CORELDRAW® GRAPHICS SUITE 11 WINDOWS®

VISUAL BASIC® FOR APPLICATIONS PROGRAMMING GUIDE

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VBA Programming Guide for CorelDRAW® 11

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Introduction 1

Welcome to the Visual Basic® for Applications Programming Guide for CorelDRAW® 11.

What's the purpose of this guide?

The purpose of this document is to describe how to develop and distribute Visual Basic for Applications (VBA) solutions in CorelDRAW 11. It introduces the VBA integrated development environment and many of its advanced features. It also describes the most important CorelDRAW functions and how to use them. Finally, this guide describes how to package and deploy VBA solutions developed for CorelDRAW.

This guide should be read in conjunction with the CorelDRAW object model reference document available in the CorelDRAW application Help.

Who should use this guide?

This guide should be used by anyone who is interested in automating simple and complex tasks in CorelDRAW or who is developing commercial solutions that integrate with CorelDRAW.

It is assumed that the reader already has experience with at least one other procedural programming language, such as BASIC, Visual Basic, C, C++, Java™, Pascal, Cobol, or Fortran. This guide does not describe the basics of procedural programming, such as functions, conditional branching, and looping. Non-programmers should first learn the basics of programming in a language such as Visual Basic or VBA before using this document to develop CorelDRAW solutions.

How to use this guide

This guide is organized into chapters that deal with specific aspects of automating tasks and building solutions in CorelDRAW.

About CorelDRAW

CorelDRAW is a comprehensive vector-based drawing program that makes it easy to create professional artwork from simple logos to technical illustrations. The tools in CorelDRAW are designed to meet the demands of the graphic arts professional.

About VBA in CorelDRAW

In 1995, Corel incorporated automation into CorelDRAW™ 6 by including its Corel SCRIPT™ language. This enabled solution developers to create intelligent mini-applications within CorelDRAW, such as ones that draw shapes, reposition and resize shapes, open and close documents, set styles, and so on.

Corel SCRIPT was included with CorelDRAW versions 6 through 9. Although the Corel SCRIPT editor is not included with CorelDRAW in versions after 9, the run-time engine is included, so scripts written for earlier versions of CorelDRAW can easily be migrated to the latest versions.

In 1998, Corel took the strategic decision to augment the Corel SCRIPT functionality of CorelDRAW 9 by licensing the Microsoft Visual Basic for Applications engine to handle its behind-the-scenes automation. The addition of VBA

made CorelDRAW immediately accessible to millions of existing VBA developers, as well as Visual Basic developers, around the world.

VBA in CorelDRAW can be used as a platform for developing powerful corporate graphical solutions, such as automated ticket generators, customized calendars, and batch processing of files. VBA can also be used to enhance and optimize the workflow within CorelDRAW. For example, you can improve and customize some of the built-in functionality of CorelDRAW (alignments, transformations, object creation), or add page layouts on-the-fly (company letterheads).

VBA comes with a fully integrated development environment that provides contextual pop-up lists, syntax highlighting, line-by-line debugging, and visual designer windows. These helpful prompts and aids create a particularly friendly environment for inexperienced developers to learn in.

About Corel Corporation

Founded in 1985, Corel Corporation (http://www.corel.com) is a leading technology company that offers software for home and small business users, creative professionals and enterprise customers. With its headquarters in Ottawa, Canada, Corel's common stock trades on the Nasdaq Stock Market under the symbol CORL and on the Toronto Stock Exchange under the symbol COR.

Writing and running macros in CorelDRAW 2

Before you can develop and run macros in CorelDRAW, it may be necessary to install the VBA component.

