileNo
```

Again here, the file handle should be specified.

The following example shows how a text file is opened, written, and closed:

```
Dim FileNo As Integer
Dim CurrentLine As String
Dim Filename As String

Filename = "c:\data.txt"            ' Define file name
FileNo = FreeFile               ' Establish free file handle

Open Filename For Output As #FileNo         ' Open file (writing mode)
Print #FileNo, "This is a line of text"      ' Save line
Print #FileNo, "This is another line of text"   ' Save line
Close #FileNo                  ' Close file
```

Reading Text Files

Text files are read in the same way that they are written. The `Open` instruction used to open the file contains the `For Input` expression in place of the `For Output` expression and, rather than the Print command for writing data, the Line Input instruction should be used to read the data.

Finally, when calling up a text file, the `eof` instruction is used to check whether the end of the file has been reached:

```
eof(FileNo)
```

The following example shows how a text file can be read:

```
Dim FileNo As Integer
Dim CurrentLine As String
Dim File As String
Dim Msg as String

' Define filename
Filename = "c:\data.txt"

' Establish free file handle
FileNo = Freefile

' Open file (reading mode)
```

```
Open Filename For Input As FileNo

' Check whether file end has been reached
Do While not eof(FileNo)
  ' Read line
  Line Input #FileNo, CurrentLine
  If CurrentLine <>"" then
    Msg = Msg & CurrentLine & Chr(13)
  end if
Loop


' Close file

Close #FileNo
Msgbox Msg
```

The individual lines are retrieved in a `Do While` loop, saved in the `Msg` variable, and displayed at the end in a message box.

Message and Input Boxes

OpenOffice.org Basic provides the `MsgBox` and `InputBox` functions for basic user communication.

Displaying Messages

`MsgBox` displays a basic information box, which can have one or more buttons. In its simplest variant the `MsgBox` only contains text and an OK button:

```
MsgBox "This is a piece of information!"
```

The appearance of the information box can be changed using a parameter. The parameter provides the option of adding additional buttons, defining the pre-assigned button, and adding an information symbol.

Note – By convention, the symbolic names given below are written in UPPERCASE, to mark them as predefined, rather than user-defined. However, the names are not case-sensitive.

The values for selecting the buttons are:

- `0, MB_OK` - OK button
- `1, MB_OKCANCEL` - OK and Cancel button
- `2, MB_ABORTRETRYIGNORE` - Abort, Retry, and Ignore buttons
- `3, MB_YESNOCANCEL` - Yes, No, and Cancel buttons
- `4, MB_YESNO` - Yes and No buttons
- `5, MB_RETRYCANCEL` - Retry and Cancel buttons

To set a button as the default button, add one of the following values to the parameter value from the list of button selections. For example, to create Yes, No and Cancel buttons (value 3) where Cancel is the default (value 512), the parameter value is 3 + 512 = 515. The expression `MB_YESNOCANCEL + MB_DEFBUTTON3` is harder to write, but easier to understand.

- `0, MB_DEFBUTTON1` - First button is default value
- `256, MB_DEFBUTTON2` - Second button is default value
- `512, MB_DEFBUTTON3` - Third button is default value

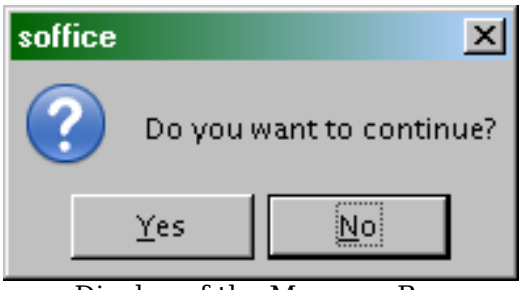
Finally, the following information symbols are available and can also be displayed by adding the relevant parameter values:

- `16, MB_ICONSTOP` - Stop sign
- `32, MB_ICONQUESTION` - Question mark
- `48, MB_ICONEXCLAMATION` - Exclamation point

- `64, MB_ICONINFORMATION` - Tip icon

The following call displays an information box with the Yes and No buttons (value 4), of which the second button (No) is set as the default value (value 256) and which also receives a question mark (value 32), 4+256+32=292.

```
MsgBox "Do you want to continue?",  292
' or,
MsgBox "Do you want to continue?", MB_YESNO + MB_DEFBUTTON2 + MB_ICONQUESTION
```



Display of the Message Box

If an information box contains several buttons, then a return value should be queried to determine which button has been pressed. The following return values are available in this instance:

- `1, IDOK` - Ok
- `2, IDCANCEL` - Cancel
- `3, IDABORT` - Abort
- `4, IDRETRY` - Retry
- `5` - Ignore
- `6, IDYES` - Yes
- `7, IDNO` - No

In the previous example, checking the return values could be as follows:

```
Dim iBox as Integer
iBox = MB_YESNO + MB_DEFBUTTON2 + MB_ICONQUESTION
If MsgBox ("Do you want to continue?", iBox) = IDYES Then
' or,
If MsgBox ("Do you want to continue?",  292) = 6 Then
  ' Yes button pressed
Else
  ' No button pressed
End IF
```

In addition to the information text and the parameter for arranging the information box, `MsgBox` also permits a third parameter, which defines the text for the box title:

```
MsgBox "Do you want to continue?",  292, "Box Title"
```

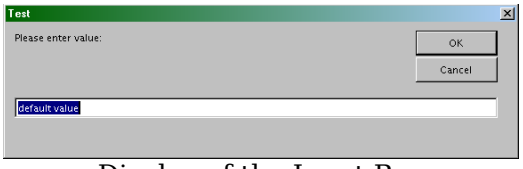
If no box title is specified, the default is “soffice”.

Input Box For Querying Simple Strings

The `InputBox` function queries simple strings from the user. It is therefore a simple alternative to configuring dialogs. `InputBox` receives three standard parameters:

- An information text.
- A box title.
- A default value which can be added within the input area.

```
InputVal = InputBox("Please enter value:", "Test", "default value")
```



Display of the Input Box

- The dimensions of the `InputBox` window cannot be changed.

- If the user clicks the OK button, the `InputBox` returns the string typed by the user (or the default string if it was not changed).
- If the user clicks the Cancel button or closes the window, the `InputBox` returns an empty string.

Other Functions

Beep

The `Beep` function causes the system to play a sound that can be used to warn the user of an incorrect action. `Beep` does not have any parameters:

```
Beep     ' creates an informative tone
```

Shell

External programs can be started using the Shell function.

```
Shell(Pathname, Windowstyle, Param, bSync)
```

Pathname

the path of the program to be executed.

In MS-Windows, use `ConvertToURL(Pathname)` otherwise the command will not work if `Pathname` contains spaces or national characters.

Windowstyle

the window in which the program is started.

The following values are possible:

0 - The program receives the focus and is started in a concealed window.

1 - The program receives the focus and is started in a normal-sized window.

2 - The program receives the focus and is started in a minimized window.

3 - The program receives the focus and is started in a maximized window.

4 - The program is started in a normal-sized window, without receiving the focus.

6 - The program is started in a minimized window, the focus remains in the current window.

10 - The program is started in full screen mode.

Param

command line parameters to be transferred to the program to be started.

bSync

wait for shell command to finish flag

`true` - wait for shell command to finish

`false` - don't wait for shell command to finish

Wait and WaitUntil

The `Wait` statement suspends program execution for a specified time. The waiting period is specified in milliseconds. The command:

```
Wait 2000
```

specifies a delay of 2 seconds (2000 milliseconds).

The `WaitUntil` statement provides a greater degree of compatibility with VBA parameter usage. `WaitUntil` takes a parameter of type `Date`, with a combined date and time value. The command:

```
WaitUntil Now + TimeValue("00:00:02")
```

specifies the same delay, 2 seconds, as the previous example.

Environ

The `Environ` function returns the environmental variables of the operating system. Depending on the system and configuration, various types of data are saved here. The following call determines the environment variables of temporary directory of the operating system:

```
Dim TempDir
TempDir=Environ ("TEMP")
```

◆ ◆ ◆ CHAPTER 4

Introduction to the API

OpenOffice.org objects and methods, such as paragraphs, spreadsheets, and fonts, are accessible to OpenOffice.org Basic through the OpenOffice.org application programming interface, or API. Through the API, for example, documents can be created, opened, modified and printed. The API can be used not only by OpenOffice.org Basic, but also by other programming languages, such as Java and C++. The interface between the API and various programming languages is provided by something called **Universal Network Objects** (UNO).

This chapter provides a background on the API. Building on this background, the following chapters will show how the API can be used to make OpenOffice.org do what you want it to do.

Universal Network Objects (UNO)

OpenOffice.org provides a programming interface in the form of the Universal Network Objects (UNO). This is an object-oriented programming interface which OpenOffice.org sub-divides into various objects which for their part ensure program-controlled access to the Office package.

Since OpenOffice.org Basic is a procedural programming language, several linguistic constructs have had to be added to it which enable the use of UNO.

To use a Universal Network Object in OpenOffice.org Basic, you will need a variable declaration for the associated object. The declaration is made using the `Dim` instruction (see The Language of OpenOffice.org Basic). The `Object` type designation should be used to declare an object variable:

```
Dim Obj As Object
```

The call declares an object variable named `Obj`.

The object variable created must then be initialized so that it can be used. This can be done using the `createUnoService` function:

```
Obj = createUnoService("com.sun.star.frame.Desktop")
```

This call assigns to the `Obj` variable a reference to the newly created object. `com.sun.star.frame.Desktop` resembles an object type; however in UNO terminology it is called a service rather than a type. In accordance with UNO philosophy, an Obj is described as a reference to an object which supports the

```
com.sun.star.frame.Desktop
```

service. The service term used in OpenOffice.org Basic therefore corresponds to the type and class terms used in other programming languages.

There is, however, one main difference: a Universal Network Object may support several services at the

same time. Some UNO services in turn support other services so that, through one object, you are provided with a whole range of services. For example, that the aforementioned object, which is based on the

```
com.sun.star.frame.Desktop
```

service, can also include other services for loading documents and for ending the program.

Note – VBA : Whereas the structure of an object in VBA is defined by the class to which it belongs, in OpenOffice.org Basic the structure is defined through the services which it supports. A VBA object is always assigned to precisely one single class. A OpenOffice.org Basic object can, however, support several services.

Properties and Methods

An object in OpenOffice.org Basic provides a range of properties and methods which can be called by means of the object.

Properties

Properties are like the properties of an object; for example, `Filename` and `Title` for a `Document` object.

The properties are set by means of a simple assignment:

```
Document.Title = "OpenOffice.org Basic Programmer's Guide"
Document.Filename = "basguide.odt"
```

A property, just like a normal variable, has a type that defines which values it can record. The preceding `Filename` and `Title` properties are of the string type.

Real Properties and Imitated Properties

Most of the properties of an object in OpenOffice.org Basic are defined as such in the UNO description of the service. In addition to these "real" properties, there are also properties in OpenOffice.org Basic which consist of two methods at the UNO level. One of these is used to query the value of the property and the other is issued to set it (`get` and `set` methods). The property has been virtually imitated from two methods. Character objects in UNO, for example, provide the `getPosition` and `setPosition` methods through which the associated key point can be called up and changed. The OpenOffice.org Basic programmer can access the values through the `Position` property. Regardless of this, the original methods are also available (in our example, `getPosition` and `setPosition`).

Methods

Methods can be understood as functions that relate directly to an object and through which this object is called. The preceding `Document` object could, for example, provide a `Save` method, which can be called as follows:

```
Document.Save()
```

Methods, just like functions, may contain parameters and return values. The syntax of such method calls is oriented towards classic functions. The following call also specifies the `True` parameter for the document object when requesting the Save method.

```
Ok = Document.Save(True)
```

Once the method has been completed, `Save` saves a return value in the `Ok` variable.

Modules, Services and Interfaces

OpenOffice.org provides hundreds of services. To provide an overview of these services, they have been combined into modules. The modules are of no other functional importance for OpenOffice.org Basic programmers. When specifying a service name, it is only the module name which is of any importance because this must be also listed in the name. The complete name of a service consists of the `com.sun.star` expression, which specifies that it is a OpenOffice.org service, followed by the module name, such as `frame`, and finally the actual service name, such as `Desktop`. The complete name in the named example would be:

```
com.sun.star.frame.Desktop
```

In addition to the module and service terms, UNO introduces the term **'interface'**. While this term may be familiar to Java programmers, it is not used in Basic.

An interface combines several methods. In the strictest sense of the word, a service in UNO does not support methods, but rather interfaces, which in turn provide different methods. In other words, the methods are assigned (as combinations) to the service in interfaces. This detail may be of interest in particular to Java- or C++ programmers, since in these languages, the interface is needed to request a method. In OpenOffice.org Basic, this is irrelevant. Here, the methods are called directly by means of the relevant object.

For an understanding of the API, it is, however, useful to have the assignment of methods to various interfaces handy, since many interfaces are used in the different services. If you are familiar with an interface, then you can transfer your knowledge from one service to another.

Some central interfaces are used so frequently, triggered by different services, that they are shown again at the end of this chapter.

Tools for Working with UNO

The question remains as to which objects — or services if we are going to remain with UNO terminology — support which properties, methods and interfaces and how these can be determined. In addition to this guide, you can get more information about objects from the following sources: the `supportsService` method, the debug methods as well as the Developer's Guide, and the API reference.

The supportsService Method

A number of UNO objects support the `supportsService` method, with which you can establish whether an object supports a particular service. The following call, for example, determines whether the `TextElement` object supports the com.sun.star.text.Paragraph service.

```
Ok = TextElement.supportsService("com.sun.star.text.Paragraph")
```

Debug Properties

Every UNO object knows what properties, methods and interfaces it already contains. OpenOffice.org Basic provides properties that return these in the form of a string containing a list. The corresponding properties are:

`DBG_properties`

returns a string containing all properties of an object

`DBG_methods`

returns a string containing all methods of an object

DBG_supportedInterfaces

returns a string containing all interfaces which support an object.

The following program code shows how DBG_properties and DBG_methods can be used in real-life applications. It first creates the com.sun.star.frame.Desktop service and then displays the supported properties and methods in message boxes.

```
Dim Obj As Object
Obj = createUnoService("com.sun.star.frame.Desktop")

MsgBox Obj.DBG_Properties
MsgBox Obj.DBG_methods
```

When using DBG_properties, note that the function returns all properties that the services offered by the object can theoretically support. No assurances are, however, provided for whether these can also be used by the object in question. In very rare cases, before calling up some property, use the IsEmpty function to check whether it is actually available.

Debugging tools

Using the DBG_ properties is a very crude method to discover the contents of an API objects.

The watch window of the Basic IDE can display the properties of a Uno object (but not the methods, not the interfaces).

To display all information available from an object and link to the corresponding API documentation, use instead **Xray tool or MRI tool**.

Note – VBA : OpenOffice.org Basic does **not** provide code completion. Only at run-time can you find out which properties or methods are available for an object. All the above debug tools work on a running program.

API Reference

More information about the available services, and their interfaces, methods and properties can be found in the reference for the OpenOffice.org API.

Overview of Central Interfaces

Some interfaces of OpenOffice.org can be found in many parts of the OpenOffice.org API. They define sets of methods for abstract tasks which can be applied to various problems. Here, you will find an overview of the most common of these interfaces.

The origin of the objects is explained at a later point in this guide. At this point, only some of the abstract aspects of objects, for which the OpenOffice.org API provides some central interfaces, are discussed.

Creating Context-Dependent Objects

The OpenOffice.org API provides two options for creating objects. One can be found in the createUnoService function mentioned at the start of this chapter. createUnoService creates an object which can be used universally. Such objects and services are also known as context-independent services.

In addition to context-independent services, there are also context-dependent services whose objects are

only useful when used in conjunction with another object. A drawing object for a spreadsheet document, for example, can therefore only exist in conjunction with this one document.

com.sun.star.lang.XMultiServiceFactory Interface

Context-dependent objects are usually created by means of an object method, on which the object depends. The `createInstance` method, which is defined in the `XMultiServiceFactory` interface, is used in particular in the document objects.

The drawing object can, for example, be created as follows using a spreadsheet object:

```
Dim RectangleShape As Object
RectangleShape = _
  Spreadsheet.createInstance("com.sun.star.drawing.RectangleShape")
```

A paragraph template in a text document is created in the same way:

```
Dim Style as Object
Style = Textdocument.createInstance("com.sun.star.style.ParagraphStyle")
```

Named Access to Subordinate Objects

The `XNameAccess` and `XNameContainer` interfaces are used in objects that contain subordinate objects, which can be addressed using a natural language name.

While `XNamedAccess` permits access to the individual objects, `XNameContainer` takes on the insertion, modification and deletion of elements.

com.sun.star.container.XNameAccess Interface

An example of the use of `XNameAccess` is provided by the `sheets` object of a spreadsheet. It combines all the pages within the spreadsheet. The individual pages are accessed from the `sheets` object, by using the `getByName` method from `XNameAccess`:

```
Dim Sheets As Object
Dim Sheet As Object

Sheets = Spreadsheet.Sheets
Sheet = Sheets.getByName("Sheet1")
```

The `getElementNames` method provides an overview of the names of all elements. As a result, it returns a data field containing the names. The following example shows how all element names of a spreadsheet can thereby be determined and displayed in a loop:

```
Dim Sheets As Object
Dim SheetNames
Dim I As Integer

Sheets = Spreadsheet.Sheets
SheetNames = Sheets.getElementNames

For I=LBound(SheetNames) To UBound(SheetNames)
  MsgBox SheetNames(I)
Next I
```

The `hasByName` method of the `XNameAccess` interface reveals whether a subordinate object with a particular name exists within the basic object. The following example therefore displays a message that informs the user whether the `Spreadsheet` object contains a page of the name `Sheet1`.

```
Dim Sheets As Object

Sheets = Spreadsheet.Sheets
If Sheets.HasByName("Sheet1") Then
  MsgBox " Sheet1 available"
Else
  MsgBox "Sheet1 not available"
End If
```

com.sun.star.container.XNameContainer Interface

The `XNameContainer` interface takes on the insertion, deletion and modification of subordinate elements in a basic object. The functions responsible are `insertByName`, `removeByName` and `replaceByName`.

The following is a practical example of this. It calls a text document, which contains a `StyleFamilies` object and uses this to in turn make the paragraph templates (ParagraphStyles) of the document available.

```
Dim StyleFamilies As Object
Dim ParagraphStyles As Object
Dim NewStyle As Object

StyleFamilies = Textdoc.StyleFamilies
ParagraphStyles = StyleFamilies.getByName("ParagraphStyles")
ParagraphStyles.insertByName("NewStyle", NewStyle)
ParagraphStyles.replaceByName("ChangingStyle", NewStyle)
ParagraphStyles.removeByName("OldStyle")
```

The `insertByName` line inserts the `NewStyle` style under the name of the same name in the `ParagraphStyles` object. The `replaceByName` line changes the object behind `ChangingStyle` into `NewStyle`. Finally, the `removeByName` call removes the object behind `OldStyle` from `ParagraphStyles`.

Index-Based Access to Subordinate Objects

The `XIndexAccess` and `XIndexContainer` interfaces are used in objects which contain subordinate objects and which can be addressed using an index.

`XIndexAccess` provides the methods for accessing individual objects. `XIndexContainer` provides methods for inserting and removing elements.

com.sun.star.container.XIndexAccess Interface

`XIndexAccess` provides the `getByIndex` and `getCount` methods for calling the subordinate objects. `getByIndex` provides an object with a particular index. `getCount` returns how many objects are available.

```
Dim Sheets As Object
Dim Sheet As Object
Dim I As Integer

Sheets = Spreadsheet.Sheets

For I = 0 to Sheets.getCount() - 1
  Sheet = Sheets.getByIndex(I)
  ' Editing sheet
Next I
```

The example shows a loop that runs through all sheet elements one after another and saves a reference to each in the `Sheet` object variable. When working with the indexes, note that `getCount` returns the number of elements. The elements in `getByIndex` however are numbered beginning with 0. The counting variable of the loop therefore runs from 0 to `getCount()-1`.

com.sun.star.container.XIndexContainer Interface

The `XIndexContainer` interface provides the `insertByIndex` and `removeByIndex` functions. The parameters are structured in the same way as the corresponding functions in `XNameContainer`.

Iterative Access to Subordinate Objects

In some instances, an object may contain a list of subordinate objects that cannot be addressed by either a name or an index. In these situations, the `XEnumeration` and `XenumerationAccess` interfaces are

appropriate. They provide a mechanism through which all subordinate elements of an objects can be passed, step by step, without having to use direct addressing.

com.sun.star.container.XEnumeration and XenumerationAccess Interfaces

The basic object must provide the `XEnumerationAccess` interface, which contains only a `createEnumeration` method. This returns an auxiliary object, which in turn provides the `XEnumeration` interface with the `hasMoreElements` and `nextElement` methods. Through these, you then have access to the subordinate objects.

The following example steps through all the paragraphs of a text:

```
Dim ParagraphEnumeration As Object
Dim Paragraph As Object

ParagraphEnumeration = Textdoc.Text.createEnumeration

While ParagraphEnumeration.hasMoreElements()
  Paragraph = ParagraphEnumeration.nextElement()
Wend
```

The example first creates a `ParagraphEnumeration` auxiliary object. This gradually returns the individual paragraphs of the text in a loop. The loop is terminated as soon as the `hasMoreElements` method returns the `False` value, signaling that the end of the text has been reached.

◆ ◆ ◆ CHAPTER 5

Working with Documents

The OpenOffice.org API has been structured so that as many of its parts as possible can be used universally for different tasks. This includes the interfaces and services for creating, opening, saving, converting, and printing documents and for template administration. Since these function areas are available in all types of documents, they are explained first in this chapter.

The current document

In previous versions of the Basic Programming Guide these instructions were used to obtain the current document :

```
Dim Doc As Object

Doc = StarDesktop.CurrentComponent
```

This correct code has a drawback : it does not work if the macro is started from the IDE because it then refers to the IDE, not the document. This code works only if the macro is started from the document itself!

You should instead use Basic object `ThisComponent`. It returns the document object on which the macro is run. If you start the macro from the IDE, `ThisComponent` will still find and return your document.

```
Dim Doc As Object

Doc = ThisComponent ' recommended coding for Basic
```

The StarDesktop

When working with documents, two services are used most frequently:

- The com.sun.star.frame.Desktop service, which is similar to the core service of OpenOffice.org. It provides the functions for the frame object of OpenOffice.org, under which all document windows are classified. Documents can also be created, opened and imported using this service.
- The basic functionality for the individual document objects is provided by the com.sun.star.document.OfficeDocument service. This provides the methods for saving, exporting and printing documents.

The com.sun.star.frame.Desktop service is created automatically when OpenOffice.org is started. This service can be addressed in OpenOffice.org Basic using the global name `StarDesktop`.

The most important interface of the `StarDesktop` is com.sun.star.frame.XComponentLoader. This basically

covers the loadComponentFromURL method, which is responsible for creating, importing, and opening documents.

Note – StarOffice 5 : The name of the StarDesktop object dates back to StarOffice 5, in which all document windows were embedded in one common application called StarDesktop. In the present version of OpenOffice.org, a visible StarDesktop is no longer used. The name StarDesktop was, however, retained for the frame object of OpenOffice.org because it clearly indicates that this is a basic object for the entire application.
The StarDesktop object replaces the Application object of StarOffice 5 which previously applied as a root object. However, unlike the old Application object, StarDesktop is primarily responsible for opening new documents. The functions resident in the old Application object for controlling the on-screen depiction of OpenOffice.org (for example, FullScreen, FunctionBarVisible, Height, Width, Top, Visible) are no longer used.

Note – VBA : Whereas the active document in Word is accessed through Application.ActiveDocument and in Excel through Application.ActiveWorkbook, in OpenOffice.org, the StarDesktop is responsible for this task. The active document object is accessed in OpenOffice.org through the StarDesktop.CurrentComponent property, or through ThisComponent.

ThisComponent

The global name ThisComponent generally returns the same object as StarDesktop.CurrentComponent, with one significant advantage. If you are running from within the Basic IDE, debugging or exploring, then StarDesktop returns the Basic IDE itself. This is probably not what you want. ThisComponent returns the last previously active document.

Basic Information about Documents in OpenOffice.org

When working with OpenOffice.org documents, it is useful to deal with some of the basic issues of document administration in OpenOffice.org. This includes the way in which file names are structured for OpenOffice.org documents, as well as the format in which files are saved.

File Names in URL Notation

Since OpenOffice.org is a platform-independent application, it uses URL notation (which is independent of any operating system), as defined in the Internet Standard RFC 1738 for file names. Standard file names using this system begin with the prefix file:/// followed by the local path. If the file name contains sub-directories, then these are separated by a single forward slash, not with a backslash usually used under Windows. The following path references the test.odt file in the doc directory on the C: drive.

```
file:///C:/doc/test.odt
```

To convert local file names into an URL, OpenOffice.org provides the ConvertToUrl function. To convert a URL into a local file name, OpenOffice.org provides the ConvertFromUrl function:

```
MsgBox ConvertToUrl("C:\doc\test.odt")
  ' supplies file:///C:/doc/test.odt
MsgBox ConvertFromUrl("file:///C:/doc/test.odt")
  '  supplies (under Windows) c:\doc\test.odt
```

The example converts a local file name into a URL and displays it in a message box. It then converts a URL into a local file name and also displays this.

The Internet Standard RFC 1738, upon which this is based, permits use of the 0-9, a-z, and A-Z characters. All other characters are inserted as escape coding in the URLs. To do this, they are converted into their hexadecimal value in the UTF-8 set of characters and are preceded by a percent sign. A space in a local file name therefore, for example, becomes a %20 in the URL.

XML File Format

OpenOffice.org documents are based on the XML file format. XML-based files can be opened and edited with other programs.

Compression of Files

Since XML is based on standard text files, the resultant files are usually very large. OpenOffice.org therefore compresses the files and saves them as a ZIP file. By means of a `storeAsURL` method option, the user can save the original XML files directly. See storeAsURL Method Options, below.

Creating, Opening and Importing Documents

Documents are opened, imported and created using the method StarDesktop.loadComponentFromURL(URL, Frame, SearchFlags, FileProperties) The first parameter of `loadComponentFromURL` specifies the URL of the associated file.

As the second parameter, `loadComponentFromURL` expects a name for the frame object of the window that OpenOffice.org creates internally for its administration. The predefined `_blank` name is usually specified here, and this ensures that OpenOffice.org creates a new window.

Using these parameters, the user can open a OpenOffice.org document, since place holders (dummy values) can be assigned to the last two parameters:

```
Dim Doc As Object
Dim Url As String
Dim Dummy() 'An (empty) array of PropertyValues

Url = "file:///C:/test.odt"

Doc = StarDesktop.loadComponentFromURL(Url, "_blank", 0, Dummy)
```

The preceding call opens the `test.odt` file and displays this in a new window.

Any number of documents can be opened in this way in OpenOffice.org Basic and then edited using the returned document objects.

Note – StarOffice 5 : `StarDesktop.loadComponentFromURL` supersedes the `Documents.Add` and `Documents.Open` methods from the old OpenOffice.org API.

Replacing the Content of the Document Window

The named `_blank` value for the `Frame` parameter ensures that OpenOffice.org creates a new window for every call from `loadComponentFromURL`. In some situations, it is useful to replace the content of an existing window. In this case, the frame object of the window should contain an explicit name. Note that this name must not begin with an underscore. Furthermore, the `SearchFlags` parameter must be set so that the corresponding framework is created, if it does not already exist. The corresponding constant for `SearchFlags` is:

```
SearchFlags = com.sun.star.frame.FrameSearchFlag.CREATE + _
              com.sun.star.frame.FrameSearchFlag.ALL
```

The following example shows how the content of an opened window can be replaced with the help of the frame parameter and `SearchFlags`:

```
Dim Doc As Object
Dim Dummy()
Dim Url As String
Dim SearchFlags As Long

SearchFlags = com.sun.star.frame.FrameSearchFlag.CREATE + _
              com.sun.star.frame.FrameSearchFlag.ALL
```

```
Url = "file:///C:/test.odt"
Doc = StarDesktop.loadComponentFromURL(Url, "MyFrame", SearchFlags, Dummy)
MsgBox "Press OK to display the second document."

Url = "file:///C:/test2.odt"
Doc = StarDesktop.loadComponentFromURL(Url, "MyFrame", _
      SearchFlags, Dummy)
```

The example first opens the `test.odt` file in a new window with the frame name of `MyFrame`. Once the message box has been confirmed, it replaces the content of the window with the `test2.odt` file.

loadComponentFromURL Method Options

The fourth parameter of the `loadComponentFromURL` function is a `PropertyValue` data field. which provides OpenOffice.org with various options for opening and creating documents. The data field must provide a `PropertyValue` structure for each option in which the name of the option is saved as a string as well as the associated value.

`loadComponentFromURL` supports the following options:

AsTemplate (Boolean)

if true, loads a new, untitled document from the given URL. If is false, template files are loaded for editing.

CharacterSet (String)

defines which set of characters a document is based on.

FilterName (String)

specifies a special filter for the `loadComponentFromURL` function. The filter names available are defined in the `\share\config\registry\instance\org\openoffice\office\TypeDetection.xml` file.

FilterData (String)

defines additional options for filters.

FilterOptions (String)

defines additional options (used by old filters).

Hidden (Boolean)

value true loads the document in invisible mode.

JumpMark (String)

once a document has been opened, jumps to the position defined in JumpMark.

MacroExecutionMode (Integer)

indicates if document macros may be executed. Values : see com.sun.star.document.MacroExecMode

Password (String)

transfers a password for a protected file.

ReadOnly (Boolean)

value true loads a document in read-only mode.

UpdateDocMode (Integer)

indicates how/if links will be updated. Values : see com.sun.star.document.UpdateDocMode

The following example shows how a text file separated by a comma in OpenOffice.org Calc can be opened using the `FilterName` option.

```
Dim Doc As Object
Dim FileProperties(1) As New com.sun.star.beans.PropertyValue
Dim Url As String

Url = "file:///C:/doc.csv"
```

```
FileProperties(0).Name = "FilterName"
FileProperties(0).Value ="Text - txt - csv (StarCalc)"
FileProperties(1).Name = "FilterOptions"
FileProperties(1).value  = "44,34,0,1"

Doc = StarDesktop.loadComponentFromURL(Url, "_blank", 0, FileProperties())
```

The `FileProperties` array has two elements, one for each option used. The `Filtername` property defines whether OpenOffice.org uses a OpenOffice.org Calc text filter to open files. The `FilterOptions` property contains the description of the syntax of the csv file.

Creating New Documents

OpenOffice.org automatically creates a new document if the document specified in the URL is a template.

Alternatively, if only an empty document without any adaptation is needed, a `private:factory` URL can be specified:

```
Dim Dummy()
Dim Url As String
Dim Doc As Object

Url = "private:factory/swriter"
Doc = StarDesktop.loadComponentFromURL(Url, "_blank", 0, Dummy())
```

The call creates an empty OpenOffice.org writer document.

Document Objects

The `loadComponentFromURL` function introduced in the previous section returns a document object. This supports the com.sun.star.document.OfficeDocument service, which in turn provides two central interfaces:

- The com.sun.star.frame.XStorable interface, which is responsible for saving documents.
- The com.sun.star.view.XPrintable interface, which contains the methods for printing documents.

Saving and Exporting Documents

OpenOffice.org documents are saved directly through the document object. The `store` method of the com.sun.star.frame.XStorable interface is available for this purpose:

```
Doc.store()
```

This call functions provided that the document has already been assigned a memory space. This is not the case for new documents. In this instance, the `storeAsURL` method is used. This method is also defined in com.sun.star.frame.XStorable and can be used to define the location of the document:

```
Dim URL As String
Dim Dummy()

Url = "file:///C:/test3.odt"
Doc.storeAsURL(URL, Dummy())
```

In addition to the preceding methods, com.sun.star.frame.XStorable also provides some help methods which are useful when saving documents. These are:

`hasLocation()`

specifies whether the document has already been assigned a URL.

`isReadonly()`

specifies whether a document has read-only protection.

`isModified()`

specifies whether a document has been modified since it was last saved.

The code for saving a document can be extended by these options so that the document is only saved if the object has actually been modified and the file name is only queried if it is actually needed:

```
If (Doc.isModified) Then
  If (Doc.hasLocation And (Not Doc.isReadOnly)) Then
    Doc.store()
  Else
    Doc.storeAsURL(URL, Dummy())
  End If
End If
```

The example first checks whether the relevant document has been modified since it was last saved. It only continues with the saving process if this is the case. If the document has already been assigned a URL and is not a read-only document, it is saved under the existing URL. If it does not have a URL or was opened in its read-only status, it is saved under a new URL.

storeAsURL Method Options

As with the `loadComponentFromURL` method, some options can also be specified in the form of a `PropertyValue` data field using the `storeAsURL` method. These determine the procedure OpenOffice.org uses when saving a document. `storeAsURL` provides the following options:

`CharacterSet (String)`

defines which set of characters a document is based on.

`FilterName (String)`

specifies a special filter for the `loadComponentFromURL` function. The filter names available are defined in the `\share\config\registry\instance\org\openoffice\office\TypeDetection.xml` file.

`FilterData (String)`

defines additional options for filters.

`FilterOptions (String)`

defines additional options (used by old filters).

`Overwrite (Boolean)`

allows a file which already exists to be overwritten without a query.

`Password (String)`

transfers the password for a protected file.

`Unpacked (Boolean)`

saves the document (not compressed) in sub-directories.

The possibility to store documents in unpacked way is not currently supported, the "Unpacked" property is just ignored, see Issue 64364 .

The following example shows how the `Overwrite` option can be used in conjunction with `storeAsURL`:

```
Dim Doc As Object
Dim FileProperties(0) As New com.sun.star.beans.PropertyValue
Dim Url As String
' ... Initialize Doc

Url = "file:///c:/test3.odt"
FileProperties(0).Name = "Overwrite"
FileProperties(0).Value = True
Doc.storeAsURL(Url, FileProperties())
```

The example then saves `Doc` under the specified file name if a file already exists under the name.

Printing Documents

Similar to saving, documents are printed out directly by means of the document object. The `Print` method of the com.sun.star.view.Xprintable interface is provided for this purpose. In its simplest form, the print call is:

```
Dim Dummy()

Doc.print(Dummy())
```

As in the case of the `loadComponentFromURL` method, the Dummy parameter is a `PropertyValue` data field through which OpenOffice.org can specify several options for printing.

The options of the print method

The `print` method expects a `PropertyValue` data field as a parameter, which reflects the settings of the print dialog of OpenOffice.org:

`CopyCount (Integer)`

specifies the number of copies to be printed.

`FileName (String)`

prints the document in the specified file.

`Collate (Boolean)`

advises the printer to collate the pages of the copies.

`Sort (Boolean)`

sorts the pages when printing out several copies (`CopyCount` > 1).

`Pages (String)`

contains the list of the pages to be printed (syntax as specified in print dialog).

`Wait (Boolean)`

if set to True the print method will return *after* the job is stored on the waiting list for the printer. Use this option if you want to close the document after print.

The following example shows how several pages of a document can be printed out using the `Pages` option:

```
Dim Doc As Object
Dim PrintProperties(1) As New com.sun.star.beans.PropertyValue

PrintProperties(0).Name="Pages"
PrintProperties(0).Value="1-3; 7; 9"
PrintProperties(1).Name="Wait"
PrintProperties(1).Value=True
Doc.print(PrintProperties())
```

Printer selection and settings

The com.sun.star.view.XPrintable interface provides the `Printer` property, which selects the printer. This property receives a `PropertyValue` data field with the following settings:

`Name (String)`

specifies the name of printer.

`PaperOrientation (Enum)`

specifies the paper orientation (com.sun.star.view.PaperOrientation.PORTRAIT value for portrait format, com.sun.star.view.PaperOrientation.LANDSCAPE for landscape format).

`PaperFormat (Enum)`

specifies the paper format (for example, com.sun.star.view.PaperFormat.A4 for DIN A4 or com.sun.star.view.PaperFormat.Letter for US letters).

PaperSize (Size)

specifies the paper size in hundredths of a millimeter.

The following example shows how a printer can be changed and the paper size set with the help of the `Printer` property.

```
Dim Doc As Object
Dim PrinterProperties(1) As New com.sun.star.beans.PropertyValue
Dim PaperSize As New com.sun.star.awt.Size

PaperSize.Width = 20000   ' corresponds to 20 cm
PaperSize.Height = 20000   ' corresponds to 20 cm
PrinterProperties (0).Name="Name"
PrinterProperties (0).Value="My HP Laserjet"
PrinterProperties (1).Name="PaperSize"
PrinterProperties (1).Value=PaperSize
Doc.Printer = PrinterProperties()
```

The example defines an object named `PaperSize` with the com.sun.star.awt.Size type. This is needed to specify the paper size. Furthermore, it creates a data field for two `PropertyValue` entries named `PrinterProperties`. This data field is then initialized with the values to be set and assigned the `Printer` property. From the standpoint of UNO, the printer is not a real property but an imitated one.

Styles and Templates

Styles

Styles are named lists containing formatting attributes. They work in all applications of OpenOffice.org and help to significantly simplify formatting. If the user changes one of the attributes of a style, then OpenOffice.org automatically adjusts all document sections depending on the attribute. The user can therefore, for example, change the font type of all level one headers by means of a central modification in the document.

Style Types

Depending on the relevant document types, OpenOffice.org recognizes a whole range of different types of styles.

OpenOffice.org Writer supports the following types of styles:

- Character styles
- Paragraph styles
- Frame styles
- Page styles
- Numbering styles

OpenOffice.org Calc supports the following types of styles:

- Cell styles
- Page styles

OpenOffice.org Impress supports the following types of styles:

- Character element styles
- Presentation styles

In OpenOffice.org terminology, the different types of styles are called `StyleFamilies` in accordance with the com.sun.star.style.StyleFamily service on which they are based. The `StyleFamilies` are accessed by means of the document object:

```
Dim Doc As Object
Dim Sheet As Object
Dim StyleFamilies As Object
Dim CellStyles As Object

Doc = ThisComponent
StyleFamilies = Doc.StyleFamilies
CellStyles = StyleFamilies.getByName("CellStyles")
```

The example uses the `StyleFamilies` property of a spreadsheet document to establish a list containing all available cell styles.

The individual styles can be accessed directly by means of an index:

```
Dim Doc As Object
Dim Sheet As Object
Dim StyleFamilies As Object
Dim CellStyles As Object
Dim CellStyle As Object
Dim I As Integer

Doc = ThisComponent
StyleFamilies = Doc.StyleFamilies
CellStyles = StyleFamilies.getByName("CellStyles")

For I = 0 To CellStyles.Count - 1
  CellStyle = CellStyles(I)
  MsgBox CellStyle.Name
Next I
```

The loop added since the previous example displays the names of all cell styles one after another in a message box.

Note – The reference `CellStyles(I)` corresponds to the method `getByIndex()`, which is optional for these style container objects. It may not be available in all types of documents. The method `getByName()` is mandatory, and should always be available.

Details about various formatting options

Each type of style provides a whole range of individual formatting properties. Here is an overview of the most important formatting properties and the points at which they are explained:

- Character properties, com.sun.star.style.CharacterProperties service
- Paragraph properties, com.sun.star.text.Paragraph service
- Cell properties, com.sun.star.table.CellProperties service
- Page properties, com.sun.star.style.PageProperties service
- Character element properties, Various services

The format properties are by no means restricted to the applications in which these are explained, but instead can be used universally. For example, most of the page properties described in Spreadsheets can therefore be used not only in OpenOffice.org Calc, but also in OpenOffice.org Writer.

More information about working with styles can be found in the **Default values for character and paragraph properties** section in Text Documents.

Templates

Templates are auxiliary documents. They provide a very convenient way to store, maintain, and distribute styles, macros, boiler-plate text, and other useful things.

Document and Template Types

Each major type of OpenOffice.org document has its own associated template type. In general, and for

styles in particular, you can access information within a template in the same way you would access the same information in the associated document type. In other words, code (like the above examples) that works in a particular document type should also work for the associated template type.

Automatic Update

Most template types – Draw templates are the exception – have an automatic-update feature. If a style in the template has been changed, and you open a document created with that template, you will see a message asking whether to update the styles in the document. If you click on **Yes**, the new or changed styles will be copied into the document. Styles deleted from the template are not removed from documents.

A problem may arise if you click on **No**: the styles will not be updated, and the automatic-update feature will be turned off. As of OpenOffice.org Version 3.1, this status does not show in the GUI, nor is there any GUI way to re-enable the feature. (For Writer documents only, you can use the Template Changer extension to set this feature again.)

The following subroutine, adapted from the Template Changer extension, will re-enable the update feature for all document types.

```
Sub FixUpdate
  Dim oDocSettings as Object
  oDocSettings = ThisComponent.createInstance( "com.sun.star.document.Settings" )
  oDocSettings.UpdateFromTemplate = True
End Sub 'FixUpdate
```

◆ ◆ ◆ CHAPTER 6

Text Documents

In addition to pure strings, text documents also contain formatting information. These may appear at any point in the text. The structure is further complicated by tables. These include not only single-dimensional strings, but also two-dimensional fields. Most word processing programs now finally provide the option of placing drawing objects, text frames and other objects within a text. These may be outside the flow of text and can be positioned anywhere on the page.

This chapter presents the central interfaces and services of text documents.

- The Structure of Text Documents
- Editing Text Documents
- More than Just Text

The first section deals with the anatomy of text documents and concentrates on how a OpenOffice.org Basic program can be used to take iterative steps through a OpenOffice.org document. It focuses on paragraphs, paragraph portions and their formatting.

The second section focuses on efficiently working with text documents. For this purpose, OpenOffice.org provides several help objects, such as the `TextCursor` object, which extend beyond those specified in the first section.

The third section moves beyond work with texts. It concentrates on tables, text frames, text fields, bookmarks, content directories and more.

Information about how to create, open, save and print documents is described in Working with Documents, because it can be used not only for text documents, but also for other types of documents.

The Structure of Text Documents

A text document can essentially contain four types of information:

- The actual text
- Templates for formatting characters, paragraphs, and pages
- Non-text elements such as tables, graphics and drawing objects
- Global settings for the text document

This section concentrates on the text and associated formatting options.

Paragraphs and Paragraph Portions

The core of a text document consists of a sequence of paragraphs. These are neither named nor indexed and there is therefore no possible way of directly accessing individual paragraphs. The paragraphs can however be sequentially traversed with the help of the `Enumeration` object described in Introduction to the API. This allows the paragraphs to be edited.

When working with the `Enumeration` object, one special scenario should, however, be noted: it not only returns paragraphs, but also tables (strictly speaking, in OpenOffice.org Writer, a table is a special type of paragraph). Before accessing a returned object, you should therefore check whether the returned object supports the com.sun.star.text.Paragraph service for paragraphs or the com.sun.star.text.TextTable service for tables.

The following example traverses the contents of a text document in a loop and uses a message in each instance to inform the user whether the object in question is a paragraph or table.

```
Dim Doc As Object
Dim Enum As Object
Dim TextElement As Object

' Create document object
Doc = ThisComponent
' Create enumeration object
Enum = Doc.Text.createEnumeration
' loop over all text elements

While Enum.hasMoreElements
  TextElement = Enum.nextElement

  If TextElement.supportsService("com.sun.star.text.TextTable") Then
    MsgBox "The current block contains a table."
  End If

  If TextElement.supportsService("com.sun.star.text.Paragraph") Then
    MsgBox "The current block contains a paragraph."
  End If

Wend
```

The example creates a `Doc` document object which references the current OpenOffice.org document. With the aid of `Doc`, the example then creates an `Enumeration` object that traverses through the individual parts of the text (paragraphs and tables) and assigns the current element to `TextElement` object. The example uses the `supportsService` method to check whether the `TextElement` is a paragraph or a table.

Paragraphs

The com.sun.star.text.Paragraph service grants access to the content of a paragraph. The text in the paragraph can be retrieved and modified using the String property:

```
Dim Doc As Object
Dim Enum As Object
Dim TextElement As Object

Doc = ThisComponent
Enum = Doc.Text.createEnumeration

While Enum.hasMoreElements
  TextElement = Enum.nextElement

  If TextElement.supportsService("com.sun.star.text.Paragraph") Then
    TextElement.String = Replace(TextElement.String, "you", "U")
    TextElement.String = Replace(TextElement.String, "too", "2")
    TextElement.String = Replace(TextElement.String, "for", "4")
  End If

Wend
```

The example opens the current text document and passes through it with the help of the Enumeration object. It uses the `TextElement.String` property in all paragraphs to access the relevant paragraphs and replaces the `you, too and for` strings with the `U, 2 and 4` characters. The `Replace` function used for replacing

does not fall within the standard linguistic scope of OpenOffice.org Basic. This is an instance of the example function described in Search and Replace.

Note – VBA : The content of the procedure described here for accessing the paragraphs of a text is comparable with the Paragraphs listing used in VBA, which is provided in the `Range` and `Document` objects available there. Whereas in VBA the paragraphs are accessed by their number (for example, by the `Paragraph(1)` call), in OpenOffice.org Basic, the `Enumeration` object described previously should be used.

There is no direct counterpart in OpenOffice.org Basic for the `Characters, Sentences` and `Words` lists provided in VBA. You do, however, have the option of switching to a `TextCursor` which allows for navigation at the level of characters, sentences and words.

Paragraph Portions

The previous example may change the text as requested, but it may sometimes also destroy the formatting.

This is because a paragraph in turn consists of individual sub-objects. Each of these sub-objects contains its own formatting information. If the center of a paragraph, for example, contains a word printed in bold, then it will be represented in OpenOffice.org by three paragraph portions: the portion before the bold type, then the word in bold, and finally the portion after the bold type, which is again depicted as normal.

If the text of the paragraph is now changed using the paragraph's `String` property, then OpenOffice.org first deletes the old paragraph portions and inserts a new paragraph portion. The formatting of the previous sections is then lost.

To prevent this effect, the user can access the associated paragraph portions rather than the entire paragraph. Paragraphs provide their own `Enumeration` object for this purpose. The following example shows a double loop which passes over all paragraphs of a text document and the paragraph portions they contain and applies the replacement processes from the previous example:

```
Dim Doc As Object
Dim Enum1 As Object
Dim Enum2 As Object
Dim TextElement As Object
Dim TextPortion As Object

Doc = ThisComponent
Enum1 = Doc.Text.createEnumeration

' loop over all paragraphs
While Enum1.hasMoreElements
  TextElement = Enum1.nextElement

  If TextElement.supportsService("com.sun.star.text.Paragraph") Then
    Enum2 = TextElement.createEnumeration
    ' loop over all sub-paragraphs

    While Enum2.hasMoreElements
      TextPortion = Enum2.nextElement
      MsgBox "'" & TextPortion.String & "'"
      TextPortion.String = Replace(TextPortion.String, "you", "U")
      TextPortion.String = Replace(TextPortion.String, "too", "2")
      TextPortion.String = Replace(TextPortion.String, "for", "4")
    Wend

  End If
Wend
```

The example runs through a text document in a double loop. The outer loop refers to the paragraphs of the text. The inner loop processes the paragraph portions in these paragraphs. The example code modifies the content in each of these paragraph portions using the `String` property of the string. as is the case in the previous example for paragraphs. Since however, the paragraph portions are edited directly, their formatting information is retained when replacing the string.

Formatting

There are various ways of formatting text. The easiest way is to assign the format properties directly to the text sequence. This is called direct formatting. Direct formatting is used in particular with short documents because the formats can be assigned by the user with the mouse. You can, for example, highlight a certain word within a text using bold type or center a line.

In addition to direct formatting, you can also format text using templates. This is called indirect formatting. With indirect formatting, the user assigns a pre-defined template to the relevant text portion. If the layout of the text is changed at a later date, the user only needs to change the template. OpenOffice.org then changes the way in which all text portions which use this template are depicted.

Note – VBA : In VBA, the formatting properties of an object are usually spread over a range of sub-objects (for example, `Range.Font`, `Range.Borders`, `Range.Shading`, `Range.ParagraphFormat`). The properties are accessed by means of cascading expressions (for example, `Range.Font.AllCaps`). In OpenOffice.org Basic, the formatting properties on the other hand are available directly, using the relevant objects (`TextCursor, Paragraph`, and so on). You will find an overview of the character and paragraph properties available in OpenOffice.org in the following two sections.

Note – The formatting properties can be found in each object (`Paragraph, TextCursor`, and so on) and can be applied directly.

Character Properties

Those format properties that refer to individual characters are described as character properties. These include bold type and the font type. Objects that allow character properties to be set have to support the com.sun.star.style.CharacterProperties service. OpenOffice.org recognizes a whole range of services that support this service. These include the previously described com.sun.star.text.Paragraph services for paragraphs as well as the com.sun.star.text.TextPortion services for paragraph portions.

The com.sun.star.style.CharacterProperties service does not provide any interfaces, but instead offers a range of properties through which character properties can be defined and called. A complete list of all character properties can be found in the OpenOffice.org API reference. The following list describes the most important properties:

`CharFontName (String)`

name of font type selected.

`CharColor (Long)`

text color.

`CharHeight (Float)`

character height in points (pt).

`CharUnderline (Constant group)`

type of underscore (constants in accordance with com.sun.star.awt.FontUnderline).

`CharWeight (Constant group)`

font weight (constants in accordance with com.sun.star.awt.FontWeight).

`CharBackColor (Long)`

background color.

`CharKeepTogether (Boolean)`

suppression of automatic line break.

CharStyleName (String)

name of character template.

Paragraph Properties

Formatting information that does not refer to individual characters, but to the entire paragraph is considered to be a paragraph property. This includes the distance of the paragraph from the edge of the page as well as line spacing. The paragraph properties are available through the com.sun.star.style.ParagraphProperties service.

Even the paragraph properties are available in various objects. All objects that support the com.sun.star.text.Paragraph service also provide support for the paragraph properties in com.sun.star.style.ParagraphProperties.

A complete list of the paragraph properties can be found in the OpenOffice.org API reference. The most common paragraph properties are:

ParaAdjust (enum)

vertical text orientation (constants in accordance with com.sun.star.style.ParagraphAdjust).

ParaLineSpacing (struct)

line spacing (structure in accordance with com.sun.star.style.LineSpacing).

ParaBackColor (Long)

background color.

ParaLeftMargin (Long)

left margin in 100ths of a millimeter.

ParaRightMargin (Long)

right margin in 100ths of a millimeter.

ParaTopMargin (Long)

top margin in 100ths of a millimeter.

ParaBottomMargin (Long)

bottom margin in 100ths of a millimeter.

ParaTabStops (Array of struct)

type and position of tabs (array with structures of the type com.sun.star.style.TabStop).

ParaStyleName (String)

name of the paragraph template.

Example: simple HTML export

The following example demonstrates how to work with formatting information. It iterates through a text document and creates a simple HTML file. Each paragraph is recorded in its own HTML element <P> for this purpose. Paragraph portions displayed in bold type are marked using a <B> HTML element when exporting.

```
Dim FileNo As Integer, Filename As String, CurLine As String
Dim Doc As Object
Dim Enum1 As Object, Enum2 As Object
Dim TextElement As Object, TextPortion As Object

Filename = "c:\text.html"
FileNo = Freefile
Open Filename For Output As #FileNo
Print #FileNo, "<HTML><BODY>"
```

```
Doc = ThisComponent
Enum1 = Doc.Text.createEnumeration

' loop over all paragraphs
While Enum1.hasMoreElements
  TextElement = Enum1.nextElement

  If TextElement.supportsService("com.sun.star.text.Paragraph") Then
    Enum2 = TextElement.createEnumeration
    CurLine = "<P>"

    ' loop over all paragraph portions
    While Enum2.hasMoreElements
      TextPortion = Enum2.nextElement

      If TextPortion.CharWeight = com.sun.star.awt.FontWeight.BOLD THEN
        CurLine = CurLine & "<B>" & TextPortion.String & "</B>"
      Else
        CurLine = CurLine & TextPortion.String
      End If

    Wend

    ' output the line
    CurLine = CurLine & "</P>"
    Print #FileNo, CurLine
  End If

Wend

' write HTML footer
Print #FileNo, "</BODY></HTML>"
Close #FileNo
```

The basic structure of the example is oriented towards the examples for running though the paragraph portions of a text already discussed previously. The functions for writing the HTML file, as well as a test code that checks the font weight of the corresponding text portions and provides paragraph portions in bold type with a corresponding HTML tag, have been added.

Default values for character and paragraph properties

Direct formatting always takes priority over **indirect** formatting. In other words, formatting using templates is assigned a lower priority than direct formatting in a text.

Establishing whether a section of a document has been directly or indirectly formatted is not easy. The symbol bars provided by OpenOffice.org show the common text properties such as font type, weight and size. However, whether the corresponding settings are based on template or direct formatting in the text is still unclear.

OpenOffice.org Basic provides the `getPropertyState` method, with which programmers can check how a certain property was formatted. As a parameter, this takes the name of the property and returns a constant that provides information about the origin of the formatting. The following responses, which are defined in the com.sun.star.beans.PropertyState enumeration, are possible:

`com.sun.star.beans.PropertyState.DIRECT_VALUE`

the property is defined directly in the text (direct formatting)

`com.sun.star.beans.PropertyState.DEFAULT_VALUE`

the property is defined by a template (indirect formatting)

`com.sun.star.beans.PropertyState.AMBIGUOUS_VALUE`

the property is unclear. This status arises, for example, when querying the bold type property of a paragraph, which includes both words depicted in bold and words depicted in normal font.

The following example shows how format properties can be edited in OpenOffice.org. It searches through a text for paragraph portions which have been depicted as bold type using direct formatting. If it encounters a corresponding paragraph portion, it deletes the direct formatting using the `setPropertyToDefault` method and assigns a `MyBold` character template to the corresponding paragraph portion.

```
Dim Doc As Object
Dim Enum1 As Object
Dim Enum2 As Object
Dim TextElement As Object
Dim TextPortion As Object

Doc = ThisComponent
Enum1 = Doc.Text.createEnumeration

' loop over all paragraphs
While Enum1.hasMoreElements
  TextElement = Enum1.nextElement

  If TextElement.supportsService("com.sun.star.text.Paragraph") Then
    Enum2 = TextElement.createEnumeration
    ' loop over all paragraph portions

    While Enum2.hasMoreElements
      TextPortion = Enum2.nextElement

      If TextPortion.CharWeight = _
        com.sun.star.awt.FontWeight.BOLD AND _
        TextPortion.getPropertyState("CharWeight") = _
        com.sun.star.beans.PropertyState.DIRECT_VALUE Then
          TextPortion.setPropertyToDefault("CharWeight")
          TextPortion.CharStyleName = "MyBold"
      End If
    Wend
  End If
Wend
```

Editing Text Documents

The previous section has already discussed a whole range of options for editing text documents, focusing on the com.sun.star.text.TextPortion and com.sun.star.text.Paragraph services, which grant access to paragraph portions as well as paragraphs. These services are appropriate for applications in which the content of a text is to be edited in one pass through a loop. However, this is not sufficient for many problems. OpenOffice.org provides the com.sun.star.text.TextCursor service for more complicated tasks, including navigating backward within a document or navigating based on sentences and words rather than `TextPortions`.

The TextCursor

A `TextCursor` in the OpenOffice.org API is comparable with the visible cursor used in a OpenOffice.org document. It marks a certain point within a text document and can be navigated in various directions through the use of commands. The `TextCursor` objects available in OpenOffice.org Basic should not, however, be confused with the visible cursor. These are two very different things.

Note – VBA : Terminology differs from that used in VBA: In terms of scope of function, the Range object from VBA can be compared with the TextCursor object in OpenOffice.org and not — as the name possibly suggests — with the Range object in OpenOffice.org.

The TextCursor object in OpenOffice.org, for example, provides methods for navigating and changing text which are included in the Range object in VBA (for example, MoveStart, MoveEnd, InsertBefore, InsertAfter). The corresponding counterparts of the TextCursor object in OpenOffice.org are described in the following sections.

Navigating within a Text

The `TextCursor` object in OpenOffice.org Basic acts independently from the visible cursor in a text document. A program-controlled position change of a `TextCursor` object has no impact whatsoever on the

visible cursor. Several TextCursor objects can even be opened for the same document and used in various positions, which are independent of one another.

A TextCursor object is created using the createTextCursor call:

```
Dim Doc As Object
Dim Cursor As Object

Doc = ThisComponent
Cursor = Doc.Text.createTextCursor()
```

The Cursor object created in this way supports the com.sun.star.text.TextCursor service, which in turn provides a whole range of methods for navigating within text documents. The following example first moves the TextCursor ten characters to the left and then three characters to the right:

```
Cursor.goLeft(10, False)
Cursor.goRight(3, False)
```

A TextCursor can highlight a complete area. This can be compared with highlighting a point in the text using the mouse. The False parameter in the previous function call specifies whether the area passed over with the cursor movement is highlighted. For example, the TextCursor in the following example

```
Cursor.goRight(10, False)
Cursor.goLeft(3, True)
```

first moves ten characters to the right without highlighting, and then moves back three characters and highlights this. The area highlighted by the TextCursor therefore begins after the seventh character in the text and ends after the tenth character.

Here are the central methods that the com.sun.star.text.TextCursor service provides for navigation:

goLeft (Count, Expand)

jumps Count characters to the left.

goRight (Count, Expand)

jumps Count characters to the right.

gotoStart (Expand)

jumps to the start of the text document.

gotoEnd (Expand)

jumps to the end of the text document.

gotoRange (TextRange, Expand)

jumps to the specified TextRange-Object.

gotoStartOfWord (Expand)

jumps to the start of the current word.

gotoEndOfWord (Expand)

jumps to the end of the current word.

gotoNextWord (Expand)

jumps to the start of the next word.

gotoPreviousWord (Expand)

jumps to the start of the previous word.

isStartOfWord ()

returns True if the TextCursor is at the start of a word.

isEndOfWord ()

returns True if the TextCursor is at the end of a word.

gotoStartOfSentence (Expand)

jumps to the start of the current sentence.

gotoEndOfSentence (Expand)

jumps to the end of the current sentence.

gotoNextSentence (Expand)

jumps to the start of the next sentence.

gotoPreviousSentence (Expand)

jumps to the start of the previous sentence.

isStartOfSentence ()

returns `True` if the `TextCursor` is at the start of a sentence.

isEndOfSentence ()

returns `True` if the `TextCursor` is at the end of a sentence.

gotoStartOfParagraph (Expand)

jumps to the start of the current paragraph.

gotoEndOfParagraph (Expand)

jumps to the end of the current paragraph.

gotoNextParagraph (Expand)

jumps to the start of the next paragraph.

gotoPreviousParagraph (Expand)

jumps to the start of the previous paragraph.

isStartOfParagraph ()

returns `True` if the `TextCursor` is at the start of a paragraph.

isEndOfParagraph ()

returns `True` if the `TextCursor` is at the end of a paragraph.

The text is divided into sentences on the basis of sentence symbols. Periods are, for example, interpreted as symbols indicating the end of sentences. (In English, at least, they must be followed by a space, tab, or return for this to work.)

The `Expand` parameter is a Boolean value which specifies whether the area passed over during navigation is to be highlighted. All navigation methods furthermore return a Boolean parameter which specifies whether the navigation was successful or whether the action was terminated for lack of text.

The following is a list of several methods for editing highlighted areas using a `TextCursor` and which also support the com.sun.star.text.TextCursor service:

collapseToStart ()

resets the highlighting and positions the `TextCursor` at the start of the previously highlighted area.

collapseToEnd ()

resets the highlighting and positions the `TextCursor` at the end of the previously highlighted area.

isCollapsed ()

returns `True` if the `TextCursor` does not cover any highlighting at present.

Formatting Text with TextCursor

The com.sun.star.text.TextCursor service supports all the character and paragraph properties that were presented at the start of this chapter.

The following example shows how these can be used in conjunction with a `TextCursor`. It passes through a complete document and formats the first word of every sentence in bold type.