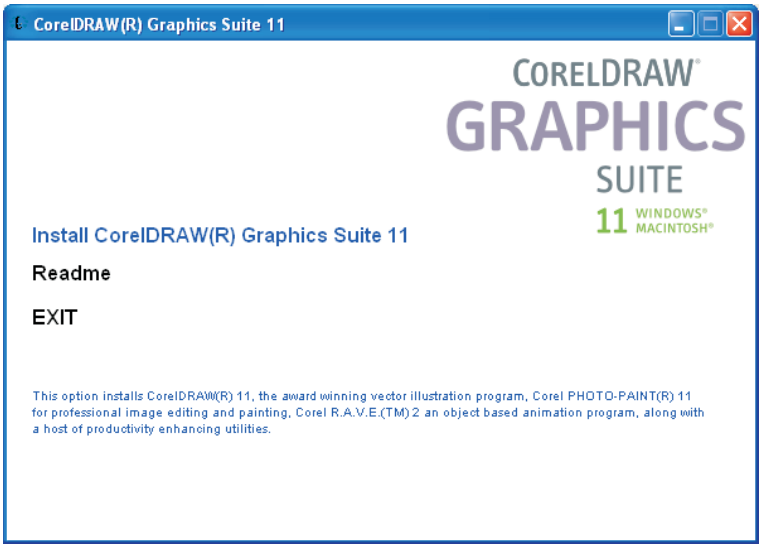
Installing VBA for CorelDRAW

With CorelDRAW 11, VBA is installed as part of the typical install. In CorelDRAW 10, VBA must be custom installed.

To custom install VBA:

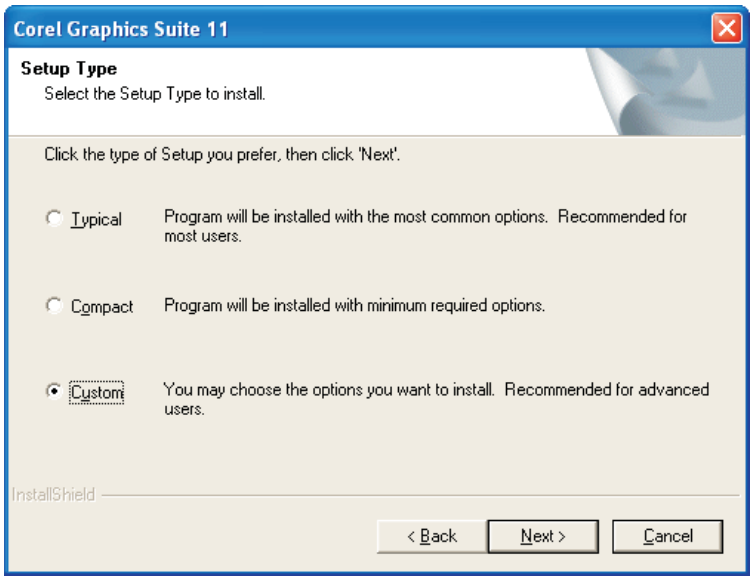
1 Insert Disc 1 of the installation CD into your computer's CD drive. If the installer does not autostart, double-click on the file D:\setup32.exe, where D: is the drive letter of your computer's CD drive.