```
Dim Doc As Object
Dim Cursor As Object
Dim Proceed As Boolean

Doc = ThisComponent
Cursor = Doc.Text.createTextCursor

Do
  Cursor.gotoEndOfWord(True)
  Cursor.CharWeight = com.sun.star.awt.FontWeight.BOLD
  Proceed = Cursor.gotoNextSentence(False)
  Cursor.gotoNextWord(False)
Loop While Proceed
```

The example first creates a document object for the text that has just been opened. Then it iterates through the entire text, sentence by sentence, and highlights each of the first words and formats this in bold.

Retrieving and Modifying Text Contents

If a `TextCursor` contains a highlighted area, then this text is available by means of the `String` property of the `TextCursor` object. The following example uses the `String` property to display the first words of a sentence in a message box:

```
Dim Doc As Object
Dim Cursor As Object
Dim Proceed As Boolean

Doc = ThisComponent
Cursor = Doc.Text.createTextCursor

Do
  Cursor.gotoEndOfWord(True)
  MsgBox Cursor.String
  Proceed = Cursor.gotoNextSentence(False)
  Cursor.gotoNextWord(False)
Loop While Proceed
```

The first word of each sentence can be modified in the same way using the `String` property:

```
Dim Doc As Object
Dim Cursor As Object
Dim Proceed As Boolean

Doc = ThisComponent
Cursor = Doc.Text.createTextCursor

Do
  Cursor.gotoEndOfWord(True)
  Cursor.String = "Ups"
  Proceed = Cursor.gotoNextSentence(False)
  Cursor.gotoNextWord(False)
Loop While Proceed
```

If the `TextCursor` contains a highlighted area, an assignment to the `String` property replaces this with the new text. If there is no highlighted area, the text is inserted at the present `TextCursor` position.

Inserting Control Codes

In some situations, it is not the actual text of a document, but rather its structure that needs modifying. OpenOffice.org provides control codes for this purpose. These are inserted in the text and influence its structure. The control codes are defined in the com.sun.star.text.ControlCharacter group of constants. The following control codes are available in OpenOffice.org:

`PARAGRAPH_BREAK`

paragraph break.

`LINE_BREAK`

line break within a paragraph.

SOFT_HYPHEN

possible point for syllabification.

HARD_HYPHEN

obligatory point for syllabification.

HARD_SPACE

protected space that is not spread out or compressed in justified text.

To insert the control codes, you need not only the cursor but also the associated text document objects. The following example inserts a paragraph after the 20th character of a text:

```
Dim Doc As Object
Dim Cursor As Object
Dim Proceed As Boolean

Doc = ThisComponent
Cursor = Doc.Text.createTextCursor
Cursor.goRight(20, False)
Doc.Text.insertControlCharacter(Cursor, _
    com.sun.star.text.ControlCharacter.PARAGRAPH_BREAK, False)
```

The `False` parameter in the call of the `insertControlCharacter` method ensures that the area currently highlighted by the `TextCursor` remains after the insert operation. If the `True` parameter is passed here, then `insertControlCharacter` replaces the current text.

Searching for Text Portions

In many instances, it is the case that a text is to be searched for a particular term and the corresponding point needs to be edited. All OpenOffice.org documents provide a special interface for this purpose, and this interface always functions in accordance with the same principle: Before a search process, what is commonly referred to as a `SearchDescriptor` must first be created. This defines what OpenOffice.org searches for in a document. A `SearchDescriptor` is an object which supports the `com.sun.star.util.SearchDescriptor` service and can be created by means of the `createSearchDescriptor` method of a document:

```
Dim SearchDesc As Object
SearchDesc = Doc.createSearchDescriptor
```

Once the `SearchDescriptor` has been created, it receives the text to be searched for:

```
SearchDesc.searchString="any text"
```

In terms of its function, the `SearchDescriptor` is best compared with the search dialog from OpenOffice.org. In a similar way to the search window, the settings needed for a search can be set in the `SearchDescriptor` object.

The properties are provided by the com.sun.star.util.SearchDescriptor service:

SearchBackwards (Boolean)

searches through the text backward rather than forward.

SearchCaseSensitive (Boolean)

takes uppercase and lowercase characters into consideration during the search.

SearchRegularExpression (Boolean)

treats the search expression like a regular expression.

SearchStyles (Boolean)

searches through the text for the specified paragraph template.

SearchWords (Boolean)

only searches for complete words.

The OpenOffice.org `SearchSimilarity` (or “fuzzy match”) function is also available in OpenOffice.org Basic. With this function, OpenOffice.org searches for an expression that may be similar to but not exactly the same as the search expression. The number of additional, deleted and modified characters for these expressions can be defined individually. Here are the associated properties of the `com.sun.star.util.SearchDescriptor` service:

`SearchSimilarity (Boolean)`

performs a similarity search.

`SearchSimilarityAdd (Short)`

number of characters which may be added for a similarity search.

`SearchSimilarityExchange (Short)`

number of characters which may be replaced as part of a similarity search.

`SearchSimilarityRemove (Short)`

number of characters which may be removed as part of a similarity search.

`SearchSimilarityRelax (Boolean)`

takes all deviation rules into consideration at the same time for the search expression.

Once the `SearchDescriptor` has been prepared as requested, it can be applied to the text document. The OpenOffice.org documents provide the `findFirst` and `findNext` methods for this purpose:

```
Found = Doc.findFirst (SearchDesc)

Do Until IsNull(Found)
  ' Edit search results...
  Found = Doc.findNext( Found.End, SearchDesc)
Loop
```

The example finds all matches in a loop and returns a `TextRange` object, which refers to the found text passage.

Example: Similarity Search

This example shows how a text can be searched for the word "turnover" and the results formatted in bold type. A similarity search is used so that not only the word “turnover”, but also the plural form "turnovers" and declinations such as "turnover's" are found. The found expressions differ by up to two letters from the search expression:

```
Dim SearchDesc As Object
Dim Doc As Object

Doc = ThisComponent
SearchDesc = Doc.createSearchDescriptor
SearchDesc.SearchString="turnover"
SearchDesc.SearchSimilarity = True
SearchDesc.SearchSimilarityAdd = 2
SearchDesc.SearchSimilarityExchange = 2
SearchDesc.SearchSimilarityRemove = 2
SearchDesc.SearchSimilarityRelax = False
Found = Doc.findFirst (SearchDesc)

Do Until IsNull(Found)
  Found.CharWeight = com.sun.star.awt.FontWeight.BOLD
  Found = Doc.findNext( Found.End, SearchDesc)
Loop
```

Note – VBA : The basic idea of search and replace in OpenOffice.org is comparable to that used in VBA. Both interfaces provide you with an object, through which the properties for searching and replacing can be defined. This object is then applied to the required text area in order to perform the action. Whereas the responsible auxiliary object in VBA can be reached through the Find property of the Range object, in OpenOffice.org Basic it is created by the `createSearchDescriptor` or `createReplaceDescriptor` call of the document object. Even the search properties and methods available differ.

As in the old API from OpenOffice.org, searching and replacing text in the new API is also performed using the document object. Whereas previously there was an object called `SearchSettings` especially for defining the search options, in the new object searches are now performed using a `SearchDescriptor` or `ReplaceDescriptor` object for automatically replacing text. These objects cover not only the options, but also the current search text and, if necessary, the associated text replacement. The descriptor objects are created using the document object, completed in accordance with the relevant requests, and then transferred back to the document object as parameters for the search methods.

Replacing Text Portions

Just as with the search function, the replacement function from OpenOffice.org is also available in OpenOffice.org Basic. The two functions are handled identically. A special object which records the parameters for the process is also first needed for a replacement process. It is called a `ReplaceDescriptor` and supports the com.sun.star.util.ReplaceDescriptor service. All the properties of the `SearchDescriptor` described in the previous paragraph are also supported by `ReplaceDescriptor`. For example, during a replacement process, case sensitivity can also be activated and deactivated, and similarity searches can be performed.

The following example demonstrates the use of `ReplaceDescriptors` for a search within a OpenOffice.org document.

```
Dim I As Long
Dim Doc As Object
Dim Replace As Object
Dim BritishWords(5) As String
Dim USWords(5) As String

BritishWords() = Array("colour", "neighbour", "centre", "behaviour", _
   "metre", "through")
USWords() = Array("color", "neighbor", "center", "behavior", _
   "meter", "thru")

Doc = ThisComponent
Replace = Doc.createReplaceDescriptor

For I = 0 To 5
  Replace.SearchString = BritishWords(I)
  Replace.ReplaceString = USWords(I)
  Doc.replaceAll(Replace)
Next I
```

The expressions for searching and replacing are set using the `SearchString` and `ReplaceString` properties of the `ReplaceDescriptors`. The actual replacement process is finally implemented using the `replaceAll` method of the document object, which replaces all occurrences of the search expression.

Example: searching and replacing text with regular expressions

The replacement function of OpenOffice.org is particularly effective when used in conjunction with regular expressions. These provide the option of defining a variable search expression with place holders and special characters rather than a fixed value.

The regular expressions supported by OpenOffice.org are described in detail in the online help section for OpenOffice.org. Here are a few examples:

- A period within a search expression stands for any character. The search expression sh.rt therefore can stand for both for `shirt` and for `short`.
- The character ^ marks the start of a paragraph. All occurrences of the name `Peter` that are at the start of a paragraph can therefore be found using the search expression `^Peter`.
- The character $ marks a paragraph end. All occurrences of the name `Peter` that are at the end of a paragraph can therefore be found using the search expression `Peter$`.
- A * indicates that the preceding character may be repeated any number of times. It can be combined with the period as a place holder for any character. The `temper.*e` expression, for example, can stand for the expressions `temperance` and `temperature`.

The following example shows how all empty lines in a text document can be removed with the help of the regular expression ^$:

```
Dim Doc As Object
Dim Replace As Object
Dim I As Long

Doc = ThisComponent
Replace = Doc.createReplaceDescriptor
Replace.SearchRegularExpression = True
Replace.SearchString = "^$"
Replace.ReplaceString = ""

Doc.replaceAll(Replace)
```

More Than Just Text

So far, this chapter has only dealt with text paragraphs and their portions. But text documents may also contain other objects. These include tables, drawings, text fields and directories. All of these objects can be anchored to any point within a text.

Thanks to these common features, all of these objects in OpenOffice.org support a common basic service called com.sun.star.text.TextContent. This provides the following properties:

`AnchorType (Enum)`

determines the anchor type of a `TextContent` object (default values in accordance with com.sun.star.text.TextContentAnchorType enumeration).

`AnchorTypes (sequence of Enum)`

enumeration of all `AnchorTypes` which support a special `TextContent` object.

`TextWrap (Enum)`

determines the text wrap type around a `TextContent` object (default values in accordance with com.sun.star.text.WrapTextMode enumeration).

The `TextContent` objects also share some methods – in particular, those for creating, inserting and deleting objects.

- A new `TextContent` object is **created** using the `createInstance` method of the document object.
- An object is **inserted** using the `insertTextContent` method of the text object.
- `TextContent` objects are **deleted** using the `removeTextContent` method.

You will find a range of examples which use these methods in the following sections.

Tables

The following example creates a table with the help of the createInstance method described previously.

```
Dim Doc As Object
Dim Table As Object
Dim Cursor As Object

Doc = ThisComponent
Cursor = Doc.Text.createTextCursor()

Table = Doc.createInstance("com.sun.star.text.TextTable")
Table.initialize(5, 4)

Doc.Text.insertTextContent(Cursor, Table, False)
```

Once created, the table is set to the number of rows and columns requested using an `initialize` call and then inserted in the text document using `insertTextContent`.

As can be seen in the example, the `insertTextContent` method expects not only the `Content` object to be inserted, but two other parameters:

- a `Cursor` object which determines the insert position
- a Boolean variable which specifies whether the `Content` object is to replace the current selection of the cursor (`True` value) or is to be inserted before the current selection in the text (`False`)

Note – VBA : When creating and inserting tables in a text document, objects similar to those available in VBA are used in OpenOffice.org Basic: The document object and a `TextCursor` object in OpenOffice.org Basic, or the `Range` object as the VBA counterpart. Whereas the `Document.Tables.Add` method takes on the task of creating and setting the table in VBA, this is created in OpenOffice.org Basic in accordance with the previous example using `createInstance`, initialized, and inserted in the document through `insertTextContent`.

The tables inserted in a text document can be determined using a simple loop. The method `getTextTables()` of the text document object is used for this purpose:

```
Dim Doc As Object
Dim TextTables As Object
Dim Table As Object
Dim I As Integer
Doc = ThisComponent
TextTables = Doc.getTextTables()
For I = 0 to TextTables.count - 1

   Table = TextTables(I)
   ' Editing table

Next I
```

Note – Text tables are available in OpenOffice.org through the `TextTables` list of the document object. The previous example shows how a text table can be created. The options for accessing text tables are described in the following section.

Editing Tables

A table consists of individual rows. These in turn contain the various cells. Strictly speaking, there are no table columns in OpenOffice.org. These are produced implicitly by arranging the rows (one under another) next to one another. To simplify access to the tables, OpenOffice.org, however, provides some methods which operate using columns. These are useful if no cells have been merged in the table.

Let us first take the properties of the table itself. These are defined in the com.sun.star.text.TextTable service. Here is an list of the most important properties of the table object:

`BackColor (Long)`

background color of table.

`BottomMargin (Long)`

bottom margin in 100ths of a millimeter.

`LeftMargin (Long)`

left margin in 100ths of a millimeter.

`RightMargin (Long)`

right margin in 100ths of a millimeter.

`TopMargin (Long)`

top margin in 100ths of a millimeter.

`RepeatHeadline (Boolean)`

table header is repeated on every page.

Width (Long)

absolute width of the table in 100ths of a millimeter.

Rows

A table consists of a list containing rows. The following example shows how the rows of a table can be retrieved and formatted.

```
Dim Doc As Object
Dim Table As Object
Dim Cursor As Object
Dim Rows As Object
Dim Row As Object
Dim I As Integer

Doc = ThisComponent
Cursor = Doc.Text.createTextCursor()

Table = Doc.createInstance("com.sun.star.text.TextTable")
Table.initialize(5, 4)

Doc.Text.insertTextContent(Cursor, Table, False)
Rows = Table.getRows
For I = 0 To Rows.getCount() - 1
   Row = Rows.getByIndex(I)
   Row.BackColor = &HFF00FF
Next
```

The example first creates a list containing all rows using a `Table.getRows` call. The `getCount` and `getByIndex` methods allow the list to be further processed and belongs to the `com.sun.star.table.XtableRows` interface. The `getByIndex` method returns a row object, which supports the com.sun.star.text.TextTableRow service.

Here are the central methods of the com.sun.star.table.XtableRows interface:

getByIndex(Integer)

returns a row object for the specified index.

getCount()

returns the number of row objects.

insertByIndex(Index, Count)

inserts Count rows in the table as of the `Index` position.

removeByIndex(Index, Count)

deletes Count rows from the table as of the `Index` position.

Whereas the `getByIndex` and `getCount` methods are available in all tables, the `insertByIndex` and `removeByIndex` methods can only be used in tables that do not contain merged cells.

The com.sun.star.text.TextTableRow service provides the following properties:

BackColor (Long)

background color of row.

Height (Long)

height of line in 100ths of a millimeter.

IsAutoHeight (Boolean)

table height is dynamically adapted to the content.

VertOrient (const)

vertical orientation of the text frame — details on vertical orientation of the text within the table (values in accordance with com.sun.star.text.VertOrientation)

Columns

Columns are accessed in the same way as rows, using the `getByIndex`, `getCount`, `insertByIndex`, and `removeByIndex` methods on the `Column` object, which is reached through `getColumns`. They can, however, only be used in tables that do not contain merged table cells. Cells cannot be formatted by column in OpenOffice.org Basic. To do so, the method of formatting individual table cells must be used.

Cells

Each cell of a OpenOffice.org document has a unique name. If the cursor of OpenOffice.org is in a cell, then the name of that cell can be seen in the status bar. The top left cell is usually called A1 and the bottom right row is usually called `Xn`, where `X` stands for the letters of the top column and `n` for the numbers of the last row. The cell objects are available through the `getCellByName()` method of the table object. The following example shows a loop that passes through all the cells of a table and enters the corresponding row and column numbers into the cells.

```
Dim Doc As Object
Dim Table As Object
Dim Cursor As Object
Dim Rows As Object
Dim RowIndex As Integer
Dim Cols As Object
Dim ColIndex As Integer
Dim CellName As String
Dim Cell As Object

Doc = ThisComponent
Cursor = Doc.Text.createTextCursor()

Table = Doc.createInstance("com.sun.star.text.TextTable")
Table.initialize(5, 4)

Doc.Text.insertTextContent(Cursor, Table, False)

Rows = Table.getRows
Cols = Table.getColumns

For RowIndex = 1 To Rows.getCount()
   For ColIndex = 1 To Cols.getCount()
      CellName = Chr(Asc("A") - 1 + ColIndex) & RowIndex
      Cell = Table.getCellByName(CellName)
      Cell.String = "row: " & CStr(RowIndex) + ", column: " & CStr(ColIndex)
   Next
Next
```

A table cell is comparable with a standard text. It supports the `createTextCursor` interface for creating an associated `TextCursor` object.

```
CellCursor = Cell.createTextCursor()
```

All formatting options for individual characters and paragraphs are therefore automatically available.

The following example searches through all tables of a text document and applies the right-align format to all cells with numerical values by means of the corresponding paragraph property.

```
Dim Doc As Object
Dim TextTables As Object
Dim Table As Object
Dim CellNames
Dim Cell As Object
Dim CellCursor As Object
Dim I As Integer
Dim J As Integer

Doc = ThisComponent
TextTables = Doc.getTextTables()

For I = 0 to TextTables.count - 1
   Table = TextTables(I)
   CellNames = Table.getCellNames()

   For J = 0 to UBound(CellNames)
      Cell = Table.getCellByName(CellNames(J))
```

```
      If IsNumeric(Cell.String) Then
         CellCursor = Cell.createTextCursor()
         CellCursor.paraAdjust = com.sun.star.style.ParagraphAdjust.RIGHT
      End If
   Next
Next
```

The example creates a `TextTables` list containing all tables of a text that are traversed in a loop. OpenOffice.org then creates a list of the associated cell names for each of these tables. There are passed through in turn in a loop. If a cell contains a numerical value, then the example changes the formatting correspondingly. To do this, it first creates a `TextCursor` object which makes reference to the content of the table cell and then adapts the paragraph properties of the table cell.

Text Frames

Text frames are considered to be `TextContent` objects, just like tables and graphs. They may essentially consist of standard text, but can be placed at any position on a page and are not included in the text flow.

As with all `TextContent` objects, a distinction is also made with text frames between the actual creation and insertion in the document.

```
Dim Doc As Object
Dim TextTables As Object
Dim Cursor As Object
Dim Frame As Object

Doc = ThisComponent
Cursor = Doc.Text.createTextCursor()
Frame = Doc.createInstance("com.sun.star.text.TextFrame")
Doc.Text.insertTextContent(Cursor, Frame, False)
```

The text frame is created using the `createInstance` method of the document object. The text frame created in this way can then be inserted in the document using the `insertTextContent` method of the `Text` object. In so doing, the name of the proper com.sun.star.text.TextFrame service should be specified.

The text frame's insert position is determined by a `Cursor` object, which is also executed when inserted.

Note – VBA : Text frames are OpenOffice.org's counterpart to the position frame used in Word. Whereas VBA uses the `Document.Frames.Add` method for this purpose, creation in OpenOffice.org Basic is performed using the previous procedure with the aid of a `TextCursor` as well as the `createInstance` method of the document object.

Text frame objects provide a range of properties with which the position and behavior of the frame can be influenced. The majority of these properties are defined in the com.sun.star.text.BaseFrameProperties service, which is also supported by each `TextFrame` service. The central properties are:

`BackColor (Long)`

background color of the text frame.

`BottomMargin (Long)`

bottom margin in 100ths of a millimeter.

`LeftMargin (Long)`

left margin in 100ths of a millimeter.

`RightMargin (Long)`

right margin in 100ths of a millimeter.

`TopMargin (Long)`

top margin in 100ths of a millimeter.

`Height (Long)`

height of text frame in 100ths of a millimeter.

Width (Long)

width of text frame in 100ths of a millimeter.

HoriOrient (const)

horizontal orientation of text frame (in accordance with com.sun.star.text.HoriOrientation).

VertOrient (const)

vertical orientation of text frame (in accordance with com.sun.star.text.VertOrientation).

The following example creates a text frame using the properties described previously:

```
Dim Doc As Object
Dim TextTables As Object
Dim Cursor As Object
Dim Frame As Object

Doc = ThisComponent
Cursor = Doc.Text.createTextCursor()
Cursor.gotoNextWord(False)
Frame = Doc.createInstance("com.sun.star.text.TextFrame")

Frame.Width = 3000
Frame.Height = 1000
Frame.AnchorType = com.sun.star.text.TextContentAnchorType.AS_CHARACTER
Frame.TopMargin = 0
Frame.BottomMargin = 0
Frame.LeftMargin = 0
Frame.RightMargin = 0
Frame.BorderDistance = 0
Frame.HoriOrient = com.sun.star.text.HoriOrientation.NONE
Frame.VertOrient = com.sun.star.text.VertOrientation.LINE_TOP

Doc.Text.insertTextContent(Cursor, Frame, False)
```

The example creates a `TextCursor` as the insertion mark for the text frame. This is positioned between the first and second word of the text. The text frame is created using `Doc.createInstance`. The properties of the text frame objects are set to the starting values required.

The interaction between the `AnchorType` (from the `TextContent` Service) and `VertOrient` (from the `BaseFrameProperties` Service) properties should be noted here. `AnchorType` receives the `AS_CHARACTER` value. The text frame is therefore inserted directly in the text flow and behaves like a character. It can, for example, be moved into the next line if a line break occurs. The `LINE_TOP` value of the `VertOrient` property ensures that the upper edge of the text frame is at the same height as the upper edge of the character.

Once initialization is complete, the text frame is finally inserted in the text document using a call from `insertTextContent`.

To edit the content of a text frame, the user uses the `TextCursor`, which has already been mentioned numerous times and is also available for text frames.

```
Dim Doc As Object
Dim TextTables As Object
Dim Cursor As Object
Dim Frame As Object
Dim FrameCursor As Object

Doc = ThisComponent
Cursor = Doc.Text.createTextCursor()
Frame = Doc.createInstance("com.sun.star.text.TextFrame")

Frame.Width = 3000
Frame.Height = 1000

Doc.Text.insertTextContent(Cursor, Frame, False)

FrameCursor = Frame.createTextCursor()
FrameCursor.charWeight = com.sun.star.awt.FontWeight.BOLD
FrameCursor.paraAdjust = com.sun.star.style.ParagraphAdjust.CENTER
FrameCursor.String = "This is a small Test!"
```

The example creates a text frame, inserts this in the current document and opens a `TextCursor` for the text

frame. This cursor is used to set the frame font to bold type and to set the paragraph orientation to centered. The text frame is finally assigned the “This is a small test!” string.

Text Fields

Text fields are `TextContent` objects because they provide additional logic extending beyond pure text. Text fields can be inserted in a text document using the same methods as those used for other `TextContent` objects:

```
Dim Doc As Object
Dim DateTimeField As Object
Dim Cursor As Object
Doc = ThisComponent
Cursor = Doc.Text.createTextCursor()

DateTimeField = Doc.createInstance("com.sun.star.text.textfield.DateTime")
DateTimeField.IsFixed = False
DateTimeField.IsDate = True
Doc.Text.insertTextContent(Cursor, DateTimeField, False)
```

The example inserts a text field with the current date at the start of the current text document. The `True` value of the `IsDate` property results in only the date and not time being displayed. The `False` value for `IsFixed` ensures that the date is automatically updated when the document is opened.

Note – VBA : While the type of a field in VBA is specified by a parameter of the `Document.Fields.Add` method, the name of the service that is responsible for the field type in question defines it in OpenOffice.org Basic.

Note – StarOffice 5 : In the past, text fields were accessed using a whole range of methods that OpenOffice.org made available in the old `Selection` object (for example `InsertField`, `DeleteUserField`, `SetCurField`).

In OpenOffice.org, the fields are administered using an object-oriented concept. To create a text field, a text field of the type required should first be created and initialized using the properties required. The text field is then inserted in the document using the `insertTextContent` method. A corresponding source text can be seen in the previous example. The most important field types and their properties are described in the following sections.

In addition to inserting text fields, searching a document for the fields can also be an important task. The following example shows how all text fields of a text document can be traversed in a loop and checked for their relevant type.

```
Dim Doc As Object
Dim TextFieldEnum As Object
Dim TextField As Object
Dim I As Integer

Doc = ThisComponent

TextFieldEnum = Doc.getTextFields.createEnumeration

While TextFieldEnum.hasMoreElements()

   TextField = TextFieldEnum.nextElement()

   If TextField.supportsService("com.sun.star.text.textfield.DateTime") Then
      MsgBox "Date/time"
   ElseIf TextField.supportsService("com.sun.star.text.textfield.Annotation") Then
      MsgBox "Annotation"
   Else
      MsgBox "unknown"
   End If

Wend
```

The starting point for establishing the text fields present is the `TextFields` list of the document object. The example creates an `Enumeration` object on the basis of this list, with which all text fields can be queried in

turn in a loop. The text fields found are checked for the service supported using the `supportsService` method. If the field proves to be a date/time field or an annotation, then the corresponding field type is displayed in an information box. If on the other hand, the example encounters another field, then it displays the information “unknown”.

Below, you will find a list of the most important text fields and their associated properties. A complete list of all text fields is provided in the API reference in the `com.sun.star.text.textfield` module. (When listing the service name of a text field, uppercase and lowercase characters should be used in OpenOffice.org Basic, as in the previous example.)

Number of Pages, Words and Characters

The text fields

- com.sun.star.text.textfield.PageCount
- com.sun.star.text.textfield.WordCount
- com.sun.star.text.textfield.CharacterCount

return the number of pages, words, or characters of a text. They support the following property:

`NumberingType (const)`

numbering format (guidelines in accordance with constants from com.sun.star.style.NumberingType).

Current Page

The number of the current page can be inserted in a document using the com.sun.star.text.textfield.PageNumber text field. The following properties can be specified:

`NumberingType (const)`

number format (guidelines in accordance with constants from com.sun.star.style.NumberingType).

`Offset (short)`

offset added to the number of pages (negative specification also possible).

The following example shows how the number of pages can be inserted into the footer of a document.

```
Dim Doc As Object
Dim DateTimeField As Object
Dim PageStyles As Object
Dim StdPage As Object
Dim FooterCursor As Object
Dim PageNumber As Object

Doc = ThisComponent

PageNumber = Doc.createInstance("com.sun.star.text.textfield.PageNumber")
PageNumber.NumberingType = com.sun.star.style.NumberingType.ARABIC

PageStyles = Doc.StyleFamilies.getByName("PageStyles")

StdPage = PageStyles("Default")
StdPage.FooterIsOn = True

FooterCursor = StdPage.FooterTextLeft.Text.createTextCursor()
StdPage.FooterTextLeft.Text.insertTextContent(FooterCursor, PageNumber, False)
```

The example first creates a text field which supports the com.sun.star.text.textfield.PageNumber service. Since the header and footer lines are defined as part of the page templates of OpenOffice.org, this is initially established using the list of all `PageStyles`.

To ensure that the footer line is visible, the `FooterIsOn` property is set to `True`. The text field is then inserted in the document using the associated text object of the left-hand footer line.

Annotations

Annotation fields (com.sun.star.text.textfield.Annotation) can be seen by means of a small yellow symbol in the text. Clicking on this symbol opens a text field, in which a comment on the current point in the text can be recorded. An annotation field has the following properties.

Author (String)

name of author.

Content (String)

comment text.

Date (Date)

date on which annotation is written.

Date / Time

A date / time field (com.sun.star.text.textfield.DateTime) represents the current date or the current time. It supports the following properties:

IsFixed (Boolean)

if `True`, the time details of the insertion remain unchanged, if `False`, these are updated each time the document is opened.

IsDate (Boolean)

if `True`, the field displays the current date, otherwise the current time.

DateTimeValue (struct)

current content of field (com.sun.star.util.DateTime structure)

NumberFormat (const)

format in which the time or date is depicted.

Chapter Name / Number

The name of the current chapter is available through a text field of the com.sun.star.text.textfield.Chapter type. The form can be defined using two properties.

ChapterFormat (const)

determines whether the chapter name or the chapter number is depicted (in accordance with com.sun.star.text.ChapterFormat)

Level (Integer)

determines the chapter level whose name and/or chapter number is to be displayed. The value 0 stands for highest level available.

Bookmarks

Bookmarks (Service com.sun.star.text.Bookmark) are `TextContent` objects. Bookmarks are created and inserted using the concept already described previously:

```
Dim Doc As Object
Dim Bookmark As Object
Dim Cursor As Object

Doc = ThisComponent

Cursor = Doc.Text.createTextCursor()

Bookmark = Doc.createInstance("com.sun.star.text.Bookmark")
```

```
Bookmark.Name = "My bookmarks"
Doc.Text.insertTextContent(Cursor, Bookmark, True)
```

The example creates a `Cursor`, which marks the insert position of the bookmark and then the actual bookmark object (`Bookmark`). The bookmark is then assigned a name and is inserted in the document through `insertTextContent` at the cursor position.

The bookmarks of a text are accessed through a list called `Bookmarks`. The bookmarks can either be accessed by their number or their name.

The following example shows how a bookmark can be found within a text, and a text inserted at its position.

```
Dim Doc As Object
Dim Bookmark As Object
Dim Cursor As Object

Doc = ThisComponent

Bookmark = Doc.Bookmarks.getByName("My bookmarks")

Cursor = Doc.Text.createTextCursorByRange(Bookmark.Anchor)
Cursor.String = "Here is the bookmark"
```

In this example, the `getByName` method is used to find the bookmark required by means of its name. The `createTextCursorByRange` call then creates a `Cursor`, which is positioned at the anchor position of the bookmark. The cursor then inserts the text required at this point.

◆ ◆ ◆ CHAPTER 7

Spreadsheet Documents

OpenOffice.org Basic provides an extensive interface for program-controlled creation and editing of spreadsheets. This chapter describes how to control the relevant services, methods and properties of spreadsheet documents:

- The Structure of Spreadsheets
- Editing Spreadsheet Documents

The first section addresses the basic structure of spreadsheet documents and shows you how to access and to edit the contents of individual cells.

The second section concentrates on how to edit spreadsheets efficiently by focusing on cell areas and the options for searching and replacing cell contents.

Note – StarOffice 5 : The `Range` object allows you to address any table area and has been extended in the new API.

The Structure of Spreadsheets

The document object of a spreadsheet is based on the com.sun.star.sheet.SpreadsheetDocument service. Each of these documents may contain several spreadsheets. In this guide, a table-based document or spreadsheet document is the entire document, whereas a spreadsheet (or sheet for short) is a sheet (table) in the document.

Note – VBA : Different terminology for spreadsheets and their content is used in VBA and OpenOffice.org Basic. Whereas the document object in VBA is called a Workbook and its individual pages Worksheets, they are called SpreadsheetDocument and Sheet in OpenOffice.org Basic.

Spreadsheets

You can access the individual sheets of a spreadsheet document through the `Sheets` list.

The following examples show you how to access a sheet either through its number or its name.

Example 1: access by means of the number (numbering begins with 0)

```
Dim Doc As Object
Dim Sheet As Object
```

```
Doc = ThisComponent
Sheet = Doc.Sheets (0)
```

Note – `ThisComponent` returns the currently active document.
The expression `Doc.Sheets(0)` is a Basic simplification of the API call :
`Doc.getSheets.getByIndex(0)`

Example 2: access by means of the name

```
Dim Doc As Object
Dim Sheet As Object

Doc = ThisComponent
Sheet = Doc.Sheets.getByName("Sheet 1")
```

In the first example, the sheet is accessed by its number (counting begins at 0). In the second example, the sheet is accessed by its name and the `getByName` method.

The `Sheet` object that is obtained by the `getByName` method supports the com.sun.star.sheet.Spreadsheet service. In addition to providing several interfaces for editing the content, this service provides the following properties:

`IsVisible (Boolean)`

value True if the spreadsheet is visible.

`PageStyle (String)`

name of the page template for the spreadsheet.

Renaming Sheets

A sheet provides methods `getName` and `setName` to read and modify its name. Basic can handle both methods like a property `Name`. Here we rename the first sheet of the spreadsheet document.