2 If the installer autostarts, click on "Install CorelDRAW® Graphics Suite 11".



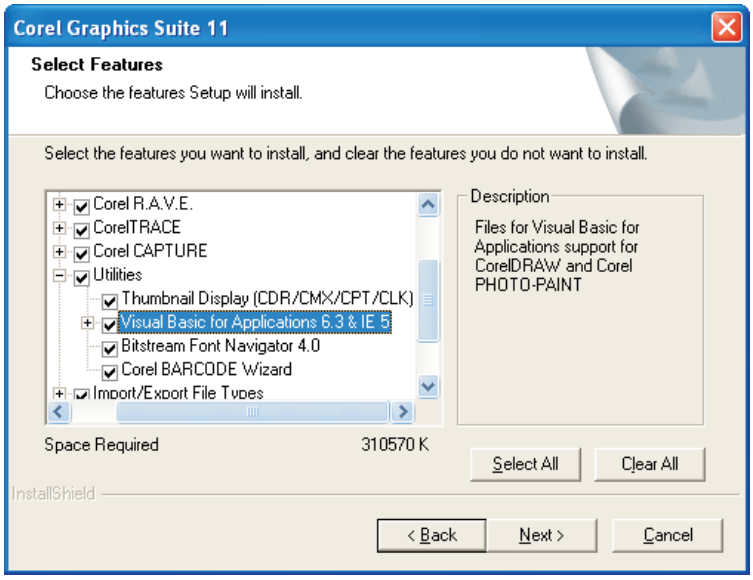
CorelDRAW 11 installer

3 Enable the **Custom** option and click **Next**:



The Installation wizard

4 Now navigate down the tree to Corel Graphics Suite 11\Main Applications\Utilities\ and enable the Visual Basic for Applications 6.3 & IE 5 check box.



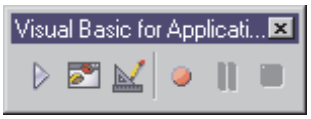
Enable the Visual Basic for Applications check box

5 Click **Next**. Any components whose check boxes you disabled will be removed.

The academic versions of CorelDRAW 10 and 11 do not include the VBA components.

The VBA toolbar in CorelDRAW

CorelDRAW has a toolbar that provides easy access to several VBA features, and to the VB Editor.



The VBA toolbar in CorelDRAW

The toolbar buttons provide the following functions:

- playing macros
- opening the VB Editor
- switching the VB Editor between design and run modes
- recording macros
- pausing the recording of macros
- stopping the recording of macros

These features are described in subsequent sections.

To display the VBA toolbar, right-click anywhere on an empty toolbar area and choose 'Visual Basic for Applications' from the pop-up menu. Alternatively, choose **Tools ▸ Toolbars ▸ Visual Basic for Applications**.

Writing a macro

Macros can only be written inside the VB Editor. However, you can save time by *recording* actions within CorelDRAW. Recording creates a new VBA macro in the chosen project, which can then be edited and customized in the VB Editor.

Writing macros in the VB Editor

Macros that are developed in the VB Editor can take advantage of full programmatical control, including conditional execution, looping, and branching. Macros that include this extra functionality are more than mere 'macros', but are programs in their own right. However, for the purpose of this guide, all VBA code is referred to as a 'macro', although in some contexts a macro is just those parts of that code that can be 'launched' by CorelDRAW.

Using the VB Editor to develop macros is described in detail in the chapter 'Visual Basic Editor'.

Recording macros

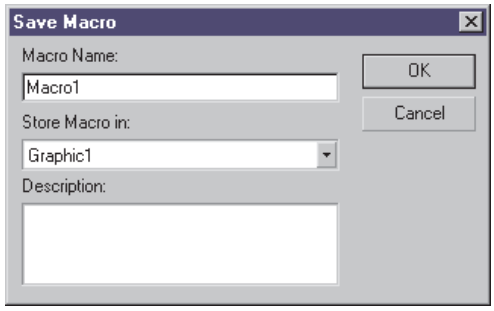
It is often very useful to record macros, particularly when you are not familiar with CorelDRAW's object model, or when you are not sure which objects and methods to use. For many simple and repetitive tasks, recorded macros are a quick, efficient solution. Recorded macros are macros in the truest sense of the word: strictly speaking a macro is a recorded set of actions within the application that can be repeatedly invoked. This is exactly what is created when you record a macro – a true copy of your actions within CorelDRAW, although this is limited to CorelDRAW actions, and does not simply record keystrokes and mouse moves.

To record a new macro:

1 Click **Tools** ▸ **Visual Basic** ▸ **Record**, or click on the Record button on the VBA toolbar.

2 Type a name in the **Macro Name** box. Macro names *must* follow VBA's naming rules, which are:

- They must start with a letter.
- They can contain numbers, but not as the first character.
- They cannot contain spaces or any non-alphanumeric characters apart from the underscore (_).
- They must be unique within the chosen project.