```
Dim Doc As Object
Dim Sheet As Object

Doc = ThisComponent
Sheet = Doc.Sheets(0)
Sheet.Name = "First"
```

Creating and Deleting Sheets

The `Sheets` container of a `spreadsheet` document is also used to create and delete individual sheets. The following example uses the `hasByName` method to check if a sheet called **MySheet** exists. If it does, the method determines a corresponding object reference by using the `getByName` method and then saves the reference in a variable in `Sheet`. If the corresponding sheet does not exist, it is created by the `createInstance` call and inserted in the spreadsheet document by the `insertByName` method.

```
Dim Doc As Object
Dim Sheet As Object

Doc = ThisComponent

If Doc.Sheets.hasByName("MySheet") Then
   Sheet = Doc.Sheets.getByName("MySheet")
Else
   Sheet = Doc.createInstance("com.sun.star.sheet.Spreadsheet")
   Doc.Sheets.insertByName("MySheet", Sheet)
End If
```

The `hasByName`, `getByName` and `insertByName` methods are obtained from the com.sun.star.container.XNameContainer interface as described in Introduction to the API.

The interface com.sun.star.sheet.Spreadsheets provides a better method to create a new sheet: `insertNewByName`. It inserts a new sheet with the name specified by the first argument, at the position specified by the second argument.

```
Dim Doc As Object

Doc = ThisComponent

Doc.Sheets.insertNewByName("OtherSheet", 2)
```

The same interface provides methods `moveByName` and `copyByName`.

The com.sun.star.container.XNameContainer interface provides a method to remove a sheet of a given name:

```
Dim Doc As Object

Doc = ThisComponent

Doc.Sheets.removeByName("OtherSheet")
```

Rows and Columns

Each sheet contains a list of its rows and columns. These are available through the `Rows` and `Columns` properties of the spreadsheet object and support the com.sun.star.table.TableColumns and/or com.sun.star.table.TableRows services.

The following example creates two objects that reference the first row and the first column of a sheet and stores the references in the `FirstCol` and `FirstRow` object variables.

```
Dim Doc As Object
Dim Sheet As Object
Dim FirstRow As Object
Dim FirstCol As Object

Doc = ThisComponent
Sheet = Doc.Sheets(0)

FirstCol = Sheet.Columns(0)
FirstRow = Sheet.Rows(0)
```

The column objects support the com.sun.star.table.TableColumn service that has the following properties:

`Width (long)`

width of a column in hundredths of a millimeter.

`OptimalWidth (Boolean)`

sets a column to its optimum width.

`IsVisible (Boolean)`

displays a column.

`IsStartOfNewPage (Boolean)`

when printing, creates a page break before a column.

The width of a column is only optimized when the `OptimalWidth` property is set to `True`. If the width of an individual cell is changed, the width of the column that contains the cell is not changed. In terms of functionality, `OptimalWidth` is more of a method than a property.

The row objects are based on the com.sun.star.table.TableRow service that has the following properties:

`Height (long)`

height of the row in 100ths of a millimeter.

`OptimalHeight (Boolean)`

sets the row to its optimum height.

`IsVisible (Boolean)`

displays the row.

IsStartOfNewPage (Boolean)

when printing, creates a page break before the row.

If the `OptimalHeight` property of a row is set to the `True`, the row height changes automatically when the height of a cell in the row is changed. Automatic optimization continues until the row is assigned an absolute height through the `Height` property.

The following example activates the automatic height optimization for the first five rows in the sheet and makes the second column invisible.

```
Dim Doc As Object
Dim Sheet As Object
Dim Row As Object
Dim Col As Object
Dim I As Integer

Doc = ThisComponent
Sheet = Doc.Sheets(0)

For I = 0 To 4
   Row = Sheet.Rows(I)
   Row.OptimalHeight = True
Next I

Col = Sheet.Columns(1)
Col.IsVisible = False
```

Note – The `Rows` and `Columns` lists can be accessed through an index in OpenOffice.org Basic. The real API call is : `Sheet.getColumns.getByIndex(1)`

Note – VBA : Unlike in VBA, the first column has the index 0 and not the index 1.

Inserting and Deleting Rows and Columns

The `Rows` and `Columns` objects of a sheet can access existing rows and columns as well as insert and delete them.

```
Dim Doc As Object
Dim Sheet As Object
Dim NewColumn As Object

Doc = ThisComponent
Sheet = Doc.Sheets(0)

Sheet.Columns.insertByIndex(3, 1)
Sheet.Columns.removeByIndex(5, 1)
```

This example uses the `insertByIndex` method to insert a new column into the fourth column position in the sheet (index 3 - numbering starts at 0). The second parameter specifies the number of columns to be inserted (in this example: one).

The `removeByIndex` method deletes the sixth column (index 5). Again, the second parameter specifies the number of columns that you want to delete.

The methods for inserting and deleting rows use the `Rows` object function in the same way as the methods shown for editing columns using the `Columns` object.

Cells and Ranges

A spreadsheet consists of a two-dimensional list containing cells. Each cell is defined by its X and Y-position with respect to the top left cell which has the position (0,0).

Addressing and Editing Individual Cells

The following example creates an object that references the top left cell and inserts a text in the cell:

```
Dim Doc As Object
Dim Sheet As Object
Dim Cell As Object

Doc = ThisComponent
Sheet = Doc.Sheets(0)

Cell = Sheet.getCellByPosition(0, 0)
Cell.String = "Test"
```

In addition to numerical coordinates, each cell in a sheet has a name, for example, the top left cell (0,0) of a spreadsheet is called `A1`. The letter `A` stands for the column and the number 1 for the row. It is important that the **name** and **position** of a cell are not confused because row counting for names begins with 1 but the counting for position begins with 0.

If the position of the cell is fixed, it is more clear to use the following code:

```
Dim Doc As Object
Dim Sheet As Object
Dim Cell As Object

Doc = ThisComponent
Sheet = Doc.Sheets(0)

Cell = Sheet.getCellRangeByName("A1")
Cell.String = "Test"
```

The above code also works with a named cell.

In OpenOffice.org, a table cell can be empty or contain text, numbers, or formulas. The cell type is not determined by the content that is saved in the cell, but rather the object property which was used for its entry. Numbers can be inserted and called up with the `Value` property, text with the `String` property, and formulas with the `Formula` property.

```
Dim Doc As Object
Dim Sheet As Object
Dim Cell As Object

Doc = ThisComponent
Sheet = Doc.Sheets(0)

Cell = Sheet.getCellByPosition(0, 0)
Cell.Value = 100

Cell = Sheet.getCellByPosition(0, 1)
Cell.String = "Test"

Cell = Sheet.getCellByPosition(0, 2)
Cell.Formula = "=A1"
```

The example inserts one number, one text, and one formula in the fields A1 to A3.

Note – StarOffice 5 : The `Value`, `String`, and `Formula` properties supersede the old `PutCell` method of StarOffice 5 for setting the values of a table cell.

OpenOffice.org treats cell content that is entered using the `String` property as text, even if the content is a number. Numbers are left-aligned in the cell instead of right-aligned. You should also note the difference between text and numbers when you use formulas:

```
Dim Doc As Object
Dim Sheet As Object
Dim Cell As Object

Doc = ThisComponent
Sheet = Doc.Sheets(0)

Cell = Sheet.getCellByPosition(0, 0)
Cell.Value = 100

Cell = Sheet.getCellByPosition(0, 1)
```

```
Cell.String = 1000

Cell = Sheet.getCellByPosition(0, 2)
Cell.Formula = "=A1+A2"

MsgBox Cell.Value
```

Although cell A1 contains the value 100 and cell A2 contains the value 1000, the A1+A2 formula returns the value 100. This is because the contents of cell A2 were entered as a string and not as a number.

To check if the contents of a cell contains a number or a string, use the `Type` property:

```
Dim Doc As Object
Dim Sheet As Object
Dim Cell As Object

Doc = ThisComponent
Sheet = Doc.Sheets(0)
Cell = Sheet.getCellByPosition(1,1)

Cell.Value = 1000

Select Case Cell.Type
Case com.sun.star.table.CellContentType.EMPTY
   MsgBox "Content: Empty"
Case com.sun.star.table.CellContentType.VALUE
   MsgBox "Content: Value"
Case com.sun.star.table.CellContentType.TEXT
   MsgBox "Content: Text"
Case com.sun.star.table.CellContentType.FORMULA
   MsgBox "Content: Formula"
End Select
```

The `Cell.Type` property returns a value for the com.sun.star.table.CellContentType enumeration which identifies the contents type of a cell. The possible values are:

`EMPTY`

no value

`VALUE`

number

`TEXT`

strings

`FORMULA`

formula

Inserting, Deleting, Copying and Moving Cells

In addition to directly modifying cell content, OpenOffice.org Calc also provides an interface that allows you to insert, delete, copy, or merge cells. The interface (com.sun.star.sheet.XRangeMovement) is available through the spreadsheet object and provides four methods for modifying cell content.

The `insertCell` method is used to insert cells into a sheet.

```
Dim Doc As Object
Dim Sheet As Object
Dim CellRangeAddress As New com.sun.star.table.CellRangeAddress

Doc = ThisComponent
Sheet = Doc.Sheets(0)

CellRangeAddress.Sheet = 0
CellRangeAddress.StartColumn = 1
CellRangeAddress.StartRow = 1
CellRangeAddress.EndColumn = 2
CellRangeAddress.EndRow = 2

Sheet.insertCells(CellRangeAddress, com.sun.star.sheet.CellInsertMode.DOWN)
```

This example inserts a cells range that is two rows by two columns in size into the second column and row (each bear the number 1) of the first sheet (number 0) in the spreadsheet. Any existing values in the specified cell range are moved below the range.

To define the cell range that you want to insert, use the com.sun.star.table.CellRangeAddress structure. The following values are included in this structure:

Sheet (short)

number of the sheet (numbering begins with 0).

StartColumn (long)

first column in the cell range (numbering begins with 0).

StartRow (long)

first row in the cell range (numbering begins with 0).

EndColumn (long)

final column in the cell range (numbering begins with 0).

EndRow (long)

final row in the cell range (numbering begins with 0).

The completed `CellRangeAddress` structure must be passed as the first parameter to the `insertCells` method. The second parameter of `insertCells` contains a value of the com.sun.star.sheet.CellInsertMode enumeration and defines what is to be done with the values that are located in front of the insert position. The `CellInsertMode` enumeration recognizes the following values:

NONE

the current values remain in their present position.

DOWN

the cells at and under the insert position are moved downwards.

RIGHT

the cells at and to the right of the insert position are moved to the right.

ROWS

the rows after the insert position are moved downwards.

COLUMNS

the columns after the insert position are moved to the right.

The `removeRange` method is the counterpart to the `insertCells` method. This method deletes the range that is defined in the `CellRangeAddress` structure from the sheet.

```
Dim Doc As Object
Dim Sheet As Object
Dim CellRangeAddress As New com.sun.star.table.CellRangeAddress

Doc = ThisComponent
Sheet = Doc.Sheets(0)

CellRangeAddress.Sheet = 0
CellRangeAddress.StartColumn = 1
CellRangeAddress.StartRow = 1
CellRangeAddress.EndColumn = 2
CellRangeAddress.EndRow = 2

Sheet.removeRange(CellRangeAddress, com.sun.star.sheet.CellDeleteMode.UP)
```

This example removes the `B2:C3` cell range from the sheet and then shifts the underlying cells up by two rows. The type of removal is defined by one of the following values from the com.sun.star.sheet.CellDeleteMode enumeration:

NONE

the current values remain in their current position.

UP

the cells at and below the insert position are moved upwards.

LEFT

the cells at and to the right of the insert position are moved to the left.

ROWS

the rows after the insert position are moved upwards.

COLUMNS

the columns after the insert position are moved to the left.

The `XRangeMovement` interface provides two additional methods for moving (`moveRange`) or copying (`copyRange`) cell ranges. The following example moves the `B2:C3` range so that the range starts at position `A6`:

```
Dim Doc As Object
Dim Sheet As Object
Dim CellRangeAddress As New com.sun.star.table.CellRangeAddress
Dim CellAddress As New com.sun.star.table.CellAddress

Doc = ThisComponent
Sheet = Doc.Sheets(0)

CellRangeAddress.Sheet = 0
CellRangeAddress.StartColumn = 1
CellRangeAddress.StartRow = 1
CellRangeAddress.EndColumn = 2
CellRangeAddress.EndRow = 2

CellAddress.Sheet = 0
CellAddress.Column = 0
CellAddress.Row = 5

Sheet.moveRange(CellAddress, CellRangeAddress)
```

In addition to the `CellRangeAdress` structure, the `moveRange` method expects a com.sun.star.table.CellAddress structure to define the origin of the move's target region. The `CellAddress` method provides the following values:

Sheet (short)

number of the spreadsheet (numbering begins with 0).

Column (long)

number of the addressed column (numbering begins with 0).

Row (long)

number of the addressed row (numbering begins with 0).

The cell contents in the target range are always overwritten by the `moveRange` method. Unlike in the `InsertCells` method , a parameter for performing automatic moves is not provided in the `removeRange` method.

The `copyRange` method functions in the same way as the `moveRange` method, except that `copyRange` inserts a copy of the cell range instead of moving it.

Note – VBA : In terms of their function, the OpenOffice.org Basic `insertCell`, `removeRange`, and `copyRange` methods are comparable with the VBA `Range.Insert`, `Range.Delete` ,and `Range.Copy` methods. Whereas in VBA, the methods are applied to the corresponding `Range` object, in OpenOffice.org Basic they are applied to the associated `Sheet` object.

Formatting Spreadsheet Documents

A spreadsheet document provides properties and methods for formatting cells and pages.

Cell Properties

There are numerous options for formatting cells, such as specifying the font type and size for text. Each cell supports the com.sun.star.style.CharacterProperties and com.sun.star.style.ParagraphProperties services, the main properties of which are described in Text Documents. Special cell formatting is handled by the com.sun.star.table.CellProperties service. The main properties of this service are described in the following sections.

You can apply all of the named properties to individual cells and to cell ranges.

Note – VBA : The `CellProperties` object in the OpenOffice.org API is comparable with the `Interior` object from VBA which also defines cell-specific properties.

Background Color and Shadows

The com.sun.star.table.CellProperties service provides the following properties for defining background colors and shadows:

`CellBackColor (Long)`

background color of the table cell

`IsCellBackgroundTransparent (Boolean)`

sets the background color to transparent

`ShadowFormat (struct)`

specifies the shadow for cells (structure in accordance with com.sun.star.table.ShadowFormat)

The com.sun.star.table.ShadowFormat structure and the detailed specifications for cell shadows have the following structure:

`Location (enum)`

position of shadow (value from the com.sun.star.table.ShadowLocation structure).

`ShadowWidth (Short)`

size of shadow in hundredths of a millimeter

`IsTransparent (Boolean)`

sets the shadow to transparent

`Color (Long)`

color of shadow

The following example writes the number 1000 to the B2 cell, changes the background color to red using the `CellBackColor` property, and then creates a light gray shadow for the cell that is moved 1 mm to the left and down.

```
Dim Doc As Object
Dim Sheet As Object
Dim Cell As Object
Dim ShadowFormat As New com.sun.star.table.ShadowFormat

Doc = ThisComponent
Sheet = Doc.Sheets(0)
Cell = Sheet.getCellByPosition(1,1)

Cell.Value = 1000
```

```
Cell.CellBackColor = RGB(255, 0, 0)

ShadowFormat.Location = com.sun.star.table.ShadowLocation.BOTTOM_RIGHT
ShadowFormat.ShadowWidth = 100
ShadowFormat.Color = RGB(160, 160, 160)

Cell.ShadowFormat = ShadowFormat
```

Justification

OpenOffice.org provides various functions that allow you to change the justification of a text in a table cell.

The following properties define the horizontal and vertical justification of a text:

HoriJustify (enum)

horizontal justification of the text (value from com.sun.star.table.CellHoriJustify)

VertJustify (enum)

vertical justification of the text (value from com.sun.star.table.CellVertJustify)

Orientation (enum)

orientation of text (value in accordance with com.sun.star.table.CellOrientation)

IsTextWrapped (Boolean)

permits automatic line breaks within the cell

RotateAngle (Long)

angle of rotation of text in hundredths of a degree

The following example shows how you can "stack" the contents of a cell so that the individual characters are printed one under another in the top left corner of the cell. The characters are not rotated.

```
Dim Doc As Object
Dim Sheet As Object
Dim Cell As Object

Doc = ThisComponent
Sheet = Doc.Sheets(0)
Cell = Sheet.getCellByPosition(1,1)

Cell.Value = 1000

Cell.HoriJustify = com.sun.star.table.CellHoriJustify.LEFT
Cell.VertJustify = com.sun.star.table.CellVertJustify.TOP
Cell.Orientation = com.sun.star.table.CellOrientation.STACKED
```

Number, Date and Text Format

OpenOffice.org provides a whole range of predefined date and time formats. Each of these formats has an internal number that is used to assign the format to cells using the `NumberFormat` property. OpenOffice.org provides the `queryKey` and `addNew` methods so that you can access existing number formats as well as create your own number formats. The methods are accessed through the following object call:

```
NumberFormats = Doc.NumberFormats
```

A format is specified using a format string that is structured in a similar way to the format function of OpenOffice.org Basic. However there is one major difference: whereas the command format expects English abbreviations and decimal points or characters as thousands separators, the country-specified abbreviations must be used for the structure of a command format for the `NumberFormats` object.

The following example formats the B2 cell so that numbers are displayed with three decimal places and use commas as a thousands separator.

```
Dim Doc As Object
Dim Sheet As Object
Dim Cell As Object
Dim NumberFormats As Object
```

```
Dim NumberFormatString As String
Dim NumberFormatId As Long
Dim LocalSettings As New com.sun.star.lang.Locale

Doc = ThisComponent
Sheet = Doc.Sheets(0)
Cell = Sheet.getCellByPosition(1,1)

Cell.Value = 23400.3523565

LocalSettings.Language = "en"
LocalSettings.Country = "us"

NumberFormats = Doc.NumberFormats
NumberFormatString = "#,##0.000"

NumberFormatId = NumberFormats.queryKey(NumberFormatString, LocalSettings, True)
If NumberFormatId = -1 Then
   NumberFormatId = NumberFormats.addNew(NumberFormatString, LocalSettings)
End If

MsgBox NumberFormatId
Cell.NumberFormat = NumberFormatId
```

The **Format Cells** dialog in OpenOffice.org Calc provides an overview of the different formatting options for cells.

Page Properties

Page properties are the formatting options that position document content on a page as well as visual elements that are repeated page after page. These include

- Paper formats
- Page margins
- Headers and footers.

The procedure for defining page formats differs from other forms of formatting. Whereas cell, paragraph, and character elements can be formatted directly, page formats can also be defined and indirectly applied using page styles. For example, headers or footers are added to the page style.

The following sections describe the main formatting options for spreadsheet pages. Many of the styles that are described are also available for text documents. The page properties that are valid for both types of documents are defined in the com.sun.star.style.PageProperties service. The page properties that only apply to spreadsheet documents are defined in the com.sun.star.sheet.TablePageStyle service.

Note – VBA : The page properties (page margins, borders, and so on) for a Microsoft Office document are defined by means of a `PageSetup` object at the `Worksheet` object (Excel) or `Document` object (Word) level. In OpenOffice.org, these properties are defined using a page style which in turn is linked to the associated document.

Page Background

The com.sun.star.style.PageProperties service defines the following properties of a pages background:

`BackColor (long)`

color of background

`BackGraphicURL (String)`

URL of the background graphics that you want to use

`BackGraphicFilter (String)`

name of the filter for interpreting the background graphics

BackGraphicLocation (Enum)

position of the background graphics (value according to enumeration)

BackTransparent (Boolean)

makes the background transparent

Page Format

The page format is defined using the following properties of the com.sun.star.style.PageProperties service:

IsLandscape (Boolean)

landscape format

Width (long)

width of page in hundredths of a millimeter

Height (long)

height of page in hundredths of a millimeter

PrinterPaperTray (String)

name of the printer paper tray that you want to use

The following example sets the page size of the "Default" page style to the DIN A5 landscape format (height 14.8 cm, width 21 cm):

```
Dim Doc As Object
Dim Sheet As Object
Dim StyleFamilies As Object
Dim PageStyles As Object
Dim DefPage As Object

Doc = ThisComponent
StyleFamilies = Doc.StyleFamilies
PageStyles = StyleFamilies.getByName("PageStyles")
DefPage = PageStyles.getByName("Default")

DefPage.IsLandscape = True
DefPage.Width = 21000
DefPage.Height = 14800
```

Page Margin, Border, and Shadow

The com.sun.star.style.PageProperties service provides the following properties for adjusting page margins as well as borders and shadows:

LeftMargin (long)

width of the left hand page margin in hundredths of a millimeter

RightMargin (long)

width of the right hand page margin in hundredths of a millimeter

TopMargin (long)

width of the top page margin in hundredths of a millimeter

BottomMargin (long)

width of the bottom page margin in hundredths of a millimeter

LeftBorder (struct)

specifications for left-hand line of page border (com.sun.star.table.BorderLine structure)

RightBorder (struct)

specifications for right-hand line of page border (com.sun.star.table.BorderLine structure)

TopBorder (struct)

specifications for top line of page border (com.sun.star.table.BorderLine structure)

BottomBorder (struct)

specifications for bottom line of page border (com.sun.star.table.BorderLine structure)

LeftBorderDistance (long)

distance between left-hand page border and page content in hundredths of a millimeter

RightBorderDistance (long)

distance between right-hand page border and page content in hundredths of a millimeter

TopBorderDistance (long)

distance between top page border and page content in hundredths of a millimeter

BottomBorderDistance (long)

distance between bottom page border and page content in hundredths of a millimeter

ShadowFormat (struct)

specifications for shadow of content area of page (com.sun.star.table.ShadowFormat structure)

The following example sets the left and right-hand borders of the "Default" page style to 1 centimeter.

```
Dim Doc As Object
Dim Sheet As Object
Dim StyleFamilies As Object
Dim PageStyles As Object
Dim DefPage As Object

Doc = ThisComponent
StyleFamilies = Doc.StyleFamilies
PageStyles = StyleFamilies.getByName("PageStyles")
DefPage = PageStyles.getByName("Default")

DefPage.LeftMargin = 1000
DefPage.RightMargin = 1000
```

Headers and Footers

The headers and footers of a document form part of the page properties and are defined using the com.sun.star.style.PageProperties service. The properties for formatting headers are:

HeaderIsOn (Boolean)

header is activated

HeaderLeftMargin (long)

distance between header and left-hand page margin in hundredths of a millimeter

HeaderRightMargin (long)

distance between header and right-hand page margin in hundredths of a millimeter

HeaderBodyDistance (long)

distance between header and main body of document in hundredths of a millimeter

HeaderHeight (long)

height of header in hundredths of a millimeter

HeaderIsDynamicHeight (Boolean)

height of header is automatically adapted to content

HeaderLeftBorder (struct)

details of the left-hand border of frame around header (com.sun.star.table.BorderLine structure)

HeaderRightBorder (struct)

details of the right-hand border of frame around header (com.sun.star.table.BorderLine structure)

HeaderTopBorder (struct)

details of the top line of the border around header (com.sun.star.table.BorderLine structure)

HeaderBottomBorder (struct)

details of the bottom line of the border around header (com.sun.star.table.BorderLine structure)

HeaderLeftBorderDistance (long)

distance between left-hand border and content of header in hundredths of a millimeter

HeaderRightBorderDistance (long)

distance between right-hand border and content of header in hundredths of a millimeter

HeaderTopBorderDistance (long)

distance between top border and content of header in hundredths of a millimeter

HeaderBottomBorderDistance (long)

distance between bottom border and content of header in hundredths of a millimeter

HeaderIsShared (Boolean)

headers on even and odd pages have the same content (refer to `HeaderText` , `HeaderTextLeft`, and `HeaderTextRight`)

HeaderBackColor (long)

background color of header

HeaderBackGraphicURL (String)

URL of the background graphics that you want to use

HeaderBackGraphicFilter (String)

name of the filter for interpreting the background graphics for the header

HeaderBackGraphicLocation (Enum)

position of the background graphics for the header (value according to com.sun.star.style.GraphicLocation enumeration)

HeaderBackTransparent (Boolean)

shows the background of the header as transparent

HeaderShadowFormat (struct)

details of shadow of header (com.sun.star.table.ShadowFormat structure)

The properties for formatting footers are:

FooterIsOn (Boolean)

footer is activated

FooterLeftMargin (long)

distance between footer and left-hand page margin in hundredths of a millimeter

FooterRightMargin (long)

distance between footer and right-hand page margin in hundredths of a millimeter

FooterBodyDistance (long)

distance between footer and main body of document in hundredths of a millimeter

FooterHeight (long)

height of footer in hundredths of a millimeter

FooterIsDynamicHeight (Boolean)

height of footer is adapted automatically to the content

FooterLeftBorder (struct)

details of left-hand line of border around footer (com.sun.star.table.BorderLine structure)

FooterRightBorder (struct)

details of right-hand line of border around footer (com.sun.star.table.BorderLine structure)

FooterTopBorder (struct)

details of top line of border around footer (com.sun.star.table.BorderLine structure)

FooterBottomBorder (struct)

details of bottom line of border around footer (com.sun.star.table.BorderLine structure)

FooterLeftBorderDistance (long)

distance between left-hand border and content of footer in hundredths of a millimeter

FooterRightBorderDistance (long)

distance between right-hand border and content of footer in hundredths of a millimeter

FooterTopBorderDistance (long)

distance between top border and content of footer in hundredths of a millimeter

FooterBottomBorderDistance (long)

distance between bottom border and content of footer in hundredths of a millimeter

FooterIsShared (Boolean)

the footers on the even and odd pages have the same content (refer to `FooterText`, `FooterTextLeft`, and `FooterTextRight`)

FooterBackColor (long)

background color of footer

FooterBackGraphicURL (String)

URL of the background graphics that you want to use

FooterBackGraphicFilter (String)

name of the filter for interpreting the background graphics for the footer

FooterBackGraphicLocation (Enum)

position of background graphics for the footer (value according to com.sun.star.style.GraphicLocation enumeration)

FooterBackTransparent (Boolean)

shows the background of the footer as transparent

FooterShadowFormat (struct)

details of shadow of footer (com.sun.star.table.ShadowFormat structure)

Changing the Text of Headers and Footers

The content of headers and footers in a spreadsheet is accessed through the following properties:

LeftPageHeaderContent (Object)

content of headers for even pages (com.sun.star.sheet.HeaderFooterContent service)

RightPageHeaderContent (Object)

content of headers for odd pages (com.sun.star.sheet.HeaderFooterContent service)

LeftPageFooterContent (Object)

content of footers for even pages (com.sun.star.sheet.HeaderFooterContent service)

RightPageFooterContent (Object)

content of footers for odd pages (com.sun.star.sheet.HeaderFooterContent service)

If you do not need to distinguish between headers or footers for odd and even pages (the `FooterIsShared` property is `False`), then set the properties for headers and footers on odd pages.

All the named objects return an object that supports the com.sun.star.sheet.HeaderFooterContent service. By means of the (non-genuine) properties `LeftText`, `CenterText`, and `RightText`, this service provides three text elements for the headers and footers of OpenOffice.org Calc.

The following example writes the "Just a Test." value in the left-hand text field of the header from the "Default" template.

```
Dim Doc As Object
Dim Sheet As Object
Dim StyleFamilies As Object
Dim PageStyles As Object
Dim DefPage As Object
Dim HText As Object
Dim HContent As Object
Doc = ThisComponent
StyleFamilies = Doc.StyleFamilies
PageStyles = StyleFamilies.getByName("PageStyles")
DefPage = PageStyles.getByName("Default")

DefPage.HeaderIsOn = True
HContent = DefPage.RightPageHeaderContent
HText = HContent.LeftText
HText.String = "Just a Test."
DefPage.RightPageHeaderContent = HContent
```

Note the last line in the example: Once the text is changed, the `TextContent` object must be assigned to the header again so that the change is effective.

Another mechanism for changing the text of headers and footers is available for text documents (OpenOffice.org Writer) because these consist of a single block of text. The following properties are defined in the com.sun.star.style.PageProperties service:

HeaderText (Object)

text object with content of the header (com.sun.star.text.XText service)

HeaderTextLeft (Object)

text object with content of headers on left-hand pages (com.sun.star.text.XText service)

HeaderTextRight (Object)

text object with content of headers on right-hand pages (com.sun.star.text.XText service)

FooterText (Object)

text object with content of the footer (com.sun.star.text.XText service)

FooterTextLeft (Object)

text object with content of footers on left-hand pages (com.sun.star.text.XText service)

FooterTextRight (Object)

text object with content of footers on right-hand pages (com.sun.star.text.XText service)

The following example creates a header in the "Default" page style for text documents and adds the text "Just a Test" to the header.

```
Dim Doc As Object
Dim Sheet As Object
Dim StyleFamilies As Object
Dim PageStyles As Object
Dim DefPage As Object
Dim HText As Object
```

```
Doc = ThisComponent
StyleFamilies = Doc.StyleFamilies
PageStyles = StyleFamilies.getByName("PageStyles")
DefPage = PageStyles.getByName("Default")

DefPage.HeaderIsOn = True
HText = DefPage.HeaderText

HText.String = "Just a Test."
```

In this instance, access is provided directly through the `HeaderText` property of the page style rather than the `HeaderFooterContent` object.

Centering (Spreadsheets Only)

The com.sun.star.sheet.TablePageStyle service is only used in OpenOffice.org Calc page styles and allows cell ranges that you want printed to be centered on the page. This service provides the following properties:

`CenterHorizontally (Boolean)`

table content is centered horizontally

`CenterVertically (Boolean)`

table content is centered vertically

Definition of Elements to be Printed (Spreadsheets Only)

When you format sheets, you can define whether page elements are visible. For this purpose, the com.sun.star.sheet.TablePageStyle service provides the following properties:

`PrintAnnotations (Boolean)`

prints cell comments

`PrintGrid (Boolean)`

prints the cell gridlines

`PrintHeaders (Boolean)`

prints the row and column headings

`PrintCharts (Boolean)`

prints charts contained in a sheet

`PrintObjects (Boolean)`

prints embedded objects

`PrintDrawing (Boolean)`

prints draw objects

`PrintDownFirst (Boolean)`

if the contents of a sheet extend across several pages, they are first printed in vertically descending order, and then down the right-hand side.

`PrintFormulas (Boolean)`

prints the formulas instead of the calculated values

`PrintZeroValues (Boolean)`

prints the zero values

Editing Spreadsheet Documents

Whereas the previous section described the main structure of spreadsheet documents, this section describes the services that allow you to easily access individual cells or cell ranges.

Cell Ranges

In addition to an object for individual cells (com.sun.star.table.Cell service), OpenOffice.org also provides objects that represent cell ranges. Such `CellRange` objects are created using the `getCellRangeByName` call of the spreadsheet object:

```
Dim Doc As Object
Dim Sheet As Object
Dim CellRange As Object

Doc = ThisComponent
Sheet = Doc.Sheets.getByName("Sheet 1")
CellRange = Sheet.getCellRangeByName("A1:C15")
```

A colon (:) is used to specify a cell range in a spreadsheet document. For example, A1:C15 represents all the cells in rows 1 to 15 in columns A, B, and C.

If the position of the cell range is only known at runtime, use the following code:

```
Dim Doc As Object
Dim Sheet As Object
Dim CellRange As Object

Doc = ThisComponent
Sheet = Doc.Sheets.getByName("Sheet 1")
CellRange = Sheet.getCellRangeByPosition(0, 0,  2, 14)
```

The arguments of `getCellRangeByPosition` are the position of the upper left cell of the range, followed by the position of the bottom right cell of the same range.

The location of individual cells in a cell range can be determined using the `getCellByPosition` method, where the coordinates of the top left cell in the cell range is (0, 0). The following example uses this method to create an object of cell C3.

```
Dim Doc As Object
Dim Sheet As Object
Dim CellRange As Object
Dim Cell As Object

Doc = ThisComponent
Sheet = Doc.Sheets.getByName("Sheet 1")
CellRange = Sheet.getCellRangeByName("B2:D4")
Cell = CellRange.GetCellByPosition(1, 1)
```

Formatting Cell Ranges

Just like individual cells, you can apply formatting to cell ranges using the com.sun.star.table.CellProperties service. For more information and examples of this service, see Formatting Spreadsheet Documents.

Computing With Cell Ranges

You can use the `computeFunction` method to perform mathematical operations on cell ranges. The `computeFunction` expects a constant as the parameter that describes the mathematical function that you want to use. The associated constants are defined in the com.sun.star.sheet.GeneralFunction enumeration. The following values are available:

`SUM`

sum of all numerical values

COUNT

total number of all values (including non-numerical values)

COUNTNUMS

total number of all numerical values

AVERAGE

average of all numerical values

MAX

largest numerical value

MIN

smallest numerical value

PRODUCT

product of all numerical values

STDEV

standard deviation

VAR

variance

STDEVP

standard deviation based on the total population

VARP

variance based on the total population

The following example computes the average value of the `A1:C3` range and prints the result in a message box:

```
Dim Doc As Object
Dim Sheet As Object
Dim CellRange As Object

Doc = ThisComponent
Sheet = Doc.Sheets.getByName("Sheet 1")
CellRange = Sheet.getCellRangeByName("A1:C3")

MsgBox CellRange.computeFunction(com.sun.star.sheet.GeneralFunction.AVERAGE)
```

Warning – Functions VAR, VARP, STDVERP return an incorrect value when applied to a properly defined range. See Issue 22625 .

Deleting Cell Contents

The `clearContents` method simplifies the process of deleting cell contents and cell ranges in that it deletes one specific type of content from a cell range.

The following example removes all the strings and the direct formatting information from the `B2:C3` range.

```
Dim Doc As Object
Dim Sheet As Object
Dim CellRange As Object
Dim Flags As Long

Doc = ThisComponent
Sheet = Doc.Sheets(0)
CellRange = Sheet.getCellRangeByName("B2:C3")

Flags = com.sun.star.sheet.CellFlags.STRING + _
      com.sun.star.sheet.CellFlags.HARDATTR
```

```
CellRange.clearContents(Flags)
```

The flags specified in `clearContents` come from the com.sun.star.sheet.CellFlags constants list. This list provides the following elements:

VALUE

numerical values that are not formatted as date or time

DATETIME

numerical values that are formatted as date or time

STRING

strings

ANNOTATION

comments that are linked to cells

FORMULA

formulas

HARDATTR

direct formatting of cells

STYLES

indirect formatting

OBJECTS

drawing objects that are connected to cells

EDITATTR

character formatting that only applies to parts of the cells

You can also add the constants together to delete different information using a call from `clearContents`.

Searching and Replacing Cell Contents

Spreadsheet documents, like text documents, provide a function for searching and replacing.

The descriptor objects for searching and replacing in spreadsheet documents are not created directly through the document object, but rather through the `Sheets` list. The following is an example of a search and replace process:

```
Dim Doc As Object
Dim Sheet As Object
Dim ReplaceDescriptor As Object
Dim I As Integer

Doc = ThisComponent
Sheet = Doc.Sheets(0)

ReplaceDescriptor = Sheet.createReplaceDescriptor()
ReplaceDescriptor.SearchString = "is"
ReplaceDescriptor.ReplaceString = "was"
For I = 0 to Doc.Sheets.Count - 1
   Sheet = Doc.Sheets(I)
   Sheet.ReplaceAll(ReplaceDescriptor)
Next I
```

This example uses the first page of the document to create a `ReplaceDescriptor` and then applies this to all pages in a loop.

◆ ◆ ◆ CHAPTER 8

Drawings and Presentations

This chapter provides an introduction to the macro-controlled creation and editing of drawings and presentations.

The first section describes the structure of drawings, including the basic elements that contain drawings. The second section addresses more complex editing functions, such as grouping, rotating, and scaling objects. The third section deals with presentations.

Information about creating, opening, and saving drawings can be found in Working With Documents.

The Structure of Drawings

Pages

Tip - A Draw (or Impress) document is composed of pages, also called slides. What is written here also applies to Impress documents.

OpenOffice.org does not limit the number of pages in a drawing document. You can design each page separately. There is also no limit to the number of drawing elements that you can add to a page.

The pages of a drawing document are available through the `DrawPages` container. You can access individual pages either through their number or their name. If a document has one page and this is called **Slide 1**, then the following examples are identical.

Example 1: access by means of the number (numbering begins with 0)

```
Dim Doc As Object
Dim Page As Object

Doc = ThisComponent
Page = Doc.DrawPages(0)
```

Note – The expression `Doc.DrawPages(0)` is a Basic simplification of the API call : `Doc.getDrawPages.getByIndex(0)`

Example 2: access by means of the name

```
Dim Doc As Object
Dim Page As Object
```

```
Doc = ThisComponent
Page = Doc.DrawPages.getByName("Slide 1")
```

In Example 1, the page is accessed by its number (counting begins at 0). In the second example, the page is accessed by its name and the `getByName` method.

Properties of a page

The preceding call returns a page object that supports the `com.sun.star.drawing.DrawPage` service. The service recognizes the following properties:

`BorderLeft (Long)`

left-hand border in hundredths of a millimeter

`BorderRight (Long)`

right-hand border in hundredths of a millimeter

`BorderTop (Long)`

top border in hundredths of a millimeter

`BorderBottom (Long)`

bottom border in hundredths of a millimeter

`Width (Long)`

page width in hundredths of a millimeter

`Height (Long)`

page height in hundredths of a millimeter

`Number (Short)`

number of pages (numbering begins at 1), read-only

`Orientation (Enum)`

page orientation (in accordance with `com.sun.star.view.PaperOrientation` enumeration)

If these settings are changed, then **all** of the pages in the document are affected.

The following example sets the page size of a drawing document which has just been opened to 20 x 20 centimeters with a page margin of 0.5 centimeters:

```
Dim Doc As Object
Dim Page As Object

Doc = ThisComponent
Page = Doc.DrawPages(0)

Page.BorderLeft = 500
Page.BorderRight = 500
Page.BorderTop = 500
Page.BorderBottom = 500

Page.Width = 20000
Page.Height = 20000
```

Renaming Pages

Warning – If a new page is inserted in a drawing document of several pages, all subsequent pages which have **not** been renamed will automatically see their default name change, e.g. **Slide 3** will be changed into **Slide 4**, etc. This automatic renaming works also in reverse when a page is deleted.
The only way to have a fixed page name is to rename the page, by the user interface or by programming.

A page provides methods `getName` and `setName` to read and modify its name. Basic can handle both methods like a property `Name`. Here we rename the first page of the drawing document.

```
Dim Doc As Object
Dim Page As Object

Doc = ThisComponent
Page = Doc.DrawPages(0)
Page.Name = "First"
```

Creating and Deleting Pages

The `DrawPages` container of a `drawing` document is also used to create and delete individual pages. The following example uses the `hasByName` method to check if a page called **MyPage** exists. If it does, the method determines a corresponding object reference by using the `getByName` method and then saves the reference in a variable in `Page`. If the corresponding page does not exist, it is created and inserted in the drawing document by the `insertNewByIndex` method. The argument of the method is the position, counted from 0, of the *existing* page after which the new page will be inserted. Then the new page is renamed.

```
Dim Doc As Object
Dim Page As Object

Doc = ThisComponent

If Doc.Drawpages.hasByName("MyPage") Then
   Page = Doc.Drawpages.getByName("MyPage")
Else
   Page = Doc.Drawpages.insertNewByIndex(2)
   Page.Name = "MyPage" ' you should always rename a new page
   ' MyPage is the fourth page of the document, i.e. position 3
End If
```

The `hasByName` and `getByName` methods are obtained from the com.sun.star.container.XNameAccess interface.

The `insertNewByIndex` method is obtained from the com.sun.star.drawing.XDrawPages interface. The same interface provides the method `remove` to delete (remove) a page:

```
Dim Doc As Object

Doc = ThisComponent

If Doc.Drawpages.hasByName("MyPage") Then
   Page = Doc.Drawpages.getByName("MyPage")
   Doc.Drawpages.remove(Page)
End If
```

Duplicating a Page

A copy of a given page is created, not from the DrawPages container, but from the drawing document itself with the method `duplicate`. The copy is created at the next position after the original page, with a default name.

```
Dim Doc As Object
Dim Page As Object, ClonedPage As Object

Doc = ThisComponent
Page = Doc.Drawpages.getByName("MyPage")
ClonedPage = Doc.duplicate(Page)
ClonedPage.Name = "MyCopy" ' you should always rename a new page
```

Moving a Page

The API does not provide a method to change the position of a page inside a drawing document.

Elementary Properties of Drawing Objects

Drawing objects include shapes (rectangles, circles, and so on), lines, and text objects. All of these share a

number of common features and support the `com.sun.star.drawing.Shape` service. This service defines the `Size` and `Position` properties of a drawing object.

OpenOffice.org Basic also offers several other services through which you can modify such properties, as formatting or apply fills. The formatting options that are available depend on the type of drawing object.

The following example creates and inserts a rectangle in a drawing document:

```
Dim Doc As Object
Dim Page As Object
Dim RectangleShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

Doc = ThisComponent
Page = Doc.DrawPages(0)

Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

RectangleShape = Doc.createInstance("com.sun.star.drawing.RectangleShape")
RectangleShape.Size = Size
RectangleShape.Position = Point

Page.add(RectangleShape)
```

The `Point` and `Size` structures with the point of origin (left hand corner) and the size of the drawing object are then initialized. The lengths are specified in hundredths of a millimeter.

The program code then uses the `Doc.createInstance` call to create the rectangle drawing object as specified by the com.sun.star.drawing.RectangleShape service. At the end, the drawing object is assigned to a page using a `Page.add` call.

Fill Properties

This section describes four services and in each instance the sample program code uses a rectangle shape element that combines several types of formatting. Fill properties are combined in the com.sun.star.drawing.FillProperties service.

OpenOffice.org recognizes four main types of formatting for a fill area. The simplest variant is a single-color fill. The options for defining color gradients and hatches let you create other colors into play. The fourth variant is the option of projecting existing graphics into the fill area.

The fill mode of a drawing object is defined using the `FillStyle` property. The permissible values are defined in com.sun.star.drawing.FillStyle.

Single Color Fills

The main property for single-color fills is:

`FillColor (Long)`

fill color of area

To use the fill mode, you must the `FillStyle` property to the `SOLID` fill mode.

The following example creates a rectangle shape and fills it with red (RGB value 255, 0, 0):

```
Dim Doc As Object
Dim Page As Object
Dim RectangleShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

Point.x = 1000
```

```
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
Page = Doc.DrawPages(0)

RectangleShape = Doc.createInstance("com.sun.star.drawing.RectangleShape")
RectangleShape.Size = Size
RectangleShape.Position = Point

RectangleShape.FillStyle = com.sun.star.drawing.FillStyle.SOLID
RectangleShape.FillColor = RGB(255,0,0)

Page.add(RectangleShape)
```

Color Gradient

If you set the `FillStyle` property to `GRADIENT`, you can apply a color gradient to any fill area of a OpenOffice.org document.

If you want to apply a predefined color gradient, you can assign the associated name of the `FillTransparenceGradientName` property. To define your own color gradient, you need to complete a com.sun.star.awt.Gradient structure to assign the `FillGradient` property. This property provides the following options:

`Style (Enum)`

type of gradient, for example, linear or radial (default values in accordance with com.sun.star.awt.GradientStyle)

`StartColor (Long)`

start color of color gradient

`EndColor (Long)`

end color of color gradient

`Angle (Short)`

angle of color gradient in tenths of a degree

`XOffset (Short)`

X-coordinate at which the color gradient starts, specified in hundredths of a millimeter

`YOffset (Short)`

Y-coordinate at which the color gradient begins, specified in hundredths of a millimeter

`StartIntensity (Short)`

intensity of `StartColor` as a percentage (in OpenOffice.org Basic, you can also specify values higher than 100 percent)

`EndIntensity (Short)`

intensity of `EndColor` as a percentage (in OpenOffice.org Basic, you can also specify values higher than 100 percent)

`StepCount (Short)`

number of color graduations which OpenOffice.org is to calculate for the gradients

The following example demonstrates the use of color gradients with the aid of the com.sun.star.awt.Gradient structure:

```
Dim Doc As Object
Dim Page As Object
Dim RectangleShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size
Dim Gradient As New com.sun.star.awt.Gradient
```

```
Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
Page = Doc.DrawPages(0)

RectangleShape = Doc.createInstance("com.sun.star.drawing.RectangleShape")
RectangleShape.Size = Size
RectangleShape.Position = Point
Gradient.Style = com.sun.star.awt.GradientStyle.LINEAR
Gradient.StartColor = RGB(255,0,0)
Gradient.EndColor = RGB(0,255,0)
Gradient.StartIntensity = 150
Gradient.EndIntensity = 150
Gradient.Angle = 450
Gradient.StepCount = 100

RectangleShape.FillStyle = com.sun.star.drawing.FillStyle.GRADIENT
RectangleShape.FillGradient = Gradient

Page.add(RectangleShape)
```

This example creates a linear color gradient (`Style = LINEAR`). The gradient starts with red (`StartColor`) in the top left corner, and extends at a 45 degree angle (`Angle`) to green (`EndColor`) in the bottom right corner. The color intensity of the start and end colors is 150 percent (`StartIntensity` and `EndIntensity`) which results in the colors seeming brighter than the values specified in the `StartColor` and `EndColor` properties. The color gradient is depicted using a hundred graduated individual colors (`StepCount`).

Hatches

To create a hatch fill, the `FillStyle` property must be set to `HATCH`. The program code for defining the hatch is very similar to the code for color gradients. Again an auxiliary structure, in this case com.sun.star.drawing.Hatch, is used to define the appearance of hatches. The structure for hatches has the following properties:

`Style (Enum)`

type of hatch: simple, squared, or squared with diagonals (default values in accordance with `com.sun.star.awt.HatchStyle`)

`Color (Long)`

color of lines

`Distance (Long)`

distance between lines in hundredths of a millimeter

`Angle (Short)`

angle of hatch in tenths of a degree

The following example demonstrates the use of a hatch structure:

```
Dim Doc As Object
Dim Page As Object
Dim RectangleShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size
Dim Hatch As New com.sun.star.drawing.Hatch

Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
Page = Doc.DrawPages(0)

RectangleShape = Doc.createInstance("com.sun.star.drawing.RectangleShape")
RectangleShape.Size = Size
RectangleShape.Position = Point
```

```
RectangleShape.FillStyle = com.sun.star.drawing.FillStyle.HATCH

Hatch.Style = com.sun.star.drawing.HatchStyle.SINGLE
Hatch.Color = RGB(64,64,64)
Hatch.Distance = 20
Hatch.Angle = 450

RectangleShape.FillHatch = Hatch

Page.add(RectangleShape)
```

This code creates a simple hatch structure (`HatchStyle = SINGLE`) whose lines are rotated 45 degrees (`Angle`). The lines are dark gray (`Color`) and are spaced is 0.2 millimeters (`Distance`) apart.

Bitmaps

To use bitmap projection as a fill, you must set the `FillStyle` property to `BITMAP`. If the bitmap is already available in OpenOffice.org, you just need to specify its name in the `FillBitMapName` property and its display style (simple, tiled, or elongated) in the `FillBitmapMode` property (default values in accordance with com.sun.star.drawing.BitmapMode).

If you want to use an external bitmap file, you can specify its URL in the `FillBitmapURL` property.

The following example creates a rectangle and tiles the Sky bitmap that is available in OpenOffice.org to fill the area of the rectangle:

```
Dim Doc As Object
Dim Page As Object
Dim RectangleShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
Page = Doc.DrawPages(0)

RectangleShape = Doc.createInstance("com.sun.star.drawing.RectangleShape")
RectangleShape.Size = Size
RectangleShape.Position = Point

RectangleShape.FillStyle = com.sun.star.drawing.FillStyle.BITMAP
RectangleShape.FillBitmapName = "Sky"
RectangleShape.FillBitmapMode = com.sun.star.drawing.BitmapMode.REPEAT

Page.add(RectangleShape)
```

Transparency

You can adjust the transparency of any fill that you apply. The simplest way to change the transparency of a drawing element is to use the `FillTransparence` property.

The following example creates a red rectangle with a transparency of 50 percent.

```
Dim Doc As Object
Dim Page As Object
Dim RectangleShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
Page = Doc.DrawPages(0)
```

```
RectangleShape = Doc.createInstance("com.sun.star.drawing.RectangleShape")
RectangleShape.Size = Size
RectangleShape.Position = Point

RectangleShape.FillStyle = com.sun.star.drawing.FillStyle.SOLID
RectangleShape.FillTransparence = 50
RectangleShape.FillColor = RGB(255,0,0)

Page.add(RectangleShape)
```

To make the fill transparent, set the `FillTransparence` property to 100.

In addition to the `FillTransparence` property, the com.sun.star.drawing.FillProperties service also provides the `FillTransparenceGradient` property. This is used to define a gradient that specifies the transparency of a fill area.

Line Properties

All drawing objects that can have a border line support the com.sun.star.drawing.LineStyle service. Some of the properties that this service provides are:

`LineStyle (Enum)`

line type (default values in accordance with com.sun.star.drawing.LineStyle)

`LineColor (Long)`

line color

`LineTransparence (Short)`

line transparency

`LineWidth (Long)`

line thickness in hundredths of a millimeter

`LineJoint (Enum)`

transitions to connection points (default values in accordance with com.sun.star.drawing.LineJoint)

The following example creates a rectangle with a solid border (`LineStyle = SOLID`) that is 5 millimeters thick (`LineWidth`) and 50 percent transparent. The right and left-hand edges of the line extend to their points of intersect with each other (`LineJoint = MITER`) to form a right-angle.

```
Dim Doc As Object
Dim Page As Object
Dim RectangleShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
Page = Doc.DrawPages(0)

RectangleShape = Doc.createInstance("com.sun.star.drawing.RectangleShape")
RectangleShape.Size = Size
RectangleShape.Position = Point

RectangleShape.LineColor = RGB(128,128,128)
RectangleShape.LineTransparence = 50
RectangleShape.LineWidth = 500
RectangleShape.LineJoint = com.sun.star.drawing.LineJoint.MITER

RectangleShape.LineStyle = com.sun.star.drawing.LineStyle.SOLID

Page.add(RectangleShape)
```

In addition to the listed properties, the com.sun.star.drawing.LineStyle service provides options for drawing

dotted and dashed lines. For more information, see the OpenOffice.org API reference.

Text Properties (Drawing Objects)

The com.sun.star.style.CharacterProperties and com.sun.star.style.ParagraphProperties

services can format text in drawing objects. These services relate to individual characters and paragraphs and are described in detail in Text Documents.

The following example inserts text in a rectangle and formats the font com.sun.star.style.CharacterProperties service.

```
Dim Doc As Object
Dim Page As Object
Dim RectangleShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size
Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000
Doc = ThisComponent
Page = Doc.DrawPages(0)

RectangleShape = Doc.createInstance("com.sun.star.drawing.RectangleShape")
RectangleShape.Size = Size
RectangleShape.Position = Point

Page.add(RectangleShape)

RectangleShape.String = "This is a test"
RectangleShape.CharWeight = com.sun.star.awt.FontWeight.BOLD
RectangleShape.CharFontName = "Arial"
```

This code uses the `String`-property of the rectangle to insert the text and the `CharWeight` and `CharFontName` properties from the com.sun.star.style.CharacterProperties service to format the text font.

The text can only be inserted after the drawing object has been added to the drawing page. You can also use the com.sun.star.drawing.Text service to position and format text in drawing object. The following are some of the important properties of this service:

`TextAutoGrowHeight (Boolean)`

adapts the height of the drawing element to the text it contains

`TextAutoGrowWidth (Boolean)`

adapts the width of the drawing element to the text it contains

`TextHorizontalAdjust (Enum)`

horizontal position of text within the drawing element (default values in accordance with com.sun.star.drawing.TextHorizontalAdjust)

`TextVerticalAdjust (Enum)`

vertical position of text within the drawing element (default values in accordance with com.sun.star.drawing.TextVerticalAdjust)

`TextLeftDistance (Long)`

left-hand distance between drawing element and text in hundredths of a millimeter

`TextRightDistance (Long)`

right-hand distance between drawing element and text in hundredths of a millimeter

`TextUpperDistance (Long)`

upper distance between drawing element and text in hundredths of a millimeter

`TextLowerDistance (Long)`

lower distance between drawing element and text in hundredths of a millimeter

The following example demonstrates use of the named properties.

```
Dim Doc As Object
Dim Page As Object
Dim RectangleShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
Page = Doc.DrawPages(0)

RectangleShape = Doc.createInstance("com.sun.star.drawing.RectangleShape")
RectangleShape.Size = Size
RectangleShape.Position = Point

Page.add(RectangleShape)

RectangleShape.String = "This is a test"   ' May only take place after Page.add!

RectangleShape.TextVerticalAdjust = com.sun.star.drawing.TextVerticalAdjust.TOP
RectangleShape.TextHorizontalAdjust = com.sun.star.drawing.TextHorizontalAdjust.LEFT

RectangleShape.TextLeftDistance = 300
RectangleShape.TextRightDistance = 300
RectangleShape.TextUpperDistance = 300
RectangleShape.TextLowerDistance = 300
```

This code inserts a drawing element in a page and then adds text to the top left corner of the drawing object using the `TextVerticalAdjust` and `TextHorizontalAdjust` properties. The minimum distance between the text edge of the drawing object is set to three millimeters.

Shadow Properties

You can add a shadow to most drawing objects with the com.sun.star.drawing.ShadowProperties service. The properties of this service are:

`Shadow (Boolean)`

activates the shadow

`ShadowColor (Long)`

shadow color

`ShadowTransparence (Short)`

transparency of the shadow

`ShadowXDistance (Long)`

vertical distance of the shadow from the drawing object in hundredths of a millimeter

`ShadowYDistance (Long)`

horizontal distance of the shadow from the drawing object in hundredths of a millimeter

The following example creates a rectangle with a shadow that is vertically and horizontally offset from the rectangle by 2 millimeters. The shadow is rendered in dark gray with 50 percent transparency.

```
Dim Doc As Object
Dim Page As Object
Dim RectangleShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
```

```
Page = Doc.DrawPages(0)

RectangleShape = Doc.createInstance("com.sun.star.drawing.RectangleShape")
RectangleShape.Size = Size
RectangleShape.Position = Point

RectangleShape.Shadow = True
RectangleShape.ShadowColor = RGB(192,192,192)
RectangleShape.ShadowTransparence = 50
RectangleShape.ShadowXDistance = 200
RectangleShape.ShadowYDistance = 200

Page.add(RectangleShape)
```

An Overview of Various Drawing Objects

Rectangle Shapes

Rectangle shape objects (com.sun.star.drawing.RectangleShape) support the following services for formatting objects:

Fill properties

com.sun.star.drawing.FillProperties

Line properties

com.sun.star.drawing.LineProperties

Text properties

com.sun.star.drawing.Text (with com.sun.star.style.CharacterProperties and com.sun.star.style.ParagraphProperties)

Shadow properties

com.sun.star.drawing.ShadowProperties

CornerRadius (Long)

radius for rounding corners in hundredths of a millimeter

Circles and Ellipses

The Service com.sun.star.drawing.EllipseShape service is responsible for circles and ellipses and supports the following services:

Fill properties

com.sun.star.drawing.FillProperties

Line properties

com.sun.star.drawing.LineProperties

Text properties

com.sun.star.drawing.Text (with com.sun.star.style.CharacterProperties and com.sun.star.style.ParagraphProperties)

Shadow properties

com.sun.star.drawing.ShadowProperties

In addition to these services, circles and ellipses also provide these properties:

CircleKind (Enum)

type of circle or ellipse (default values in accordance with com.sun.star.drawing.CircleKind)

CircleStartAngle (Long)

start angle in tenths of a degree (only for circle or ellipse segments)

CircleEndAngle (Long)

end angle in tenths of a degree (only for circle or ellipse segments)

The `CircleKind` property determines if an object is a complete circle, a circular slice, or a section of a circle. The following values are available:

com.sun.star.drawing.CircleKind.FULL

full circle or full ellipse

com.sun.star.drawing.CircleKind.CUT

section of circle (partial circle whose interfaces are linked directly to one another)

com.sun.star.drawing.CircleKind.SECTION

circle slice

com.sun.star.drawing.CircleKind.ARC

angle (not including circle line)

The following example creates a circular slice with a 70 degree angle (produced from difference between start angle of 20 degrees and end angle of 90 degrees)

```
Dim Doc As Object
Dim Page As Object
Dim EllipseShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
Page = Doc.DrawPages(0)

EllipseShape = Doc.createInstance("com.sun.star.drawing.EllipseShape")
EllipseShape.Size = Size
EllipseShape.Position = Point

EllipseShape.CircleStartAngle = 2000
EllipseShape.CircleEndAngle = 9000
EllipseShape.CircleKind =  com.sun.star.drawing.CircleKind.SECTION

Page.add(EllipseShape)
```

Lines

OpenOffice.org provides the com.sun.star.drawing.LineShape service for line objects. Line objects support all of the general formatting services with the exception of areas. The following are all of the properties that are associated with the `LineShape` service:

Line properties

com.sun.star.drawing.LineProperties

Text properties

com.sun.star.drawing.Text (with com.sun.star.style.CharacterProperties and com.sun.star.style.ParagraphProperties)

Shadow properties

com.sun.star.drawing.ShadowProperties

The following example creates and formats a line with the help of the named properties. The origin of the line is specified in the `Location` property, whereas the coordinates listed in the `Size` property specify the end point of the line.

```
Dim Doc As Object
Dim Page As Object
Dim LineShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
Page = Doc.DrawPages(0)

LineShape = Doc.createInstance("com.sun.star.drawing.LineShape")
LineShape.Size = Size
LineShape.Position = Point

Page.add(LineShape)
```

Polypolygon Shapes

OpenOffice.org also supports complex polygonal shapes through the com.sun.star.drawing.PolyPolygonShape service. Strictly speaking, a PolyPolygon is not a simple polygon but a multiple polygon. Several independent lists containing corner points can therefore be specified and combined to form a complete object.

As with rectangle shapes, all the formatting properties of drawing objects are also provided for polypolygons:

`Fill properties`

com.sun.star.drawing.FillProperties

`Line properties`

com.sun.star.drawing.LineProperties

`Text properties`

com.sun.star.drawing.Text (with com.sun.star.style.CharacterProperties and com.sun.star.style.ParagraphProperties)

`Shadow properties`

com.sun.star.drawing.ShadowProperties

The `PolyPolygonShape` service also has a property that lets you define the coordinates of a polygon:

- `PolyPolygon (Array)` – field containing the coordinates of the polygon (double array with points of the com.sun.star.awt.Point type)

The following example shows how you can define a triangle with the `PolyPolygonShape` service.