The Save Macro dialog box when recording

3 Choose a VBA project (**GMS**) file or CorelDRAW (**CDR**) file from the Store macro in list. You can type an optional comment in the Description box. The benefits of selecting a **GMS** or **CDR** file are discussed in a later section.

4 Click OK.

CorelDRAW is now recording every action – each creation of a shape, each movement of an object and each change to a property is recorded.

To stop recording a macro, click **Tools** ▸ **Visual Basic** ▸ **Stop**. The macro will now be saved.

To pause while recording a macro, click **Tools** ▸ **Visual Basic** ▸ **Pause**.

The record, pause, stop, and play controls are also available from the Visual Basic for Applications toolbar in CorelDRAW.

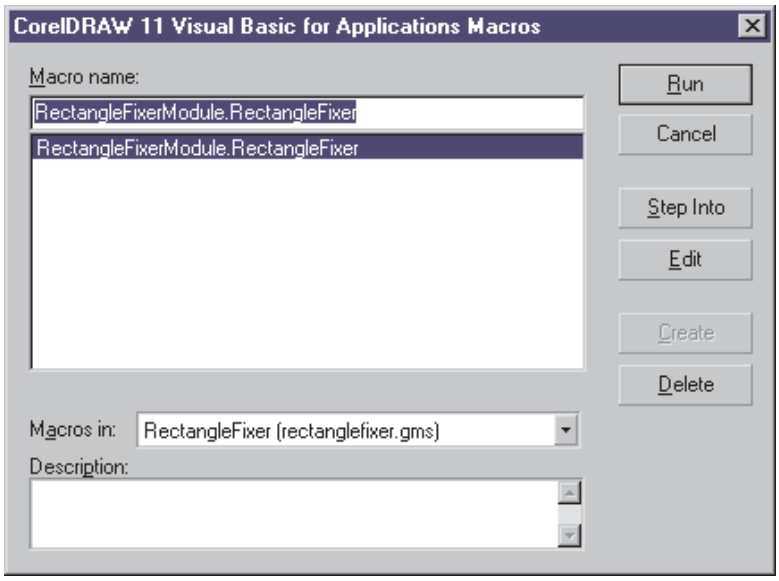
Not all actions in CorelDRAW can be recorded. Some cannot be recorded because of their complexity, although they can usually be hand-coded in the VB Editor. When something cannot be recorded, the following comment is placed in the code: 'The recording of this command is not supported'.

Running a macro

You can run a macro from a CorelDRAW menu, or directly from the VB Editor.

To run a macro from a CorelDRAW menu:

1 Click Tools ▸ **Visual Basic** ▸ **Play**….



The Macros dialog box

Clicking the Run button on the VBA toolbar will also bring up the Macros dialog box.

2 From the 'Macros in' list box, select the project (GMS) file that contains the macro you want to run. This will populate the Macro name list.

3 Choose a macro from the Macro name list.

4 Click Run.

To run a macro from inside the VB Editor:

1 Click anywhere inside the subroutine that forms the macro and click **Run** ▸ **Run Macro**.

Introducing automation and VBA 3

Visual Basic for Applications, more commonly known as 'VBA', is a built-in programming language that can automate repetitive functions and create intelligent solutions in CorelDRAW. Corel Graphics Suite 11 includes VBA version 6.3.

VBA is both a language and an editor. It is not possible to have the language without the editor, nor is it possible to edit VBA in anything but the VB Editor. And the VB Editor is also needed to run VBA programs.

VBA is developed by Microsoft and is built into almost all of its desktop applications, including Microsoft® Office. VBA is licensed by Microsoft to other companies, including Corel Corporation (in CorelDRAW, Corel PHOTO-PAINT®, and WordPerfect®), Autodesk, Inc. (in AutoCAD®), IntelliSoft (IntelliCAD®), and many others. This enables CorelDRAW to communicate with a wide array of applications that support VBA. A complete list of applications that support VBA can be viewed at the Microsoft Web site at http://www.msdn.microsoft.com/vba/companies/company.asp.

It is not necessary for an application to support VBA in order for the VBA engine in CorelDRAW to control that application. That means you can build solutions in CorelDRAW that access databases, word processors, specialized content editors, XML documents, and more.

What is automation?

Most actions that you can do in CorelDRAW can be done programmatically through VBA. This programmability of CorelDRAW is called automation. Automating repetitive tasks can save time and reduce effort, while automating complex tasks can make possible the otherwise impossible.

In its simplest form, automation is simply recording a sequence of actions in CorelDRAW (a macro) that can be played back time and again. The term 'macro' has come to include any code accessible to VBA running within the process, even though some of that code might be far more advanced than a mere set of recorded actions. Thus wherever 'macro' is used in this guide, it refers to VBA functions and subroutines

While it is possible to record a sequence of actions in CorelDRAW, the real power of automation and VBA is that these recordings can be edited to provide *conditional* and *looping* execution. For example, a simple macro may set the selected shape's fill color to red and apply a one-point outline. But, by adding a condition and looping to the VBA code, the macro could, for example, be made to visit each selected shape, and apply only the fill to text shapes and the outline to all other shape-types.

VBA for non-programmers

Visual Basic for Applications (VBA) is based on Microsoft's successful Visual Basic (VB) programming language. The main difference between VBA and VB is that you cannot create stand-alone executable (EXE) files using VBA, which you can with full VB; you can only create programs in VBA that run inside the host application, in this case CorelDRAW. In all other respects VBA and VB are the same.

Visual Basic is, as the name describes it to be, a 'visual' version of the BASIC language. This means that it is a very easy language to learn, and it is helped in this by providing visual cues within the editor. Microsoft has added a great deal to the original BASIC language, and it is now a powerful and fast language, although not as powerful as Java or C++, or as quick as C.

The aim of this guide is not to teach you how to become a programmer - you must do that on your own. The aim of this guide is to teach experienced programmers how to apply their skills to developing useful solutions within

CorelDRAW. Before continuing reading this guide, you may find it useful to refer to the many books that have been written about VBA and Visual Basic.

VBA for programmers

VBA is an in-process automation controller, in other words, it can be used to control the functionality of CorelDRAW that can be automated. And, since it runs 'in-process', it bypasses the interprocess synchronization mechanisms. This makes it run much more efficiently.

All of the automation that is available to the in-process VBA is also available to external out-of-process automation controllers, or OLE clients. This includes applications developed in programming languages that can be used to develop OLE clients, including:

- Microsoft Visual Basic, Visual C++, and Windows® Scripting Host
- Borland® Delphi™ and C++
- Other applications' VBA engines

The rest of this chapter and the next is intended to familiarize you with the VBA language and the VB Editor.

The main features of VBA structure and syntax

This section describes the main features of the structure and syntax of VBA code. This is intended to give experienced developers a quick grounding in VBA syntax and structure. Since VBA is a procedural language that shares much in common with all procedural languages, your current knowledge should help you get off to a quick start using VBA.

This section is by no means exhaustive, but it does cover the most common syntactical nuances in which VBA differs from its peers.

The following language topics are covered:

- variables, structures, enumerated types, arrays, and strings
- functions and subroutines
- line endings
- comments
- memory pointers and allocation
- passing values by reference and by value
- code formatting
- scope
- classes

Declaring variables

In VBA, the construct for declaring variables is:

```
Dim foobar As Integer
```

The built-in data types are: Byte, Boolean, Integer, Long, Single, Double, String, Variant, and several other less-used types including Date, Decimal, and Object.

Variables can be declared anywhere within the body of a function, or at the top of the current module. If the option 'Require Variable Declaration' is set in VBA's options dialog, all variables must be declared before they are used. This is generally good practice, since it enables the compiler to use an explicit type efficiently; if variables are simply used without being declared as a particular type, the compiler will create them as variants, which are less efficient at run time.