```
Dim Doc As Object
Dim Page As Object
Dim PolyPolygonShape As Object
Dim PolyPolygon As Variant
Dim Coordinates(2) As New com.sun.star.awt.Point

Doc = ThisComponent
Page = Doc.DrawPages(0)

PolyPolygonShape = Doc.createInstance("com.sun.star.drawing.PolyPolygonShape")
Page.add(PolyPolygonShape)   ' Page.add must take place before the coordinates are set

Coordinates(0).x = 1000
Coordinates(1).x = 7500
Coordinates(2).x = 10000
Coordinates(0).y = 1000
Coordinates(1).y = 7500
Coordinates(2).y = 5000

PolyPolygonShape.PolyPolygon = Array(Coordinates())
```

Since the points of a polygon are defined as absolute values, you do not need to specify the size or the start position of a polygon. Instead, you need to create an array of the points, package this array in a second array (using the `Array(Coordinates())` call), and then assign this array to the polygon. Before the corresponding call can be made, the polygon must be inserted into the document.

The double array in the definition allows you to create complex shapes by merging several polygons. For example, you can create a rectangle and then insert another rectangle inside it to create a hole in the original rectangle:

```
Dim Doc As Object
Dim Page As Object
Dim PolyPolygonShape As Object
Dim PolyPolygon As Variant
Dim Square1(3) As New com.sun.star.awt.Point
Dim Square2(3) As New com.sun.star.awt.Point
Dim Square3(3) As New com.sun.star.awt.Point

Doc = ThisComponent
Page = Doc.DrawPages(0)

PolyPolygonShape = Doc.createInstance("com.sun.star.drawing.PolyPolygonShape")

Page.add(PolyPolygonShape)   ' Page.add must take place before the coordinates are set

Square1(0).x = 5000
Square1(1).x = 10000
Square1(2).x = 10000
Square1(3).x = 5000
Square1(0).y = 5000
Square1(1).y = 5000
Square1(2).y = 10000
Square1(3).y = 10000

Square2(0).x = 6500
Square2(1).x = 8500
Square2(2).x = 8500
Square2(3).x = 6500
Square2(0).y = 6500
Square2(1).y = 6500
Square2(2).y = 8500
Square2(3).y = 8500

Square3(0).x = 6500
Square3(1).x = 8500
Square3(2).x = 8500
Square3(3).x = 6500
Square3(0).y = 9000
Square3(1).y = 9000
Square3(2).y = 9500
Square3(3).y = 9500

PolyPolygonShape.PolyPolygon = Array(Square1(), Square2(), Square3())
```

With respect as to which areas are filled and which areas are holes, OpenOffice.org applies a simple rule: the edge of the outer shape is always the outer border of the polypolygon. The next line inwards is the inner border of the shape and marks the transition to the first hole. If there is another line inwards, it marks the transition to a filled area.

Graphics

The last of the drawing elements presented here are graphic objects that are based on the com.sun.star.drawing.GraphicObjectShape service. These can be used with any graphic within OpenOffice.org whose appearance can be adapted using a whole range of properties.

Graphic objects support two of the general formatting properties:

`Text properties`

com.sun.star.drawing.Text (with com.sun.star.style.CharacterProperties and com.sun.star.style.ParagraphProperties)

Shadow properties

com.sun.star.drawing.ShadowProperties

Additional properties that are supported by graphic objects are:

GraphicURL (String)

URL of the graphic

AdjustLuminance (Short)

luminance of the colors, as a percentage (negative values are also permitted)

AdjustContrast (Short)

contrast as a percentage (negative values are also permitted)

AdjustRed (Short)

red value as a percentage (negative values are also permitted)

AdjustGreen (Short)

green value as a percentage (negative values are also permitted)

AdjustBlue (Short)

blue value as a percentage (negative values are also permitted)

Gamma (Short)

gamma value of a graphic

Transparency (Short)

transparency of a graphic as a percentage

GraphicColorMode (enum)

color mode, for example, standard, gray stages, black and white (default value in accordance with com.sun.star.drawing.ColorMode)

The following example shows how to insert a page into a graphics object.

```
Dim Doc As Object
Dim Page As Object
Dim GraphicObjectShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

Point.x = 1000         ' specifications, insignificant because latter
                       coordinates are binding
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
Page = Doc.DrawPages(0)

GraphicObjectShape = Doc.createInstance("com.sun.star.drawing.GraphicObjectShape")

GraphicObjectShape.Size = Size
GraphicObjectShape.Position = Point

GraphicObjectShape.GraphicURL = "file:///c:/test.jpg"
GraphicObjectShape.AdjustBlue = -50
GraphicObjectShape.AdjustGreen = 5
GraphicObjectShape.AdjustBlue = 10
GraphicObjectShape.AdjustContrast = 20
GraphicObjectShape.AdjustLuminance = 50
GraphicObjectShape.Transparency = 40
GraphicObjectShape.GraphicColorMode = com.sun.star.drawing.ColorMode.STANDARD

Page.add(GraphicObjectShape)
```

This code inserts the `test.jpg` graphic and adapts its appearance using the `Adjust` properties. In this example, the graphics are depicted as 40 percent transparent with no other color conversions do not take place (`GraphicColorMode = STANDARD`).

Editing Drawing Objects

Grouping Objects

In many situations, it is useful to group several individual drawing objects together so that they behave as a single large object.

The following example combines two drawing objects:

```
Dim Doc As Object
Dim Page As Object
Dim Square As Object
Dim Circle As Object
Dim Shapes As Object
Dim Group As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size
Dim NewPos As New com.sun.star.awt.Point
Dim Height As Long
Dim Width As Long

Doc = ThisComponent
Page = Doc.DrawPages(0)
Point.x = 3000
Point.y = 3000
Size.Width = 3000
Size.Height = 3000
' create square drawing element
Square = Doc.createInstance("com.sun.star.drawing.RectangleShape")
Square.Size = Size
Square.Position = Point
Square.FillColor = RGB(255,128,128)
Page.add(Square)

' create circle drawing element
Circle = Doc.createInstance("com.sun.star.drawing.EllipseShape")
Circle.Size = Size
Circle.Position = Point
Circle.FillColor = RGB(255,128,128)
Circle.FillColor = RGB(0,255,0)
Page.add(Circle)

' combine square and circle drawing elements
Shapes = createUnoService("com.sun.star.drawing.ShapeCollection")
Shapes.add(Square)

Shapes.add(Circle)
Group = Page.group(Shapes)
' centre combined drawing elements
Height = Page.Height
Width = Page.Width
NewPos.X = Width / 2
NewPos.Y = Height / 2
Height = Group.Size.Height
Width = Group.Size.Width
NewPos.X = NewPos.X - Width / 2
NewPos.Y = NewPos.Y - Height / 2
Group.Position = NewPos
```

This code creates a rectangle and a circle and inserts them into a page. It then creates an object that supports the com.sun.star.drawing.ShapeCollection service and uses the `Add` method to add the rectangle and the circle to this object. The `ShapeCollection` is added to the page using the `Group` method and returns the actual `Group` object that can be edited like an individual `Shape`.

If you want to format the individual objects of a group, apply the formatting before you add them to the group. You cannot modify the objects once they are in the group.

Rotating and Shearing Drawing Objects

All of the drawing objects that are described in the previous sections can also be rotated and sheared using the com.sun.star.drawing.RotationDescriptor service.

The service provides the following properties:

`RotateAngle (Long)`

rotary angle in hundredths of a degree

`ShearAngle (Long)`

shear angle in hundredths of a degree

The following example creates a rectangle and rotates it by 30 degrees using the `RotateAngle` property:

```
Dim Doc As Object
Dim Page As Object
Dim RectangleShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
Page = Doc.DrawPages(0)

RectangleShape = Doc.createInstance("com.sun.star.drawing.RectangleShape")
RectangleShape.Size = Size
RectangleShape.Position = Point

RectangleShape.RotateAngle = 3000

Page.add(RectangleShape)
```

The next example creates the same rectangle as in the previous example, but instead shears it through 30 degrees using the `ShearAngle` property.

```
Dim Doc As Object
Dim Page As Object
Dim RectangleShape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Doc = ThisComponent
Page = Doc.DrawPages(0)
RectangleShape = Doc.createInstance("com.sun.star.drawing.RectangleShape")
RectangleShape.Size = Size
RectangleShape.Position = Point

RectangleShape.ShearAngle = 3000

Page.add(RectangleShape)
```

Searching and Replacing

As in text documents, drawing documents provide a function for searching and replace. This function is similar to the one that is used in text documents as described in Text Documents. However, in drawing documents the descriptor objects for searching and replacing are not created directly through the document object, but rather through the associated character level. The following example outlines the replacement process within a drawing:

```
Dim Doc As Object
```

```
Dim Page As Object
Dim ReplaceDescriptor As Object
Dim I As Integer

Doc = ThisComponent
Page = Doc.DrawPages(0)

ReplaceDescriptor = Page.createReplaceDescriptor()
ReplaceDescriptor.SearchString = "is"
ReplaceDescriptor.ReplaceString = "was"

For I = 0 to Doc.DrawPages.Count - 1
   Page = Doc.DrawPages(I)
   Page.ReplaceAll(ReplaceDescriptor)
Next I
```

This code uses the first page of the document to create a `ReplaceDescriptor` and then applies this descriptor in a loop to all of the pages in the drawing document.

Presentations

OpenOffice.org presentations are based on drawing documents. Each page in the presentation is a slide. You can access slides in the same way as a standard drawing is accessed through the `DrawPages` list of the document object. The com.sun.star.presentation.PresentationDocument service, responsible for presentation documents, also provides the complete com.sun.star.drawing.DrawingDocument service.

Working With Presentations

In addition to the drawing functions that are provided by the `Presentation` property, the presentation document has a presentation object that provides access to the main properties and control mechanisms for presentations. For example, this object provides a `start` method that can start presentations.

```
Dim Doc As Object
Dim Presentation As Object

Doc = ThisComponent
Presentation = Doc.Presentation
Presentation.start()
```

The code used in this example creates a `Doc` object that references the current presentation document and establishes the associated presentation object. The `start()` method of the object is used to start the example and run the screen presentation.

The following methods are provided as presentation objects:

`start`

starts the presentation

`end`

ends the presentation

`rehearseTimings`

starts the presentation from the beginning and establishes its runtime

The following properties are also available:

`AllowAnimations (Boolean)`

runs animations in the presentation

`CustomShow (String)`

allows you to specify the name of the presentation so that you can reference the name in the presentation

FirstPage (String)

name of slide that you want to start the presentation with

IsAlwaysOnTop (Boolean)

always displays the presentation window as the first window on the screen

IsAutomatic (Boolean)

automatically runs through the presentation

IsEndless (Boolean)

restarts the presentation from the beginning once it ends

IsFullScreen (Boolean)

automatically starts the presentation in full screen mode

IsMouseVisible (Boolean)

displays the mouse during the presentation

Pause (long)

the amount of time that a blank screen is displayed at the end of the presentation

StartWithNavigator (Boolean)

displays the navigator window when the presentation starts

UsePn (Boolean)

displays the pointer during the presentation

◆ ◆ ◆ CHAPTER 9

Charts (Diagrams)

OpenOffice.org can display data as a chart, which creates graphical representations of numerical data in the form of bars, pie charts, lines or other elements. Data can either be displayed as 2D or 3D graphics, and the appearance of the chart elements can be individually adapted in a way similar to the process used for drawing elements.

Charts are not treated as independent documents in OpenOffice.org, but as objects that are embedded in an existing document.

A chart may contain its own data or may display data from the container document. For example charts in spreadsheets can display data obtained from the cell ranges and charts in text documents can display data obtained from writer tables.

Using Charts in Spreadsheets

Charts within spreadsheets can display the data from an assigned cell range within the spreadsheet. Any modifications made to the data within the spreadsheet will also be reflected in the assigned chart. The following example shows how to create a chart assigned to some cell ranges within a spreadsheet document:

```
Dim Doc As Object
Dim Charts As Object
Dim Chart as Object
Dim Rect As New com.sun.star.awt.Rectangle
Dim RangeAddress(0) As New com.sun.star.table.CellRangeAddress

Doc = ThisComponent
Charts = Doc.Sheets(0).Charts

Rect.X = 8000
Rect.Y = 1000
Rect.Width = 10000
Rect.Height = 7000
RangeAddress(0).Sheet = 0
RangeAddress(0).StartColumn = 0
RangeAddress(0).StartRow = 0
RangeAddress(0).EndColumn = 2
RangeAddress(0).EndRow = 12

Charts.addNewByName("MyChart", Rect, RangeAddress(), True, True)
```

Although the code used in the example may appear to be complex, the central processes are limited to three lines. The first central line creates the `Doc` document variable, which references the current spreadsheet document (`Doc` line = `StarDesktop.CurrentComponent`). The code used in the example then creates a list containing all charts of the first spreadsheet (`Charts` line = `Doc.Sheets(0).Charts`). Finally, in the last line, a new chart is added to this list using the `addNewByName` method. This new chart is then visible to the

user. The variable `RangeAddress` determines the assigned cell range whose data will be displayed within the chart. The variable `Rect` determines the position and size of the chart within the first sheet in the spreadsheet document.

The previous example creates a bar chart. If a different chart type is needed, then the bar chart must be explicitly replaced:

```
Chart = Charts.getByName("MyChart").embeddedObject
Chart.Diagram = Chart.createInstance("com.sun.star.chart.LineDiagram")
```

The first line defines the corresponding chart object. The second line replaces the current chart with a new one — in this example, a line chart.

Note – VBA : In Microsoft Excel, a distinction is made between charts which have been inserted as a separate page in a Microsoft Excel document and charts which are embedded in a table page. Correspondingly, two different access methods are defined there for charts. This distinction is not made in OpenOffice.org Basic, because charts in OpenOffice.org Calc are always created as embedded objects of a table page. The charts are always accessed using the `Charts` list of the associated `Sheet` object.

The Structure of Charts

The structure of a chart, and therefore the list of services and interfaces supported by it, depends on the chart type. For example, the methods and properties of the Z-axis, are available in 3D charts, but not in 2D charts, and in pie charts, there are no interfaces for working with axes.

Title, Subtitle and Legend

Title, subtitle and legend are basic elements provided for every chart. The `Chart` object provides the following properties for administrating these elements:

`HasMainTitle (Boolean)`

activates the title

`Title (Object)`

object with detailed information about the chart title (supports the com.sun.star.chart.ChartTitle service)

`HasSubTitle(Boolean)`

activates the subtitle

`Subtitle (Object)`

object with detailed information about the chart subtitle (supports the com.sun.star.chart.ChartTitle service)

`HasLegend (Boolean)`

activates the legend

`Legend (Object)`

object with detailed information about the legend (supports the com.sun.star.chart.ChartLegend service)

Both services `com.sun.star.chart.ChartTitle` and `com.sun.star.chart.ChartLegend` do support the service `com.sun.star.drawing.Shape`. This allows to determine the position and size of the elements using the `Position` and `Size` properties. As the size of the legend and the titles is calculated automatically based on the current content and the character height for example, the size property provides read access only.

Fill and line properties (com.sun.star.drawing.FillProperties and com.sun.star.drawing.LineProperties services) as well as the character properties (com.sun.star.style.CharacterProperties service) are provided for further formatting of the elements.

com.sun.star.chart.ChartTitlecontains not only the listed formatting properties, but also two other properties:

String (String)

text which to be displayed as the title or subtitle

TextRotation (Long)

angle of rotation of text in 100ths of a degree

The legend (com.sun.star.chart.ChartLegend) contains the following additional property:

Alignment (Enum)

position at which the legend appears (value of type com.sun.star.chart.ChartLegendPosition)

The following example creates a chart with a title "Main Title String", a subtitle "Subtitle String" and a legend. The legend has a gray background color, is placed at the bottom of the chart, and has a character size of 7 points.

```
Dim Doc As Object
Dim Charts As Object
Dim Chart as Object
Dim Rect As New com.sun.star.awt.Rectangle
Dim RangeAddress(0) As New com.sun.star.table.CellRangeAddress

Rect.X = 8000
Rect.Y = 1000
Rect.Width = 10000
Rect.Height = 7000
RangeAddress(0).Sheet = 0
RangeAddress(0).StartColumn = 0
RangeAddress(0).StartRow = 0
RangeAddress(0).EndColumn = 2
RangeAddress(0).EndRow = 12

Doc = ThisComponent

Charts = Doc.Sheets(0).Charts
Charts.addNewByName("MyChart", Rect, RangeAddress(), True, True)
Chart = Charts.getByName("MyChart").EmbeddedObject
Chart.HasMainTitle = True
Chart.Title.String = "Main Title String"
Chart.HasSubTitle = True
Chart.Subtitle.String = "Subtitle String"
Chart.HasLegend = True
Chart.Legend.Alignment = com.sun.star.chart.ChartLegendPosition.BOTTOM
Chart.Legend.FillStyle = com.sun.star.drawing.FillStyle.SOLID
Chart.Legend.FillColor = RGB(210, 210, 210)
Chart.Legend.CharHeight = 7
```

Background

Every chart has a background area. The `Chart` object provides the property `Area` to format the background:

Area (Object)

background area of the chart (supports com.sun.star.chart.ChartArea service)

The background of a chart covers its complete area, including the area under the title, subtitle and legend. The associated com.sun.star.chart.ChartArea service supports line and fill properties.

Diagram

The `Chart` object provides the property `Diagram` which forms the coordinate system with axes and grids,

where the data finally is displayed:

Diagram (Object)

object forming the coordinate system where the data is plotted. It supports com.sun.star.chart.Diagram service and:

com.sun.star.chart.StackableDiagram

com.sun.star.chart.ChartAxisXSupplier

com.sun.star.chart.ChartAxisYSupplier

com.sun.star.chart.ChartAxisZSupplier

com.sun.star.chart.ChartTwoAxisXSupplier

com.sun.star.chart.ChartTwoAxisYSupplier

Different services are supported depending on the chart type (see Chart Types).

Wall and Floor

The chart wall is the background of the coordinate system where the data is plotted. Two chart walls usually exist for 3D charts: one behind the plotted data and one as the left-hand or right-hand demarcation. This depends on the rotation of the chart. 3D charts usually also have a floor.

The `Diagram` object provides the properties Wall and Floor:

Wall (Object)

background wall of the coordinate system (supports com.sun.star.chart.ChartArea service)

Floor (Object)

floor panel of coordinate system (only for 3D charts, supports com.sun.star.chart.ChartArea service)

The specified objects support the `com.sun.star.chart.ChartArea` service, which provides the usual fill and line properties (com.sun.star.drawing.FillProperties and com.sun.star.drawing.LineProperties services, refer to Drawings and Presentations).

The following example shows how graphics (named Sky) already contained in OpenOffice.org can be used as a background for a chart. The wall is set to be blue.

```
Dim Doc As Object
Dim Charts As Object
Dim Chart as Object
Dim Rect As New com.sun.star.awt.Rectangle
Dim RangeAddress(0) As New com.sun.star.table.CellRangeAddress

Rect.X = 8000
Rect.Y = 1000
Rect.Width = 10000
Rect.Height = 7000
RangeAddress(0).Sheet = 0
RangeAddress(0).StartColumn = 0
RangeAddress(0).StartRow = 0
RangeAddress(0).EndColumn = 2
RangeAddress(0).EndRow = 12

Doc = ThisComponent

Charts = Doc.Sheets(0).Charts
Charts.addNewByName("MyChart", Rect, RangeAddress(), True, True)
Chart = Charts.getByName("MyChart").EmbeddedObject
Chart.Area.FillStyle = com.sun.star.drawing.FillStyle.BITMAP
Chart.Area.FillBitmapName = "Sky"
Chart.Area.FillBitmapMode = com.sun.star.drawing.BitmapMode.REPEAT

Chart.Diagram.Wall.FillStyle = com.sun.star.drawing.FillStyle.SOLID
Chart.Diagram.Wall.FillColor = RGB(00,132,209)
```

Axes

OpenOffice.org recognizes five different axes that can be used in a chart. In the simplest scenario, these are the X and Y-axes. When working with 3D charts, a Z-axis is also sometimes provided. For charts in which the values of the various rows of data deviate significantly from one another, OpenOffice.org provides a second X and Y-axis for second scaling operations.

The `Diagram` object provides the following properties to access the axes:

`HasXAxis (Boolean)`

activates the X-axis

`XAxis (Object)`

object with detailed information about the X-axis (supports com.sun.star.chart.ChartAxis service)

`HasXAxisDescription (Boolean)`

activates the labels for the interval marks for the X-axis

`HasYAxis (Boolean)`

activates the Y-axis

`YAxis (Object)`

object with detailed information about the Y-axis (supports com.sun.star.chart.ChartAxis service)

`HasYAxisDescription (Boolean)`

activates the labels for the interval marks for the Y-axis

`HasZAxis (Boolean)`

activates the Z-axis

`ZAxis (Object)`

object with detailed information about the Z-axis (supports com.sun.star.chart.ChartAxis service)

`HasZAxisDescription (Boolean)`

activates the labels for the interval marks for the Z-axis

`HasSecondaryXAxis (Boolean)`

activates the secondary X-axis

`SecondaryXAxis (Object)`

object with detailed information about the secondary X-axis (supports com.sun.star.chart.ChartAxis service)

`HasSecondaryXAxisDescription (Boolean)`

activates the labels for the interval marks for the secondary X-axis

`HasSecondaryYAxis (Boolean)`

activates the secondary Y-axis

`SecondaryYAxis (Object)`

object with detailed information about the secondary Y-axis (supports com.sun.star.chart.ChartAxis service)

`HasSecondaryYAxisDescription (Boolean)`

activates the labels for the interval marks for the secondary Y-axis

Properties of Axes

The axis objects of a OpenOffice.org chart support the com.sun.star.chart.ChartAxis service. In addition to

the properties for characters (com.sun.star.style.CharacterProperties service, refer to Text Documents) and lines (com.sun.star.drawing.LineStyle service, refer to Drawings and Presentations), it provides the following properties:

Scaling properties:

`Max (Double)`

maximum value for axis

`Min (Double)`

minimum value for axis

`Origin (Double)`

point of intersect for crossing axes

`StepMain (Double)`

distance between the major interval marks

`StepHelp (Double)`

distance between the minor interval marks (deprecated since OpenOffice.org 3.0; Use property StepHelpCount instead)

`StepHelpCount (Long)`

Contains the number of minor intervals within a major interval. E.g. a StepHelpCount of 5 divides the major interval into 5 pieces and thus produces 4 minor tick marks. (available since OpenOffice.org 3.0)

`AutoMax (Boolean)`

the maximum value for the axis is calculated automatically when set to true

`AutoMin (Boolean)`

the minimum value for the axis is calculated automatically when set to true

`AutoOrigin (Boolean)`

the origin is determined automatically when set to true

`AutoStepMain (Boolean)`

StepMain is determined automatically when set to true

`AutoStepHelp (Boolean)`

StepHelpCount is determined automatically when set to true

`Logarithmic (Boolean)`

scales the axes in logarithmic manner (rather than linear)

`ReverseDirection (Boolean)`

determines if the axis orientation is mathematical or reversed. (available since OpenOffice.org 2.4)

Label properties:

`DisplayLabels (Boolean)`

activates the text label at the interval marks

`TextRotation (Long)`

angle of rotation of text label in 100ths of a degree

`ArrangeOrder (enum)`

the label may be staggered, thus they are positioned alternately over two lines (values according to com.sun.star.chart.ChartAxisArrangeOrderType)

TextBreak (Boolean)

permits line breaks within the axes labels

TextCanOverlap (Boolean)

permits an overlap of the axes labels

NumberFormat (Long)

number format to be used with the axes labels

LinkNumberFormatToSource (Boolean)

determines whether to use the number format given by the container document, or from the property `NumberFormat`. (since OpenOffice.org 2.3)

Interval mark properties:

Marks (Const)

determines the position of the major interval marks (values in accordance with com.sun.star.chart.ChartAxisMarks)

HelpMarks (Const)

determines the position of the minor interval marks (values in accordance with com.sun.star.chart.ChartAxisMarks)

Only for bar charts:

Overlap (Long)

percentage which specifies the extent to which the bars of different sets of data may overlap (at 100%, the bars are shown as completely overlapping, at -100%, there is a distance of the width of one bar between them)

GapWidth (long)

percentage which specifies the distance there may be between the different groups of bars of a chart (at 100%, there is a distance corresponding to the width of one bar)

Grids

For the primary axes grids and sub grids can be displayed, matching to the major and minor intervals. The `Diagram` object provides the following properties to access the grids:

HasXAxisGrid (Boolean)

activates major grid for X-axis

XMainGrid (Object)

object with detailed information about the major grid for X-axis (supports com.sun.star.chart.ChartGrid service)

HasXAxisHelpGrid (Boolean)

activates minor grid for X-axis

XHelpGrid (Object)

object with detailed information about the minor grid for X-axis (supports com.sun.star.chart.ChartGrid service)

the same for y and z:

HasYAxisGrid (Boolean)

activates major grid for Y-axis

YMainGrid (Object)

object with detailed information about the major grid for Y-axis (supports com.sun.star.chart.ChartGrid service)

HasYAxisHelpGrid (Boolean)

activates minor grid for Y-axis

YHelpGrid (Object)

object with detailed information about the minor grid for Y-axis (supports com.sun.star.chart.ChartGrid service)

HasZAxisGrid (Boolean)

activates major grid for Z-axis

ZMainGrid (Object)

object with detailed information about the major grid for Z-axis (supports com.sun.star.chart.ChartGrid service)

HasZAxisHelpGrid (Boolean)

activates minor grid for Z-axis

ZHelpGrid (Object)

object with detailed information about the minor grid for Z-axis (supports com.sun.star.chart.ChartGrid service)

The grid object is based on the com.sun.star.chart.ChartGrid service, which in turn supports the line properties of the com.sun.star.drawing.LineStyle support service (refer to Drawings and Presentations).

Axes Title

For all axes an additional title can be displayed. The `Diagram` object provides the following properties to access the axes title:

HasXAxisTitle (Boolean)

activates title of X-axis

XAxisTitle (Object)

object with detailed information about title of the X-axis (supports com.sun.star.chart.ChartTitle service)

same y and z:

HasYAxisTitle (Boolean)

activates title of Y-axis

YAxisTitle (Object)

object with detailed information about title of the Y-axis (supports com.sun.star.chart.ChartTitle service)

HasZAxisTitle (Boolean)

activates title of Z-axis

ZAxisTitle (Object)

object with detailed information about title of the Z-axis (supports com.sun.star.chart.ChartTitle service)

and for the secondary axes (available since OpenOffice.org 3.0):

HasSecondaryXAxisTitle (Boolean)

activates title of the secondary X-axis.

SecondXAxisTitle (Object)

object with detailed information about title of the secondary X-axis (supports com.sun.star.chart.ChartTitle service)

HasSecondaryYAxisTitle (Boolean)

activates title of the secondary Y-axis.

SecondYAxisTitle (Object)

object with detailed information about title of the secondary Y-axis (supports com.sun.star.chart.ChartTitle service)

The objects for formatting the axes title are based on the com.sun.star.chart.ChartTitle service, which is also used for chart titles.

Example

The following example creates a line chart. The color for the rear wall of the chart is set to white. Both the X and Y-axes have a gray grid for visual orientation. The minimum value of the Y-axis is fixed to 0 and the maximum value is fixed to 100 so that the resolution of the chart is retained even if the values are changed. The X-axis points in reverse direction from right to left. And a title for the X-axis was added.

```
Dim Doc As Object
Dim Charts As Object
Dim Chart as Object
Dim Rect As New com.sun.star.awt.Rectangle
Dim RangeAddress(0) As New com.sun.star.table.CellRangeAddress

Doc = ThisComponent
Charts = Doc.Sheets(0).Charts

Rect.X = 8000
Rect.Y = 1000
Rect.Width = 10000
Rect.Height = 7000
RangeAddress(0).Sheet = 0
RangeAddress(0).StartColumn = 0
RangeAddress(0).StartRow = 0
RangeAddress(0).EndColumn = 2
RangeAddress(0).EndRow = 12

Charts.addNewByName("MyChart", Rect, RangeAddress(), True, True)
Chart = Charts.getByName("MyChart").embeddedObject
Chart.Diagram = Chart.createInstance("com.sun.star.chart.LineDiagram")
Chart.Diagram.Wall.FillColor = RGB(255, 255, 255)
Chart.Diagram.HasXAxisGrid = True
Chart.Diagram.XMainGrid.LineColor = RGB(192, 192, 192)
Chart.Diagram.HasYAxisGrid = True
Chart.Diagram.YMainGrid.LineColor = RGB(192, 192, 192)
Chart.Diagram.YAxis.Min = 0
Chart.Diagram.YAxis.Max = 100

Chart.Diagram.XAxis.ReverseDirection = true 'needs OpenOffice.org 2.4 or newer
Chart.Diagram.HasXAxisTitle = true
Chart.Diagram.XAxisTitle.String = "Reversed X Axis Example"
```

3D Charts

Most charts in OpenOffice.org can also be displayed with 3D graphics. The following properties are provided for 3D charts at the `Diagram` object:

Dim3D (Boolean)

activates 3D display

Deep (Boolean)

the series will be arranged behind each other in z-direction

RightAngledAxes (Boolean)

activates a 3D display mode where X- and Y-axes form a right angle within the projection. (available since OpenOffice.org 2.3)

D3DScenePerspective (Enum)

defines whether the 3D objects are to be drawn in perspective or parallel projection.(values according to com.sun.star.drawing.ProjectionMode)

Perspective (Long)

Perspective of 3D charts ([0,100]) (available since OpenOffice.org 2.4.1)

RotationHorizontal (Long)

Horizontal rotation of 3D charts in degrees ([-180,180]) (available since OpenOffice.org 2.4.1)

RotationVertical (Long)

Vertical rotation of 3D charts in degrees ([-180,180]) (available since OpenOffice.org 2.4.1)

The following example creates a 3D area chart.

```
Dim Doc As Object
Dim Charts As Object
Dim Chart as Object
Dim Rect As New com.sun.star.awt.Rectangle
Dim RangeAddress(0) As New com.sun.star.table.CellRangeAddress

Doc = ThisComponent
Charts = Doc.Sheets(0).Charts

Rect.X = 8000
Rect.Y = 1000
Rect.Width = 10000
Rect.Height = 7000
RangeAddress(0).Sheet = 0
RangeAddress(0).StartColumn = 0
RangeAddress(0).StartRow = 0
RangeAddress(0).EndColumn = 2
RangeAddress(0).EndRow = 12

Charts.addNewByName("MyChart", Rect, RangeAddress(), True, True)
Chart = Charts.getByName("MyChart").embeddedObject
Chart.Diagram = Chart.createInstance("com.sun.star.chart.AreaDiagram")
Chart.Diagram.Dim3D = true
Chart.Diagram.Deep = true
Chart.Diagram.RightAngledAxes = true 'needs OpenOffice.org 2.3 or newer
Chart.Diagram.D3DScenePerspective = com.sun.star.drawing.ProjectionMode.PERSPECTIVE
Chart.Diagram.Perspective = 100 'needs OpenOffice.org 2.4.1 or newer
Chart.Diagram.RotationHorizontal = 60 'needs OpenOffice.org 2.4.1 or newer
Chart.Diagram.RotationVertical = 30 'needs OpenOffice.org 2.4.1 or newer
```

Stacked Charts

Stacked charts are charts that are arranged with several individual values on top of one another to produce a total value. This view shows not only the individual values, but also an overview of all the values.

In OpenOffice.org, various types of charts can be displayed in a stacked form. All of these charts support the com.sun.star.chart.StackableDiagram service, which in turn provides the following properties:

Stacked (Boolean)

activates the stacked viewing mode

Percent (Boolean)

rather than absolute values, displays their percentage distribution

Chart Types

Line Charts

Line charts (com.sun.star.chart.LineDiagram) support two X-axes, two Y-axes and one Z-axis. They can be displayed as 2D or 3D graphics (com.sun.star.chart.Dim3Ddiagramservice). The lines can be stacked (com.sun.star.chart.StackableDiagram).

Line charts provide the following properties:

SymbolType (const)

symbol for displaying the data points (constant in accordance with com.sun.star.chart.ChartSymbolType)

SymbolSize (Long)

size of symbol for displaying the data points in 100ths of a millimeter

SymbolBitmapURL (String)

file name of graphics for displaying the data points

Lines (Boolean)

links the data points by means of lines

SplineType (Long)

spline function for smoothing the lines (0: no spline function, 1: cubic splines, 2: B splines)

SplineOrder (Long)

polynomial weight for splines (only for B splines)

SplineResolution (Long)

number of support points for spline calculation

Area Charts

Area charts (com.sun.star.chart.AreaDiagram service) support two X-axes, two Y-axes and one Z-axis. They can be displayed as 2D or 3D graphics (com.sun.star.chart.Dim3Ddiagram service). The areas can be stacked (com.sun.star.chart.StackableDiagram).

Bar Charts

Bar charts (com.sun.star.chart.BarDiagram) support two X-axes, two Y-axes and one Z-axis. They can be displayed as 2D or 3D graphics (com.sun.star.chart.Dim3Ddiagram service). The bars can be stacked (com.sun.star.chart.StackableDiagram).

They provide the following properties:

Vertical (Boolean)

displays the bars vertically, otherwise they are depicted horizontally

Deep (Boolean)

in 3D viewing mode, positions the bars behind one another rather than next to one another

StackedBarsConnected (Boolean)

links the associated bars in a stacked chart by means of lines (only available with horizontal charts)

NumberOfLines (Long)

number of lines to be displayed in a stacked chart as lines rather than bars

GroupBarsPerAxis (Boolean)

displays bars attached to different axes behind or next to each other (available since OpenOffice.org 2.4)

Pie Charts

Pie charts (com.sun.star.chart.PieDiagram) do not contain any axes and cannot be stacked. They can be displayed as 2D or 3D graphics (com.sun.star.chart.Dim3DDiagram service).

The following properties are provided for pie and donut charts with the `Diagram` object:

StartingAngle (Long)

angle of the first piece of a pie in degrees (available since OpenOffice.org 3.0)

◆ ◆ ◆ CHAPTER 10

Databases

OpenOffice.org has an integrated database interface (independent of any systems) called Star Database Connectivity (SDBC). The objective of developing this interface was to provide access to as many different data sources as possible.

To make this possible, data sources are accessed by drivers. The sources from which the drivers take their data is irrelevant to a SDBC user. Some drivers access file-based databases and take the data directly from them. Others use standard interfaces such as JDBC or ODBC. There are, however, also special drivers which access the MAPI address book, LDAP directories or OpenOffice.org spreadsheets as data sources.

Since the drivers are based on UNO components, other drivers can be developed and therefore open up new data sources. You will find details about this in the OpenOffice.org Developer's Guide.

Note – VBA : In terms of its concept, SDBC is comparable with the ADO and DAO libraries available in VBA. It permits high level access to databases, regardless of the underlying database backends.

SQL: a Query Language

The SQL language is provided as a query language for users of SDBC. To compare the differences between different SQL dialects, the SDBC components from OpenOffice.org have their own SQL parser. This uses the query window to check the SQL commands typed and corrects simple syntax errors, such as those associated with uppercase and lowercase characters.

If a driver permits access to a data source that does not support SQL, then it must independently convert the transferred SQL commands to the native access needed.

Types of Database Access

The database interface from OpenOffice.org is available in the OpenOffice.org Writer and OpenOffice.org Calc applications, as well as in the database forms.

In OpenOffice.org Writer, standard letters can be created with the assistance of SDBC data sources and these can then be printed out. You can also move data from the database window into text documents using the drag-and-drop function.

If you move a database table into a spreadsheet, OpenOffice.org creates a table area which can be updated

at the click of the mouse if the original data has been modified. Conversely, spreadsheet data can be moved to a database table and a database import performed.

Finally, OpenOffice.org provides a mechanism for forms based on databases. To do this, you first create a standard OpenOffice.org Writer or OpenOffice.org Calc form and then link the fields to a database.

All the options specified here are based on the user interface from OpenOffice.org. No programming knowledge is needed to use the corresponding functions.

This section, however, provides little information about the functions specified, but instead concentrates on the programming interface from SDBC, which allows for automated database querying and therefore permits a much greater range of applications to be used.

Basic knowledge of the way in which databases function and the SQL query language is however needed to fully understand the following sections.

Data Sources

A database is incorporated into OpenOffice.org by creating what is commonly referred to as a data source. The user interface provides a corresponding option for creating data sources in the Extras menu. You can also create data sources and work with them using OpenOffice.org Basic.

A database context object that is created using the `createUnoService` function serves as the starting point for accessing a data source. This based on the com.sun.star.sdb.DatabaseContext service and is the root object for all database operations.

The following example shows how a database context can be created and then used to determine the names of all data sources available. It displays the names in a message box.

```
Dim DatabaseContext As Object
Dim Names
Dim I As Integer

DatabaseContext = createUnoService("com.sun.star.sdb.DatabaseContext")

Names = DatabaseContext.getElementNames()

For I = 0 To UBound(Names())
  MsgBox Names(I)
Next I
```

The individual data sources are based on the com.sun.star.sdb.DataSource service and can be determined from the database context using the `getByName` method:

```
Dim DatabaseContext As Object
Dim DataSource As Object

DatabaseContext = createUnoService("com.sun.star.sdb.DatabaseContext")
DataSource = DatabaseContext.getByName("Customers")
```

The example creates a `DataSource` object for a data source called **Customers**.

Data sources provide a range of properties, which in turn provide general information about the origin of the data and information about access methods. The properties are:

`Name (String)`

name of data source

`URL (String)`

URL of data source in the form of **jdbc: subprotocol : subname** or **sdbc: subprotocol : subname**

`Settings (Array)`

array containing `PropertyValue`-pairs with connection parameters (usually at least user name and

password)

User (String)

user name

Password (String)

user password (is not saved)

IsPasswordRequired (Boolean)

the password is needed and is interactively requested from user.

IsReadOnly (Boolean)

permits read-only access to the database

NumberFormatsSupplier (Object)

object containing the number formats available for the database (supports the com.sun.star.util.XNumberFormatsSupplier interface)

TableFilter (Array)

list of table names to be displayed

TableTypeFilter (Array)

list of table types to be displayed. Values available are `TABLE`, `VIEW` and `SYSTEM TABLE`

SuppressVersionColumns (Boolean)

suppresses the display of columns that are used for version administration

Note – The data sources from OpenOffice.org are not 1:1 comparable with the data sources in ODBC. Whereas an ODBC data source only covers information about the origin of the data, a data source in OpenOffice.org also includes a range of information about how the data is displayed within the database windows of OpenOffice.org.

Queries

Predefined queries can be assigned to a data source. OpenOffice.org notes the SQL commands of queries so that they are available at all times. Queries are used to simplify working with databases because they can be opened with a simple mouse click and also provide users without any knowledge of SQL with the option of issuing SQL commands.

An object which supports the com.sun.star.sdb.QueryDefinition service is concealed behind a query. The queries are accessed by means of the `QueryDefinitions` method of the data source.

The following example lists the names of data source queries can be established in a message box.

```
Dim DatabaseContext As Object
Dim DataSource As Object
Dim QueryDefinitions As Object
Dim QueryDefinition As Object
Dim I As Integer

DatabaseContext = createUnoService("com.sun.star.sdb.DatabaseContext")
DataSource = DatabaseContext.getByName("Customers")
QueryDefinitions = DataSource.getQueryDefinitions()

For I = 0 To QueryDefinitions.Count() - 1
  QueryDefinition = QueryDefinitions(I)
  MsgBox QueryDefinition.Name
Next I
```

In addition to the Name property used in the example, the com.sun.star.sdb.QueryDefinition provides a whole range of other properties. These are:

Name (String)

query name

Command (String)

SQL command (typically a `SELECT` command)

The following example shows how a query object can be created in a program-controlled manner and can be assigned to a data source.

```
Dim DatabaseContext As Object
Dim DataSource As Object
Dim QueryDefinitions As Object
Dim QueryDefinition As Object
Dim I As Integer

DatabaseContext = createUnoService("com.sun.star.sdb.DatabaseContext")
DataSource = DatabaseContext.getByName("Customers")
QueryDefinitions = DataSource.getQueryDefinitions()
QueryDefinition = createUnoService("com.sun.star.sdb.QueryDefinition")
QueryDefinition.Command = "SELECT * FROM Customer"
QueryDefinitions.insertByName("NewQuery", QueryDefinition)
```

The query object is first created using the `createUnoService` call, then initialized, and then inserted into the `QueryDefinitions` object by means of `insertByName`.

Database Access

A database connection is needed for access to a database. This is a transfer channel which permits direct communication with the database. Unlike the data sources presented in the previous section, the database connection must therefore be re-established every time the program is restarted.

OpenOffice.org provides various ways of establishing database connections. This example shows how to connect to an existing data source.

```
Dim DatabaseContext As Object
Dim DataSource As Object
Dim Connection As Object
Dim InteractionHandler as Object

DatabaseContext = createUnoService("com.sun.star.sdb.DatabaseContext")
DataSource = DatabaseContext.getByName("Customers")

If Not DataSource.IsPasswordRequired Then
  Connection = DataSource.GetConnection("","")
Else
  InteractionHandler = createUnoService("com.sun.star.sdb.InteractionHandler")
  Connection = DataSource.ConnectWithCompletion(InteractionHandler)
End If
```

The code used in the example first checks whether the database is password protected. If not, it creates the database connection required using the `GetConnection` call. The two empty strings in the command line stand for the user name and password.

If the database is password protected, the example creates an `InteractionHandler` and opens the database connection using the `ConnectWithCompletion` method. The InteractionHandler ensures that OpenOffice.org asks the user for the required login data.

Iteration of Tables

A table is usually accessed in OpenOffice.org through the `ResultSet` object. A `ResultSet` is a type of marker that indicates a current set of data within a volume of results obtained using the `SELECT` command.

This example shows how a `ResultSet` can be used to query values from a database table.

```
Dim DatabaseContext As Object
Dim DataSource As Object
Dim Connection As Object
Dim InteractionHandler as Object
Dim Statement As Object
Dim ResultSet As Object

DatabaseContext = createUnoService("com.sun.star.sdb.DatabaseContext")
DataSource = DatabaseContext.getByName("Customers")

If Not DataSource.IsPasswordRequired Then
  Connection = DataSource.GetConnection("","")
Else
  InteractionHandler = createUnoService("com.sun.star.sdb.InteractionHandler")
  Connection = DataSource.ConnectWithCompletion(InteractionHandler)
End If

Statement = Connection.createStatement()
ResultSet = Statement.executeQuery("SELECT ""CustomerNumber"" FROM ""Customer""")

If Not IsNull(ResultSet) Then
  While ResultSet.next
    MsgBox ResultSet.getString(1)
  Wend
End If
```

Once the database connection has been established, the code used in the example first uses the `Connection.createObject` call to create a `Statement` object. This `Statement` object then uses the `executeQuery` call to return the actual `ResultSet`. The program now checks whether the `ResultSet` actually exists and traverses the data records using a loop. The values required (in the example, those from the `CustomerNumber` field) returns the `ResultSet` using the `getString` method, whereby the parameter 1 determines that the call relates to the values of the first column.

Note – VBA : The `ResultSet` object from SDBC is comparable with the `Recordset` object from DAO and ADO, since this also provides iterative access to a database.

Note – StarOffice 5 : The database is actually accessed in OpenOffice.org through a `ResultSet` object. This reflects the content of a table or the result of a SQL-SELECT command. In the past, the `ResultSet` object provided the resident methods in the `Application` object for navigation within the data, for example, `DataNextRecord`).

Type-Specific Methods for Retrieving Values

As can be seen in the example from the previous section, OpenOffice.org provides a `getString` method for accessing table contents. The method provides the result in the form of a string. The following `get` methods are available:

`getByte()`

supports the SQL data types for numbers, characters and strings

`getShort()`

supports the SQL data types for numbers, characters and strings

`getInt()`

supports the SQL data types for numbers, characters and strings

`getLong()`

supports the SQL data types for numbers, characters and strings

`getFloat()`

supports the SQL data types for numbers, characters and strings

`getDouble()`

supports the SQL data types for numbers, characters and strings

getBoolean()

supports the SQL data types for numbers, characters and strings

getString()

supports all SQL data types

getBytes()

supports the SQL data types for binary values

getDate()

supports the SQL data types for numbers, strings, date and time stamp

getTime()

supports the SQL data types for numbers, strings, date and time stamp

getTimestamp()

supports the SQL data types for numbers, strings, date and time stamp

getCharacterStream()

supports the SQL data types for numbers, strings and binary values

getUnicodeStream()

supports the SQL data types for numbers, strings and binary values

getBinaryStream()

binary values

getObject()

supports all SQL data types

In all instances, the number of columns should be listed as a parameter whose values should be queried.

The ResultSet Variants

Accessing databases is often a matter of critical speed. OpenOffice.org provides several ways of optimizing `ResultSets` and thereby controlling the speed of access. The more functions a `ResultSet` provides, the more complex its implementation usually is and therefore the slower the functions are.

A simple `ResultSet,` provides the minimum scope of functions available. It only allows iteration to be applied forward, and for values to be interrogated. More extensive navigation options, such as the possibility of modifying values, are therefore not included.

The Statement object used to create the `ResultSet` provides some properties which allow the functions of the `ResultSet` to be influenced:

ResultSetConcurrency (const)

specifications as to whether the data can be modified (specifications in accordance with com.sun.star.sdbc.ResultSetConcurrency).

ResultSetType (const)

specifications regarding type of `ResultSets` (specifications in accordance with com.sun.star.sdbc.ResultSetType).

The values defined in com.sun.star.sdbc.ResultSetConcurrency are:

UPDATABLE

`ResultSet` permits values to be modified

READ_ONLY

`ResultSet` does not permit modifications

The com.sun.star.sdbc.ResultSetConcurrency group of constants provides the following specifications:

FORWARD_ONLY

`ResultSet` only permits forward navigation

SCROLL_INSENSITIVE

`ResultSet` permits any type of navigation, changes to the original data are, however, not noted

SCROLL_SENSITIVE

`ResultSet` permits any type of navigation, changes to the original data impact on the `ResultSet`

Note – VBA : A `ResultSet` containing the `READ_ONLY` and `SCROLL_INSENSITIVE` properties corresponds to a record set of the `Snapshot` type in ADO and DAO.

When using the `ResultSet's UPDATEABLE` and `SCROLL_SENSITIVE` properties, the scope of function of a `ResultSet` is comparable with a `Dynaset` type `Recordset` from ADO and DAO.

Methods for Navigation in ResultSets

If a `ResultSet` is a `SCROLL_INSENSITIVE` or `SCROLL_SENSITIVE` type, it supports a whole range of methods for navigation in the stock of data. The central methods are:

next()

navigation to the next data record

previous()

navigation to the previous data record

first()

navigation to the first data record

last()

navigation to the last data record

beforeFirst()

navigation to before the first data record

afterLast()

navigation to after the last data record

All methods return a Boolean parameter which specifies whether the navigation was successful.

To determine the current cursor position, the following test methods are provided and all return a Boolean value:

isBeforeFirst()

`ResultSet` is before the first data record

isAfterLast()

`ResultSet` is after the last data record

isFirst()

`ResultSet` is the first data record

`isLast()`

`ResultSet` is the last data record

Modifying Data Records

If a `ResultSet` has been created with the `ResultSetConcurrency` = `UPDATEABLE` value, then its content can be edited. This only applies for as long as the SQL command allows the data to be re-written to the database (depends on principle). This is not, for example, possible with complex SQL commands with linked columns or accumulated values.

The `ResultSet` object provides `Update` methods for modifying values, which are structured in the same way as the `get` methods for retrieving values. The `updateString` method, for example, allows a string to be written.

After modification, the values must be transferred into the database using the `updateRow()` method. The call must take place before the next navigation command, otherwise the values will be lost.

If an error is made during the modifications, this can be undone using the `cancelRowUpdates()` method. This call is only available provided that the data has not be re-written into the database using `updateRow()`.

◆ ◆ ◆ CHAPTER 11

Dialogs

You can add custom dialog windows and forms to OpenOffice.org documents. These in turn can be linked to OpenOffice.org Basic macros to considerably extend the usage range of OpenOffice.org Basic. Dialogs can, for example, display database information or guide users through a step-by-step process of creating a new document in the form of a Wizard.

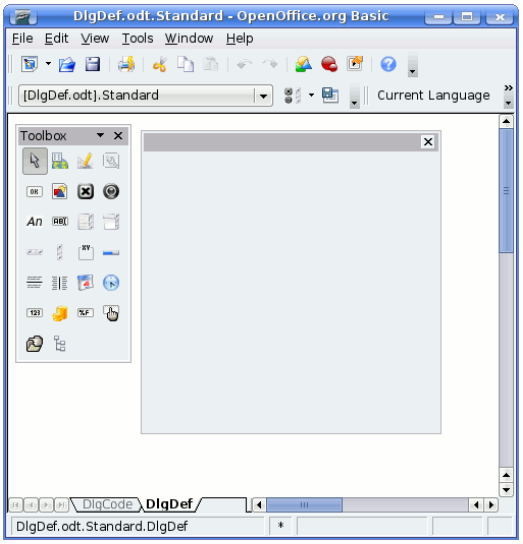
Tip - You will find another description of dialogs in the Developer's Guide:
chapter OpenOffice.org_Basic_IDE describes more fully the IDE
chapter Programming Dialogs and Dialog Controls shows more examples in Basic.

Working With Dialogs

OpenOffice.org Basic dialogs consist of a dialog window that can contain text fields, list boxes, radio buttons, and other control elements.

Creating Dialogs

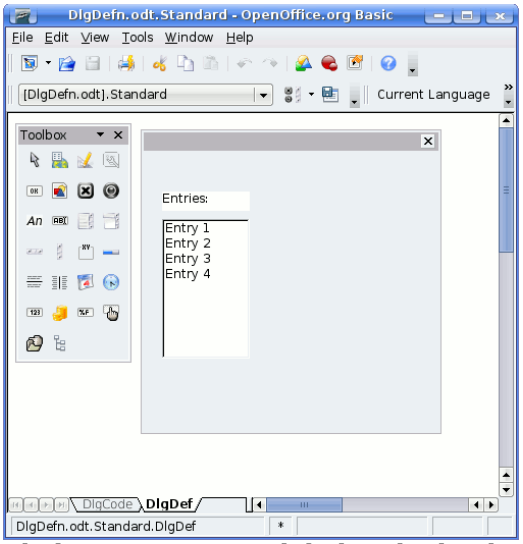
You can create and structure dialogs using the OpenOffice.org dialog editor:



Create and structure dialogs in the dialog editor

You can drag the control elements from the design pallet (right) into the dialog area, and define their position and size.

The example shows a dialog that contains a label and a list box.



A dialog containing a label and a list box

You can open a dialog with the following code:

```
Dim Dlg As Object

DialogLibraries.LoadLibrary("Standard")
Dlg = CreateUnoDialog(DialogLibraries.Standard.DlgDef)
Dlg.Execute()
Dlg.dispose()
```

`CreateUnoDialog` creates an object called `Dlg` that references the associated dialog. Before you can create the dialog, you must ensure that the library it uses (in this example, the `Standard` library) is loaded. The `LoadLibrary` method performs this task.

Once the `Dlg` dialog object has been initialized, you can use the `Execute` method to display the dialog. Dialogs such as this one are described as modal because they do not permit any other program action until they are closed. While this dialog is open, the program remains in the `Execute` call.

The `dispose` method at the end of the code releases the resources used by the dialog once the program ends.

Closing Dialogs

Closing With OK or Cancel

If a dialog contains an **OK** or a **Cancel** button, the dialog is automatically closed when you click one of these buttons. More information about working with these buttons is discussed in Dialog Control Elements in Detail.

If you close a dialog by clicking the **OK** button, the `Execute` method returns a return value of 1, otherwise a value of 0 is returned.

```
Dim Dlg As Object

DialogLibraries.LoadLibrary("Standard")
Dlg = CreateUnoDialog(DialogLibraries.Standard.MyDialog)
Select Case Dlg.Execute()
Case 1
  MsgBox "Ok pressed"
Case 0
  MsgBox "Cancel pressed"
```

```
End Select
```

Closing With the Close Button in the Title Bar

You can close a dialog by clicking the close button on the title bar of the dialog window. The `Execute` method of the dialog returns the value 0, which is the same as when you click Cancel.

Closing With an Explicit Program Call

You can also close an open dialog window with the `endExecute` method:

```
Dlg.endExecute()
```

The Execute method of the dialog returns the value 0, which is the same as when you click Cancel.

Access to Individual Control Elements

A dialog can contain any number of control elements. You can access these elements through the `getControl` method that returns the control element by name.

```
Dim Ctl As Object

Ctl = Dlg.getControl("MyButton")
Ctl.Label = "New Label"
```

This code determines the object for the `MyButton` control element and then initializes the `Ctl` object variable with a reference to the element. Finally the code sets the `Label` property of the control element to the `New Label` value.

Note – Unlike OpenOffice.org Basic identifiers, the names of control elements are case sensitive.

Working With the Model of Dialogs and Control Elements

The division between visible program elements (**View**) and the data or documents behind them (**Model**) occurs at many places in OpenOffice.org API. In addition to the methods and properties of control elements, both dialog and control element objects have a subordinate `Model` object. This object allows you to directly access the content of a dialog or control element.

In dialogs, the distinction between data and depiction is not always as clear as in other API areas of OpenOffice.org. Elements of the API are available through both the View and the Model.

The `Model` property provides program-controlled access to the model of dialog and control element objects.

```
Dim cmdNext As Object

cmdNext = Dlg.getControl("cmdNext")
cmdNext.Model.Enabled = False
```

This example deactivates the `cmdNext` button in the `Dlg` dialog with the aid of the model object from `cmdNext`.

Properties

Name and Title

Every control element has its own name that can be queried using the following model property:

`Model.Name (String)`

control element name

You can specify the title that appears in the title bar of a dialog with the following model property:

`Model.Title (String)`

dialog title (only applies to dialogs)

Position and Size

You can query the size and position of a control element using the following properties of the model object:

`Model.Height (long)`

height of control element (in ma units)

`Model.Width (long)`

width of control element (in ma units)

`Model.PositionX (long)`

X-position of control element, measured from the left inner edge of the dialog (in ma units)

`Model.PositionY (long)`

Y-position of control element, measured from top inner edge of the dialog (in ma units)

To ensure platform independence for the appearance of dialogs, OpenOffice.org uses the **Map AppFont (ma)** internal unit to specify the position and size within dialogs. An ma unit is defined as being one eighth of the average height of a character from the system font defined in the operating system and one quarter of its width. By using ma units, OpenOffice.org ensures that a dialog looks the same on different systems under different system settings.

If you want to change the size or position of control elements for runtime, determine the total size of the dialog and adjust the values for the control elements to the corresponding part ratios.

Note – The Map AppFont (ma) replaces the Twips unit to achieve better platform independence.

Focus and Tabulator Sequence

You can navigate through the control elements in any dialog by pressing the Tab key. The following properties are available in this context in the control elements model:

`Model.Enabled (Boolean)`

activates the control element

`Model.Tabstop (Boolean)`

allows the control element to be reached through the Tab key

`Model.TabIndex (Long)`

position of control element in the order of activation

Finally, the control element provides a `getFocus` method that ensures that the underlying control element receives the focus:

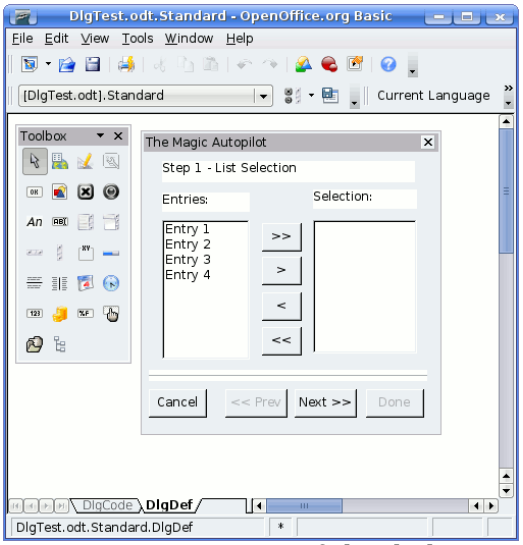
`getFocus`

control element receives the focus (only for dialogs)

Multi-Page Dialogs

A dialog in OpenOffice.org can have more than one tab page. The `Step` property of a dialog defines the current tab page of the dialog whereas the `Step` property for a control element specifies the tab page where the control element is to be displayed.

The `Step`-value of 0 is a special case. If you set this value to zero in a dialog, all of the control elements are visible regardless of their `Step` value. Similarly, if you set this value to zero for a control element, the element is displayed on all of the tab pages in a dialog.



Designing Page 1 of the dialog

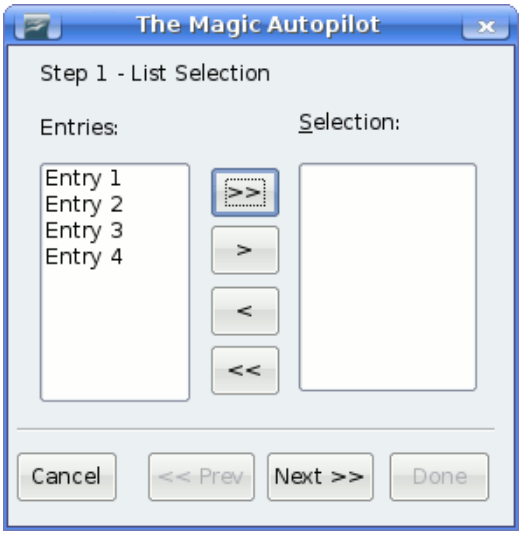
In the preceding example, you can also assign the `Step` value of 0 to the dividing line as well as the `Cancel`, `Prev`, `Next`, and `Done` buttons to display these elements on all pages. You can also assign the elements to an individual tab page (for example page 1).

The following program code shows how the `Step` value in event handlers of the `Next` and `Prev` buttons can be increased or reduced and changes the status of the buttons.

```
Sub cmdNext_Initiated

   Dim cmdNext As Object
   Dim cmdPrev As Object

   cmdPrev = Dlg.getControl("cmdPrev")
   cmdNext = Dlg.getControl("cmdNext")
   cmdPrev.Model.Enabled = Not cmdPrev.Model.Enabled
   cmdNext.Model.Enabled = False
   Dlg.Model.Step = Dlg.Model.Step + 1

End Sub

Sub cmdPrev_Initiated

   Dim cmdNext As Object
   Dim cmdPrev As Object

   cmdPrev = Dlg.getControl("cmdPrev")
   cmdNext = Dlg.getControl("cmdNext")
   cmdPrev.Model.Enabled = False
   cmdNext.Model.Enabled = True
   Dlg.Model.Step = Dlg.Model.Step - 1
```

```
End Sub
```

A global `Dlg` variable that references an open dialog must be included to make this example possible. The dialog then changes its appearance as follows:



Page 1

Page 2

Tip - You can find an other OOoBasic example here.

Dialogs supporting several languages

The strings of a Dialog can be localized, see the Developer's Guide chapter Dialog Localization.

Events

OpenOffice.org dialogs and forms are based on an event-oriented programming model where you can assign **event handlers** to the control elements. An event handler runs a predefined procedure when a particular action occurs. You can also edit documents or open databases with event handling as well as access other control elements.

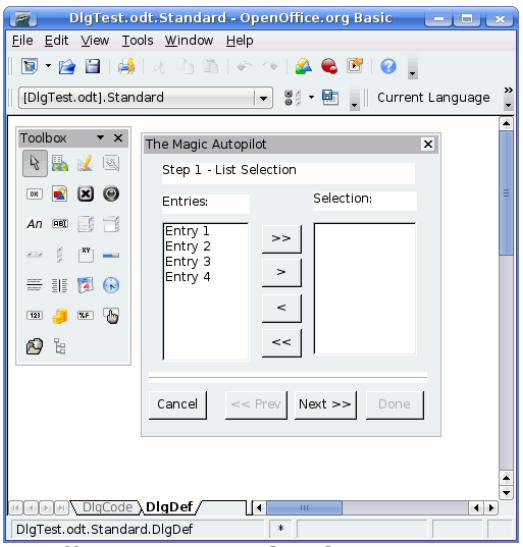
OpenOffice.org control elements recognize different types of events that can be triggered in different situations. These event types can be divided into four groups:

- **Mouse control**: Events that correspond to mouse actions (for example, simple mouse movements or a

click on a particular screen location).

- **Keyboard control**: Events that are triggered by keyboard strokes.
- **Focus modification**: Events that OpenOffice.org performs when control elements are activated or deactivated.
- **Control element-specific events**: Events that only occur in relation to certain control elements.

When you work with events, make sure that you create the associated dialog in the OpenOffice.org development environment and that it contains the required control elements or documents (if you apply the events to a form).



The OpenOffice.org Basic development environment

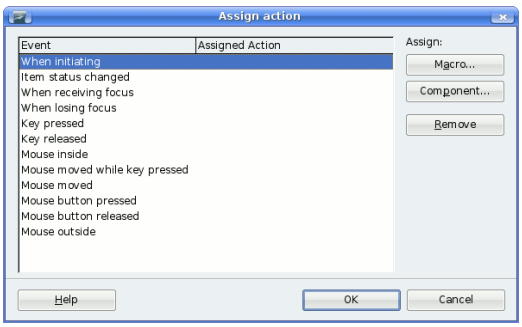
The figure above shows the OpenOffice.org Basic development environment with a dialog window that contains two list boxes. You can move the data from one list to the other using the buttons between the two list boxes.

If you want to display the layout on screen, then you should create the associated OpenOffice.org Basic procedures so that they can be called up by the event handlers. Even though you can use these procedures in any module, it is best to limit their use to two modules. To make your code easier to read, you should assign meaningful names to these procedures. Jumping directly to a general program procedure from a macro can result in unclear code. Instead, to simplify code maintenance and troubleshooting, you should create another procedure to serve as an entry point for event handling - even if it only executes a single call to the target procedure.

The code in the following example moves an entry from the left to the right list box of a dialog.