To get more information about one of the built-in data types, type it into the code window, select it, and press F1.

Booleans take False to be zero and True to be any other value, although converting from a Boolean to a Long will result in True being converted to -1.

Data structures

Data structures can be constructed using the following syntax:

```
Public Type fooType
  item1 As Integer
  item2 As String
End Type

Dim myTypedItem As fooType
```

The items within a variable declared as type `fooType` are accessed using dot notation:

```
myTypedItem.item1 = 5
```

Enumerated types

Enumerated types use the following construction:

```
Public Enum fooEnum
  ItemOne
  ItemTwo
  ItemThree
End Enum
```

The first item in an enumerated type is assigned a value of zero by default.

Arrays

Arrays are declared using parentheses, not brackets:

```
Dim barArray (4) As Integer
```

The value defines the index of the last item in the array. Since array indexes are zero-based by default, this means that there are *five* elements in the above array (zero thru four inclusive).

Arrays can be resized using `ReDim`, for example, the following code adds an extra element to `barArray`, but preserves the existing contents of the original five elements:

```
ReDim Preserve barArray (6)
```

Array upper and lower bounds can be determined at run time with the functions `UBound()` and `LBound()`.

Multi-dimensional arrays can be declared by separating the dimension indexes with commas:

```
Dim barArray (4, 3)
```

Strings

Strings are simple to use in VBA. Strings can be added together, truncated, searched forwards and backwards, and passed as simple arguments to functions. Strings in VBA are much simpler than strings in C.

To add two strings together, simply use the concatenation operator, which is ampersand (&), or the addition operator (+):

```
Dim string1 As String, string2 As String
string2 = string1 & " more text" + " even more text"
```

In VBA, there are many functions for manipulating strings, including `InStr()`, `Left()`, `Mid()`, `Right()`, `Len()`, and `Trim()`.

Functions and subroutines

VBA uses both functions and subroutines (subs) – the difference between the two is that functions can return a value, whereas subs must not return a value. Typical functions in a language such as Java or C++ may look like the following:

```
void foo( string stringItem ) {
  // The body of the function goes here
}

double bar( int numItem ) { return 23.2; }
```

In VBA these functions look like the following:

```
Public Sub foo (stringItem As String)
  ' The body of the subroutine goes here
End Sub

Public Function bar (numItem As Integer) As Double
  bar = 23.2
End Function
```

To force a sub or function to exit immediately, use '`Exit Sub`' or '`Exit Function`', respectively.

Declaring functions

VBA functions and subs do *not* need to be declared before they are used, or before they are defined. Functions and subs only need to be declared if they actually exist in external, system dynamic-linked libraries (DLLs).

Line endings

VBA does not use a line-ending character. Many languages use the semicolon to separate individual statements; in VBA each statement must exist on its own line.

To break a long VBA statement over two or more lines, each of the lines apart from the last line must end in an underscore character with at least one space in front of it:

```
newString = fooFunction ("This is a string", _
                         5, 10, 2)
```

It is also possible to put several statements onto a single line by separating them with colons:

```
a = 1 : b = 2 : c = a + b
```

A line cannot end with a colon. Lines that end with a colon are labels used by the `Goto` statement.

Comments in the code

Comments in VBA can only be created at the end of a line, similar to ANSI C++ and Java (but unlike C). Comments are started with an apostrophe and terminate at the line ending. Comments can occupy complete lines on their own, although each line of a multi-line comment must begin with its own apostrophe:

```
a = b ' This is a really interesting piece of code that
      ' needs so much explanation that I have had to break
      ' the comment over multiple lines.
```

To comment out large sections of code, use the following code, similar to C or C++:

```
#If 0 Then ' That's a zero, not the letter 'oh'.
  ' All this code will be ignored by
  ' the compiler at run time!
#End If
```

Memory pointers and memory allocation

VBA does not support C-style memory pointers. Memory allocation and garbage collection are automatic and transparent, just as in Java and JavaScript™, and some C++ code.