```
Sub cmdSelect_Initiated

   Dim lstEntries As Object
   Dim lstSelection As Object

   lstEntries = Dlg.getControl("lstEntries")
   lstSelection = Dlg.getControl("lstSelection")

   If lstEntries.SelectedItem > 0 Then
     lstSelection.AddItem(lstEntries.SelectedItem, 0)
     lstEntries.removeItems(lstEntries.SelectItemPos, 1)
   Else
     Beep
   End If

End Sub
```

If this procedure was created in OpenOffice.org Basic, you can assign it to an event required using the property window of the dialog editor.



The Assign Action dialog

The Assign Action dialog lists all of the available Events. To assign a macro to an event:

1. Select the event
2. Click **Macro...**
3. Browse to and select the macro you want to assign
4. Click OK

Parameters

The occurrence of a particular event is not always enough for an appropriate response. Additional information may be required. For example, to process a mouse click, you may need the screen position where the mouse button was pressed.

In OpenOffice.org Basic, you can use object parameters to provide more information about an event to a procedure, for example:

```
Sub ProcessEvent(Event As Object)

End Sub
```

The structure and properties of the `Event` object depend on the type of event that triggers the procedure call.

Regardless of the type of event, all objects provide access to the relevant control element and its model. The control element can be reached using `Event.Source` and its model using `Event.Source.Model`.

You can use these properties to trigger an event within an event handler.

Mouse Events

OpenOffice.org Basic recognizes the following mouse events:

`Mouse moved`

user moves mouse

`Mouse moved while key pressed`

user drags mouse while holding down a key

`Mouse button pressed`

user presses a mouse button

Note – This event is also used for notifying requests for a popup context menu on the control. In this case, the member `PopupTrigger` of the event passed to your macro function will be `TRUE`. In particular, if such a request is made by pressing the right mouse button on the control, the event will be fired twice: once for the popup menu request, and once for the real mouse event. If you are interested in only the mouse click, your macro should ignore all calls where `PopupTrigger` is `TRUE`.

Mouse button released

user releases a mouse button

Mouse outside

user moves mouse outside of the current window

The structure of the associated event objects is defined in the com.sun.star.awt.MouseEvent structure which provides the following information:

Buttons (short)

button pressed (one or more constants in accordance with com.sun.star.awt.MouseButton)

X (long)

X-coordinate of mouse, measured in pixels from the top left corner of the control element

Y (long)

Y-coordinate of mouse, measured in pixels from the top left corner of the control element

ClickCount (long)

number of clicks associated with the mouse event (if OpenOffice.org can respond fast enough, `ClickCount` is also 1 for a double-click because only an individual event is initiated)

The constants defined in com.sun.star.awt.MouseButton for the mouse buttons are:

LEFT

left mouse button

RIGHT

right mouse button

MIDDLE

middle mouse button

The following example outputs the mouse position as well as the mouse button that was pressed:

```
Sub MouseUp(Event As Object)

   Dim Msg As String

   Msg = "Keys: "
   If Event.Buttons AND com.sun.star.awt.MouseButton.LEFT Then
     Msg = Msg & "LEFT "
   End If

   If Event.Buttons AND com.sun.star.awt.MouseButton.RIGHT Then
     Msg = Msg & "RIGHT "
   End If

   If Event.Buttons AND com.sun.star.awt.MouseButton.MIDDLE Then
     Msg = Msg & "MIDDLE "
   End If

   Msg = Msg & Chr(13) & "Position: "
   Msg = Msg & Event.X & "/" & Event.Y
   MsgBox Msg

End Sub
```

Note – VBA : The VBA `Click` and `Doubleclick` events are not available in OpenOffice.org Basic. Instead use the OpenOffice.org Basic `MouseUp` event for the `click` event and imitate the `Doubleclick` event by changing the application logic.

Keyboard Events

The following keyboard events are available in OpenOffice.org Basic:

Key pressed

user presses a key.

Key released

user releases a key

Both events relate to logical key actions and not to physical actions. If the user presses several keys to output a single character (for example, to add an accent to a character), then OpenOffice.org Basic only creates one event.

A single key action on a modification key, such as the Shift key or the Alt key does not create an independent event.

Information about a pressed key is provided by the event object that OpenOffice.org Basic supplies to the procedure for event handling. It contains the following properties:

KeyCode (short)

code of the pressed key (default values in accordance with com.sun.star.awt.Key)

KeyChar (String)

character that is entered (taking the modification keys into consideration)

The following example uses the `KeyCode` property to establish if the Enter key, the Tab key, or one of the other control keys has been pressed. If one of these keys has been pressed, the name of the key is returned, otherwise the character that was typed is returned:

```
Sub KeyPressed(Event As Object)

   Dim Msg As String

   Select Case Event.KeyCode
   Case com.sun.star.awt.Key.RETURN
     Msg = "Return pressed"
   Case com.sun.star.awt.Key.TAB
     Msg = "Tab pressed"
   Case com.sun.star.awt.Key.DELETE
     Msg = "Delete pressed"
   Case com.sun.star.awt.Key.ESCAPE
     Msg = "Escape pressed"
   Case com.sun.star.awt.Key.DOWN
     Msg = "Down pressed"
   Case com.sun.star.awt.Key.UP
     Msg = "Up pressed"
   Case com.sun.star.awt.Key.LEFT
     Msg = "Left pressed"
   Case com.sun.star.awt.Key.RIGHT
     Msg = "Right pressed"
   Case Else
     Msg = "Character " & Event.KeyChar & " entered"
   End Select
   MsgBox Msg

End Sub
```

Information about other keyboard constants can be found in the API Reference under the com.sun.star.awt.Key group of constants.

Focus Events

Focus events indicate if a control element receives or loses focus. You can use these events to, for example, determine if a user has finished processing a control element so that you can update other elements of a dialog. The following focus events are available:

When receiving focus

element receives focus

When losing focus

element loses focus

The `Event` objects for the focus events are structured as follows:

FocusFlags (short)

cause of focus change (default value in accordance with com.sun.star.awt.FocusChangeReason)

NextFocus (Object)

object that receives focus (only for the `When losing focus` event)

Temporary (Boolean)

the focus is temporarily lost

Control Element-Specific Events

In addition to the preceding events, which are supported by all control elements, there are also some control element-specific events that are only defined for certain control elements. The most important of these events are:

When Item Changed

the value of a control element changes

Item Status Changed

the status of a control element changes

Text modified

the text of a control element changes

When initiating

an action that can be performed when the control element is triggered (for example, a button is pressed)

When you work with events, note that some events, such as the `When initiating` event, can be initiated each time you click the mouse on some control elements (for example, on radio buttons). No action is performed to check if the status of the control element has actually changed. To avoid such "blind events", save the old control element value in a global variable, and then check to see if the value has changed when an event is executing.

The `When initiating` event is also noteworthy for the following reasons:

- This event is initiated by either a key-press or a mouse button. Thus, it provides a consistent interface for users who navigate by mouse or by keyboard.
- When the `Repeat` property of a command button is set to `True`, this event is the one which is repeatedly sent, as long as the triggering action (key down or mouse-button down) remains in effect.

The properties for the `Item Status Changed` event are:

Selected (long)

currently selected entry

Highlighted (long)

currently highlighted entry

ItemId (long)

ID of entry

Dialog Control Elements

OpenOffice.org Basic recognizes a range of control elements which can be divided into the following groups:

Entry fields	Buttons	Selection lists	Other
Text fields	Standard buttons	List boxes	Scrollbars (horizontal and vertical)
Date fields	Checkboxes	Combo-boxes	Fields of groups
Time fields	Radio Buttons	Tree Control	Progress bars
Numerical fields			Dividing lines (horizontal and vertical)
Currency fields			Graphics
Fields adopting any format			File selection fields

Buttons

A button performs an action when you click it.

The simplest scenario is for the button to trigger a `When Initiating` event when it is clicked by a user. You can also link another action to the button to close a dialog using the `PushButtonType` property. When you click a button that has this property set to the value of 0, the dialog remains unaffected. If you click a button that has this property set to the value of 1, the dialog is closed, and the `Execute` method of the dialog returns the value 1 (dialog sequence has been ended correctly). If the `PushButtonType` has the value of 2, the dialog is closed and the `Execute` method of the dialog returns the value 0 (dialog closed). In the Dialog Editor, the property values are shown symbolically, as `Default` (0), `Okay` (1), and `Cancel` (2).

The following are some of the properties that are available through the button model:

`Model.BackgroundColor (long)`

color of background

`Model.DefaultButton (Boolean)`

The button is used as the default value and responds to the Enter key if it has no focus

`Model.FontDescriptor (struct)`

structure that specifies the details of the font to be used (in accordance with com.sun.star.awt.FontDescriptor structure)

`Model.Label (String)`

label that is displayed on the button

`Model.Printable (Boolean)`

the control element can be printed

`Model.TextColor (Long)`

text color of the control element

`Model.HelpText (String)`

help text that is displayed when you move the mouse cursor over the control element

`Model.HelpURL (String)`

URL of the online help for the corresponding control element

`PushButtonType (short)`

action that is linked to the button (0: no action, 1: OK, 2: Cancel)

Option Buttons

These buttons are generally used in groups and allow you to select from one of several options. When you select an option, all of the other options in the group are deactivated. This ensures that at any one time, only one option button is set.

An option button control element provides two properties:

State (Boolean)

activates the button

Label (String)

label that is displayed on the button

You can also use the following properties from the model of the option buttons:

Model.FontDescriptor (struct)

structure with details of the font to be used (in accordance with com.sun.star.awt.FontDescriptor)

Model.Label (String)

label that is displayed on the control element

Model.Printable (Boolean)

control element can be printed

Model.State (Short)

if this property is equal to 1, the option is activated, otherwise it is deactivated

Model.TextColor (Long)

text color of control element

Model.HelpText (String)

help text that is displayed when the mouse cursor rests over the control element

Model.HelpURL (String)

URL of online help for the corresponding control element

To combine several option buttons in a group, you must position them one after another in the activation sequence without any gaps (`Model.TabIndex` property**,** described as Order in the dialog editor). If the activation sequence is interrupted by another control element, then OpenOffice.org automatically starts with a new control element group that can be activated regardless of the first group of control elements.

Note – VBA : Unlike VBA, you cannot insert option buttons in a group of control elements in OpenOffice.org Basic. The grouping of control elements in OpenOffice.org Basic is only used to ensure a visual division by drawing a frame around the control elements.

Checkboxes

Checkboxes are used to record a Yes or No value and depending on the mode, they can adopt two or three states. In addition to the Yes and No states, a check box can have an in-between state if the corresponding Yes or No status has more than one meaning or is unclear.

Checkboxes provide the following properties:

State (Short)

state of the checkbox (0: no, 1: yes, 2: in-between state)

Label (String)

label for the control element

enableTriState (Boolean)

in addition to the activated and deactivated states, you can also use the in-between state

The model object of a checkbox provides the following properties:

Model.FontDescriptor (struct)

structure with details of the font used (in accordance with com.sun.star.awt.FontDescriptor structure)

Model.Label (String)

label for the control element

Model.Printable (Boolean)

the control element can be printed

Model.State (Short)

state of the checkbox (0: no, 1: yes, 2: in-between state)

Model.Tabstop (Boolean)

the control element can be reached with the Tab key

Model.TextColor (Long)

text color of control element

Model.HelpText (String)

help text that is displayed when you rest the mouse cursor over the control element

Model.HelpURL (String)

URL of online help for the corresponding control element

Text Fields

Text fields allow users to type numbers and text. The com.sun.star.awt.UnoControlEdit. service forms the basis for text fields.

A text field can contain one or more lines and can be edited or blocked for user entries. Text fields can also be used as special currency and numerical fields as well as screen fields for special tasks. As these control elements are based on the `UnoControlEdit` Uno service, their program-controlled handling is similar.

Text fields provide the following properties:

Text (String)

current text

SelectedText (String)

currently highlighted text

Selection (Struct)

read-only highlighting of details (structure in accordance with com.sun.star.awt.Selection, with the `Min` and `Max` properties to specify the start and end of the current highlighting)

MaxTextLen (short)

maximum number of characters that you can type in the field

Editable (Boolean)

`True` activates the option for entering text, `False` blocks the entry option (the property cannot be called up directly but only through `IsEditable`)

IsEditable (Boolean)

the content of the control element can be changed, read-only

The following properties are provided through the associated model object:

Model.Align (short)

orientation of text (0: left-aligned, 1: centered, 2: right-aligned)

Model.BackgroundColor (long)

color of the background of the control element

Model.Border (short)

type of border (0: no border, 1: 3D border, 2: simple border)

Model.EchoChar (String)

echo character for password fields

Model.FontDescriptor (struct)

structure with details of font used (in accordance with com.sun.star.awt.FontDescriptor structure)

Model.HardLineBreaks (Boolean)

automatic line breaks are permanently inserted in the control element text

Model.HScroll (Boolean)

the text has a horizontal scrollbar

Model.MaxTextLen (Short)

maximum length of text, where 0 corresponds to no length limit

Model.MultiLine (Boolean)

permits entry to spans several lines

Model.Printable (Boolean)

the control element can be printed

Model.ReadOnly (Boolean)

the content of the control element is read-only

Model.Tabstop (Boolean)

the control element can be reached with the Tab key

Model.Text (String)

text associate with the control element

Model.TextColor (Long)

text color of control element

Model.VScroll (Boolean)

the text has a vertical scrollbar

Model.HelpText (String)

help text that is displayed when the mouse cursor rests over the control element

Model.HelpURL (String)

URL of online help for the corresponding control element

List Boxes

List boxes (com.sun.star.awt.UnoControlListBox service) support the following properties:

ItemCount (Short)

number of elements, read-only

SelectedItem (String)

text of highlighted entry, read-only

SelectedItems (Array Of Strings)

data field with highlighted entries, read-only

SelectedItemPos (Short)

number of the entry highlighted at present, read-only

SelectedItemsPos (Array of Short)

data field with the number of highlighted entries (for lists which support multiple selection), read-only

MultipleMode (Boolean)

`True` activates the option for multiple selection of entries, `False` blocks multiple selections (the property cannot be called up directly but only through `IsMultipleMode`)

IsMultipleMode (Boolean)

permits multiple selection within lists, read-only

List boxes provide the following methods:

addItem (Item, Pos)

enters the string specified in the `Item` into the list at the `Pos` position

addItems (ItemArray, Pos)

enters the entries listed in the string's `ItemArray` data field into the list at the `Pos` position

removeItems (Pos, Count)

removes `Count` entries as of the `Pos` position

selectItem (Item, SelectMode)

activates or deactivates highlighting for the element specified in the string `Item` depending on the `SelectMode` Boolean variable

makeVisible (Pos)

scrolls through the list field so that the entry specified with `Pos` is visible

The model object of the list boxes provides the following properties:

Model.BackgroundColor (long)

background color of control element

Model.Border (short)

type of border (0: no border, 1: 3D border, 2: simple border)

Model.FontDescriptor (struct)

structure with details of font used (in accordance with com.sun.star.awt.FontDescriptor structure)

Model.LineCount (Short)

number of lines in control element

Model.MultiSelection (Boolean)

permits multiple selection of entries

Model.SelectedItems (Array of Strings)

list of highlighted entries

Model.StringItemList (Array of Strings)

list of all entries

Model.Printable (Boolean)

the control element can be printed

Model.ReadOnly (Boolean)

the content of the control element is read-only

Model.Tabstop (Boolean)

the control element can be reached with the Tab key

Model.TextColor (Long)

text color of control element

Model.HelpText (String)

automatically displayed help text which is displayed if the mouse cursor is above the control element

Model.HelpURL (String)

URL of online help for the corresponding control element

Note – VBA : The VBA option for issuing list entries with a numerical additional value (`ItemData`) does not exist in OpenOffice.org Basic. If you want to administer a numerical value (for example a database ID) in addition to the natural language text, you must create an auxiliary data field that administers in parallel to the list box.

◆ ◆ ◆ CHAPTER 12

Forms

In many respects, the structure of OpenOffice.org forms corresponds to the dialogs. There are, however, a few key differences:

- Dialogs appear in the form of one single dialog window, which is displayed over the document and does not permit any actions other than dialog processing until the dialog is ended. Forms, on the other hand, are displayed directly in the document, just like drawing elements.
- A dialog editor is provided for creating dialogs, and this can be found in the OpenOffice.org Basic development environment. Forms are created using the Form Controls and the Form Design Toolbar directly within the document.
- Whereas the dialog functions are available in all OpenOffice.org documents, the full scope of the form functions are only available in text and spreadsheets.
- The control elements of a form can be linked with an external database table. This function is not available in dialogs.
- The control elements of dialogs and forms differ in several aspects.

Users who want to provide their forms with their own methods for event handling, should refer to the Dialogs chapter. The mechanisms explained there are identical to those for forms.

Working With Forms

OpenOffice.org forms may contain text fields, list boxes, radio buttons, and a range of other control elements, which are inserted directly in a text or spreadsheet. The Form Functions Toolbar is used for editing forms.

A OpenOffice.org form may adopt one of two modes: the draft mode and the display mode. In draft mode, the position of control elements can be changed and their properties can be edited using a properties window.

The Form Functions Toolbar is also used to switch between modes.

Determining Object Forms

OpenOffice.org positions the control elements of a form at drawing object level. The actual object form can be accessed through the Forms list at the drawing level. The objects are accessed as follows in text documents:

```
Dim Doc As Object
Dim DrawPage As Object
Dim Form As Object
```

```
Doc = ThisComponent
DrawPage = Doc.DrawPage
Form = DrawPage.Forms.GetByIndex(0)
```

The `GetByIndex` method returns the form with the index number 0.

When working with spreadsheets, an intermediate stage is needed for the Sheets list because the drawing levels are not located directly in the document but in the individual sheets:

```
Dim Doc As Object
Dim Sheet As Object
Dim DrawPage As Object
Dim Form As Object

Doc = ThisComponent
Sheet = Doc.Sheets.GetByIndex(0)
DrawPage = Sheet.DrawPage
Form = DrawPage.Forms.GetByIndex(0)
```

As is already suggested by the `GetByIndex` method name, a document may contain several forms. This is useful, for example, if the contents of different databases are displayed within one document, or if a 1:n database relationship is displayed within a form. The option of creating sub-forms is also provided for this purpose.

The Three Aspects of a Control Element Form

A control element of a form has three aspects:

- The **Model** of the control element is the key object for the OpenOffice.org Basic-programmer when working with control element forms.
- The counterpart to this is the **View** of the control element, which administers the display information.
- Since control element forms within the documents are administered like a special drawing element, there is also a **Shape object** which reflects the drawing element-specific properties of the control element (in particular its position and size).

Accessing the Model of Control Element Forms

The models of the control elements of a form are available through the `GetByName` method of the Object form:

```
Dim Doc As Object
Dim Form As Object
Dim Ctl As Object

Doc = ThisComponent
Form = Doc.DrawPage.Forms.GetByIndex(0)
Ctl = Form.getByName("MyListBox")
```

The example determines the model of the `MyListBox` control element, which is located in the first form of the text document currently open.

If you are not sure of the form of a control element, you can use the option for searching through all forms for the control element required:

```
Dim Doc As Object
Dim Forms As Object
Dim Form As Object
Dim Ctl As Object
Dim I as Integer

Doc = ThisComponent
Forms = Doc.Drawpage.Forms

For I = 0 To Forms.Count - 1
  Form = Forms.GetbyIndex(I)
  If Form.HasByName("MyListBox") Then
    Ctl = Form.GetbyName("MyListBox")
    Exit Function
```

```
  End If
Next I
```

The example uses the `HasByName` method to check all forms of a text document to determine whether they contain a control element model called `MyListBox`. If a corresponding model is found, then a reference to this is saved in the `Ctl` variable and the search is terminated.

Accessing the View of Control Element Forms

To access the view of a control element form, you need the associated model. The view of the control element can then be determined with the assistance of the model and using the document controller.

```
Dim Doc As Object
Dim DocCrl As Object
Dim Forms As Object
Dim Form As Object
Dim Ctl As Object
Dim CtlView As Object
Dim I as Integer

Doc = ThisComponent
DocCrl = Doc.getCurrentController()
Forms = Doc.Drawpage.Forms

For I = 0 To Forms.Count - 1
  Form = Forms.GetbyIndex(I)
  If Form.HasByName("MyListBox") Then
    Ctl = Form.GetbyName("MyListBox")
    CtlView = DocCrl.GetControl(Ctl)
    Exit Function
  End If
Next I
```

The code listed in the example is very similar to the code listed in the previous example for determining a control element model. It uses not only the `Doc` document object but also the `DocCrl` document controller object which makes reference to the current document window. With the help of this controller object and the model of the control element, it then uses the `GetControl` method to determine the view (`CtlView` variable) of the control element form.

Accessing the Shape Object of Control Element Forms

The method for accessing the shape objects of a control element also uses the corresponding drawing level of the document. To determine a special control element, all drawing elements of the drawing level must be searched through.

```
Dim Doc As Object
Dim Shape as Object
Dim I as integer

Doc = ThisComponent

For i = 0 to Doc.DrawPage.Count - 1
  Shape = Doc.DrawPage(i)
  If HasUnoInterfaces(Shape, "com.sun.star.drawing.XControlShape") Then
    If Shape.Control.Name = "MyListBox" Then
      Exit Function
    End If
  End If
Next
```

The example checks all drawing elements to determine whether they support the com.sun.star.drawing.XControlShape interface needed for control element forms. If this is the case, the `Control.Name` property then checks whether the name of the control element is `MyListBox`. If this is true, the function ends the search.

Determining the Size and Position of Control Elements

As already mentioned, the size and position of control elements can be determined using the associated `shape` object. The control element shape, like all other `shape` objects, provides the `Size` and `Position` properties for this purpose:

`Size (struct)`

size of control element (com.sun.star.awt.Size data structure)

`Position (struct)`

position of control element (com.sun.star.awt.Point data structure)

The following example shows how the position and size of a control element can be set using the associated shape object:

```
Dim Shape As Object
Dim Point As New com.sun.star.awt.Point
Dim Size As New com.sun.star.awt.Size

' ... Initialize Shape object, as previously shown ...

Point.x = 1000
Point.y = 1000
Size.Width = 10000
Size.Height = 10000

Shape.Size = Size
Shape.Position = Point
```

The `shape` object of the control element must already be known if the code is to function. If this is not the case, it must be determined using the preceding code.

Control Element Forms

The control elements available in forms are similar to those of dialogs. The selection ranges from simple text fields through list and combo boxes to various buttons.

Below, you will find a list of the most important properties for control element forms. All properties form part of the associated model objects.

In addition to the standard control elements, a table control element is also available for forms, which enables the complete incorporation of database tables. This is described in the Database Forms chapter.

Buttons

The model object of a form button provides the following properties:

`BackgroundColor (long)`

background color

`DefaultButton (Boolean)`

the button serves as a default value. In this case, it also responds to the entry button if it has no focus

`Enabled (Boolean)`

the control element can be activated

`Tabstop (Boolean)`

the control element can be reached through the tabulator button

TabIndex (Long)

position of control element in activation sequence

FontName (String)

name of font type

FontHeight (Single)

height of character in points (pt)

Tag (String)

string containing additional information, which can be saved in the button for program-controlled access

TargetURL (String)

target URL for buttons of the URL type

TargetFrame (String)

name of window (or frame) in which `TargetURL` is to be opened when activating the button (for buttons of the `URL` type)

Label (String)

button label

TextColor (Long)

text color of control element

HelpText (String)

automatically displayed help text which is displayed if the mouse cursor is above the control element

HelpURL (String)

URL of online help for the corresponding control element

ButtonType (Enum)

action that is linked with the button (default value from com.sun.star.form.FormButtonType)

State (Short)

in toggle button, 1 = pushed, 0 = normal

Through the `ButtonType` property, you have the opportunity to define an action that is automatically performed when the button is pressed. The associated com.sun.star.form.FormButtonType group of constants provides the following values:

PUSH

standard button

SUBMIT

end of form entry (particularly relevant for HTML forms)

RESET

resets all values within the form to their original values

URL

call of the URL defined in `TargetURL` (is opened within the window which was specified through `TargetFrame`)

The **OK** and **Cancel** button types provided in dialogs are not supported in forms.

Option Buttons

The following properties of an option button are available through its model object:

Enabled (Boolean)

the control element can be activated

Tabstop (Boolean)

the control element can be reached through the tab key

TabIndex (Long)

position of control element in the activation sequence

FontName (String)

name of font type

FontHeight (Single)

height of character in points (pt)

Tag (String)

string containing additional information, which can be saved in the button for program-controlled access

Label (String)

inscription of button

Printable (Boolean)

the control element can be printed

State (Short)

if 1, the option is activated, otherwise it is deactivated

RefValue (String)

string for saving additional information (for example, for administering data record IDs)

TextColor (Long)

text color of control element

HelpText (String)

automatically displayed help text, which is displayed if the mouse cursor is above the control element

HelpURL (String)

URL of online help for the corresponding control element

The mechanism for grouping option buttons distinguishes between the control elements for dialogs and forms. Whereas control elements appearing one after another in dialogs are automatically combined to form a group, grouping in forms is performed on the basis of names. To do this, all option buttons of a group must contain the same name. OpenOffice.org combines the grouped control elements into an array so that the individual buttons of a OpenOffice.org Basic program can be reached in the same way.

The following example shows how the model of a control element group can be determined.

```
Dim Doc As Object
Dim Forms As Object
Dim Form As Object
Dim Ctl As Object
Dim I as Integer

Doc = ThisComponent
Forms = Doc.Drawpage.Forms

For I = 0 To Forms.Count - 1
  Form = Forms.GetbyIndex(I)
  If Form.HasByName("MyOptions") Then
    Ctl = Form. GetGroupbyName("MyOptions")
```

```
    Exit Function
  End If
Next I
```

The code corresponds to the previous example for determining a simple control element model. It searches through all forms in the current text document in a loop and uses the `HasByName` method to check whether the corresponding form contains an element with the `MyOptions` name it is searching for. If this is the case, then the model array is accessed using the `GetGroupByName` method (rather than the `GetByName` method to determine simple models).

Checkboxes

The model object of a checkbox form provides the following properties:

`Enabled (Boolean)`

the control element can be activated

`Tabstop (Boolean)`

the control element can be reached through the tab key

`TabIndex (Long)`

position of control element in the activation sequence

`FontName (String)`

name of font type

`FontHeight (Single)`

height of character in points (pt)

`Tag (String)`

string containing additional information, which can be saved in the button for program-controlled access

`Label (String)`

button label

`Printable (Boolean)`

the control element can be printed

`State (Short)`

if 1, the option is activated, otherwise it is deactivated

`RefValue (String)`

string for saving additional information (for example, for administrating data record IDs)

`TextColor (Long)`

text color of control element

`HelpText (String)`

automatically displayed help text, which is displayed if the mouse cursor is above the control element

`HelpURL (String)`

URL of online help for the corresponding control element

Text Fields

The model objects of text field forms offer the following properties:

Align (short)

orientation of text (0: left-aligned, 1: centered, 2: right-aligned)

BackgroundColor (long)

background color of control element

Border (short)

type of border (0: no border, 1: 3D border, 2: simple border)

EchoChar (String)

echo character for password field

FontName (String)

name of font type

FontHeight (Single)

height of character in points (pt)

HardLineBreaks (Boolean)

the automatic line breaks are permanently inserted in the text of the control element

HScroll (Boolean)

the text has a horizontal scrollbar

MaxTextLen (Short)

maximum length of text; if 0 is specified, there are no limits

MultiLine (Boolean)

permits multi-line entries

Printable (Boolean)

the control element can be printed

ReadOnly (Boolean)

the content of the control element is read-only

Enabled (Boolean)

the control element can be activated

Tabstop (Boolean)

the control element can be reached through the tab key

TabIndex (Long)

position of the control element in the activation sequence

FontName (String)

name of font type

FontHeight (Single)

height of character in points (pt)

Text (String)

text of control element

TextColor (Long)

text color of control element

VScroll (Boolean)

the text has a vertical scrollbar

HelpText (String)

automatically displayed help text, which is displayed if the mouse cursor is above the control element

HelpURL (String)

URL of online help for the corresponding control element

List Boxes

The model object of the list box forms provides the following properties:

BackgroundColor (long)

background color of control element

Border (short)

type of border (0: no border, 1: 3D frame, 2: simple frame)

FontDescriptor (struct)

structure with details of font to be used (in accordance with com.sun.star.awt.FontDescriptor structure)

LineCount (Short)

number of lines of control element

MultiSelection (Boolean)

permits multiple selection of entries

SelectedItems (Array of Strings)

list of highlighted entries

StringItemList (Array of Strings)

list of all entries

ValueItemList (Array of Variant)

list containing additional information for each entry (for example, for administrating data record IDs)

Printable (Boolean)

the control element can be printed

ReadOnly (Boolean)

the content of the control element is read-only

Enabled (Boolean)

the control element can be activated

Tabstop (Boolean)

the control element can be reached through the tab key

TabIndex (Long)

position of control element in the activation sequence

FontName (String)

name of font type

FontHeight (Single)

height of character in points (pt)

Tag (String)

string containing additional information which can be saved in the button for program-controlled access

TextColor (Long)

text color of control element

HelpText (String)

automatically displayed help text, which is displayed if the mouse cursor is above the control element

HelpURL (String)

URL of online help for the corresponding control element

Note – VBA : Through their `ValueItemList` property, list box forms provide a counterpart to the VBA property, `ItemData`, through which you can administer additional information for individual list entries.

Furthermore, the following methods are provided though the view object of the list box:

addItem (Item, Pos)

inserts the string specified in the `Item` at the `Pos` position in the list

addItems (ItemArray, Pos)

inserts the entries listed in the string's `ItemArray` data field in the list at the `Pos` position

removeItems (Pos, Count)

removes `Count` entries as of the `Pos` position

selectItem (Item, SelectMode)

activates or deactivates the highlighting for the element specified in the string `Item` depending on the `SelectMode` variable

makeVisible (Pos)

scrolls through the list field so that the entry specified by `Pos` is visible

Database Forms

OpenOffice.org forms can be directly linked to a database. The forms created in this way provide all the functions of a full database front end without requiring independent programming work.

You can page through and search in the selected tables and queries, as well as change data records and insert new data records. OpenOffice.org automatically ensures that the relevant data is retrieved from the database, and that any changes made are written back to the database.

A database form corresponds to a standard OpenOffice.org form. In addition to the standard properties, the following database-specific properties must also be set in the form:

DataSourceName (String)

name of data source (refer to Database Access; the data source must be globally created in OpenOffice.org)

Command (String)

name of table, query, or the SQL select command to which a link is to be made

CommandType (Const)

specifies whether the Command is a table, a query or a SQL command (value from com.sun.star.sdb.CommandType enumeration)

The com.sun.star.sdb.CommandType enumeration covers the following values:

TABLE

Table

QUERY

Query

COMMAND

SQL command

The database fields are assigned to the individual control elements through this property:

DataField (String)

name of linked database field

Tables

Another control element is provided for work with databases, the table control element. This represents the content of a complete database table or query. In the simplest scenario, a table control element is linked to a database using the autopilot form, which links all columns with the relevant database fields in accordance with the user specifications.