Passing values 'by reference' and 'by value'

Most languages, including C/C++ and Java, pass arguments to functions as a *copy* of the original. If the original needs to be passed, either a *memory pointer* is passed that points to the original in memory, or a *reference* to the original is passed. The same is true in Visual Basic, except that passing a copy of the original is called 'passing by value' and passing a reference to the original is called 'passing by reference'.

By default, function and subroutine parameters are passed 'by reference'. This means that a reference to the original variable is passed in the function's argument, and changing that argument's value within the procedure will, in effect, change the original variable's value as well. This is a great way of returning more than one value from a function or sub. To explicitly annotate the code to indicate that an argument is being passed by reference, prefix the argument with '`ByRef`'.

It is possible to force an argument to be copied instead of a reference passed, which prevents the function from changing the original variable's value. To do this, prefix the argument with '`ByVal`', as given below. This `ByRef`/`ByVal` functionality is similar to C and C++'s ability to pass a copy of a variable, or to pass a pointer to the original variable.

```
Private Sub fooFunc (ByVal int1 As Integer, _
                     ByRef long1 As Long, _
                     long2 As Long) ' Passed ByRef by default
```

In the preceding example, both arguments `long1` and `long2` are passed `ByRef`, which is the default. Modifying either argument within the body of the function will modify the original variable; however, modifying `int1` will not affect the original, since it is a copy of the original.

Code formatting

The VB Editor formats all of the code for you. The only custom formatting that you can do is to change the size of indentations.

Public and private scope

Functions, subs, and types (and members of classes) that are declared as 'Private' are only visible within that module (file). Functions that are declared as 'Public' are visible throughout all the modules. However, you may have to use fully qualified referencing if the modules are almost out of scope, for example, referencing a function in a different Project.

Local scope

Unlike C, VBA does not use braces ('{' and '}') to define local scope. Local scope in VBA is defined by an opening function or sub definition statement and a matching `End` statement (`End Function`, `End Sub`). Any variables declared within the function are only available within the scope of the function itself.

Object-oriented classes

VBA can create object-oriented classes, although these are a feature of the language and are not discussed in detail in this guide.

Boolean comparison and assignment using '='

In Visual Basic, both Boolean comparison and assignment are done using a single equals sign:

```
If a = b Then c = d
```

This is in contrast to many other languages that use a double equals for a Boolean comparison and a single equals for assignment:

```
if( a == b ) c = d;
```

The following code, which is valid in C, C++, Java, and JavaScript, is invalid in VBA:

```
if( ( result = fooBar( ) ) == true )
```

This would have to be written in VBA as the following:

```
result = fooBar( )
If result = True Then
```

Other Boolean comparisons

VBA uses the same operators as other languages do for other Boolean comparisons. The only operators that are different are 'is equal to' and 'is not equal to'. All the Boolean-comparison operators are given in the following table:

Comparison	VBA operator	C-style operator
Is equal to	=	==
Is not equal to	<>	!=
Is greater than	>	>
Is less than	<	<
Is greater than or equal to	>=	>=
Is less than or equal to	<=	<=

The result of using one of the Boolean operators is always either `True` or `False`.

Logical and bitwise operators

In VBA, logical operations are performed using the keywords `And`, `Not`, `Or`, `Xor`, `Imp`, and `Eqv`, which perform the logical operations AND, NOT, OR, Exclusive-OR, logical implication, and logical equivalence, respectively. These operators also perform Boolean comparisons. The following code shows a comparison written in C or a similar language:

```
if( ( a && b ) || ( c && d ) )
```

This would be written as follows in VBA:

```
If ( a And b ) Or ( c And d ) Then
```

Or the above could be written in the full long-hand form of:

```
If ( a And b = True ) Or ( c And d = True ) = True Then
```

The following table gives a comparison of the four common VBA logical and bitwise operators, and the C-style logical and bitwise operators used by C, C++, Java, and JavaScript:

VBA operator	C-style bitwise operator	C-style Boolean operator
`And`	`&`	`&&`
`Not`	`~`	`!`
`Or`	`|`	`||`
`Xor`	`^`	

Message boxes and input boxes

You can present simple messages to the user with VBA's `MsgBox` function:

```
Dim retval As Long
retval = MsgBox("Click OK if you agree.", _
                vbOKCancel, "Easy Message")
If retval = vbOK Then
  MsgBox "You clicked OK.", vbOK, "Affirmative"
End If
```

You can also get strings from the user with VBA's `InputBox` function:

```
Dim inText As String
inText = InputBox("Input some text:", "type here")
If Len(inText) > 0 Then
  MsgBox "You typed the following: " & inText & "."
End If
```

If the user clicks Cancel, the length of the string returned in `inText` is zero.

Comparing VBA to other programming languages

VBA has many similarities with most modern, procedural, programming languages, including Java, JavaScript, C, and C++. However, VBA runs as an in-process automation controller, whereas the other languages are used to compile stand-alone applications (apart from JavaScript).

VBA compared to Java and JavaScript

VBA is similar to Java and JavaScript in that it is a high-level, procedural programming language that has full garbage collection and very little memory-pointer support. They are also similar because code developed in VBA supports on-demand compilation. In other words, it can be executed without being compiled.

VBA has another similarity with JavaScript in that it cannot be executed as a standalone application: JavaScript is almost always embedded within Web pages, and the JavaScript is a mechanism that manipulates the Web browser's document object model or DOM. VBA is exactly the same: VBA programs are always executed inside a host environment, in this case CorelDRAW, and the programs manipulate the CorelDRAW 'DOM' – although in VBA's case this is simply called an 'object model'.

VBA applications can usually be compiled to P-code to make them run quicker, although given today's level of computer hardware, the difference is hardly noticeable. This is similar to Java, but JavaScript cannot be compiled.

VBA uses a single equals sign, '=', for both comparison and assignment, whereas Java and JavaScript both use '=' for assignment and '==' for a Boolean comparison.

VBA compared to C and C++

VBA has quite a few similarities with C, C++, and similar languages, but it also has some differences. Visual Basic uses *functions* and *subroutines*, whereas C and C++ use just functions. The difference is that C/C++ functions do not have to return a value, but they can, whereas VBA *functions* can return a value and VBA *subs* must never return a value.

Also, VBA allocates and frees memory transparently, whereas in C and C++, the developer is responsible for most memory management. This makes strings in VBA even simpler than using the `CString` class in C++.

VBA uses a single equals sign, '=', for both comparison and assignment, whereas C and C++ both use '=' for assignment and '==' for a Boolean comparison.

VBA compared to Windows Scripting Host

Windows Scripting Host is a useful addition to Windows for doing occasional scripting and automation of Windows tasks – 'WSH' is an out-of-process automation controller that can be used to control CorelDRAW. The scripts cannot be compiled, which means that they must be interpreted as they are executed, which is slower, plus the automation is being run out of process, which adds to the slowness.

WSH is a host for a number of scripting languages, each of which has its own syntax. However, the standard language used by WSH is a Visual Basic-like macro language, so for standard scripts, the syntax is the same as VBA.

Visual Basic Editor 4

The editor that is included with VBA is very similar to the editor included with full Visual Basic. The main differences between VB and VBA are that the VB Editor (for VBA) cannot compile executable (**EXE**) program files, and some of the implementations of forms and controls are different.

This chapter describes many of the features of the Visual Basic Editor and how to make best use of them.

Starting the Visual Basic Editor from CorelDRAW

To invoke the Visual Basic Editor from inside CorelDRAW, click **Tools** ▸ **Visual Basic** ▸ **Visual Basic Editor** or press Alt+F11 (this is the standard keystroke for most VBA-enabled applications, including WordPerfect Office 2002). This starts VBA as a new application in Windows (although it is running within the CorelDRAW process).

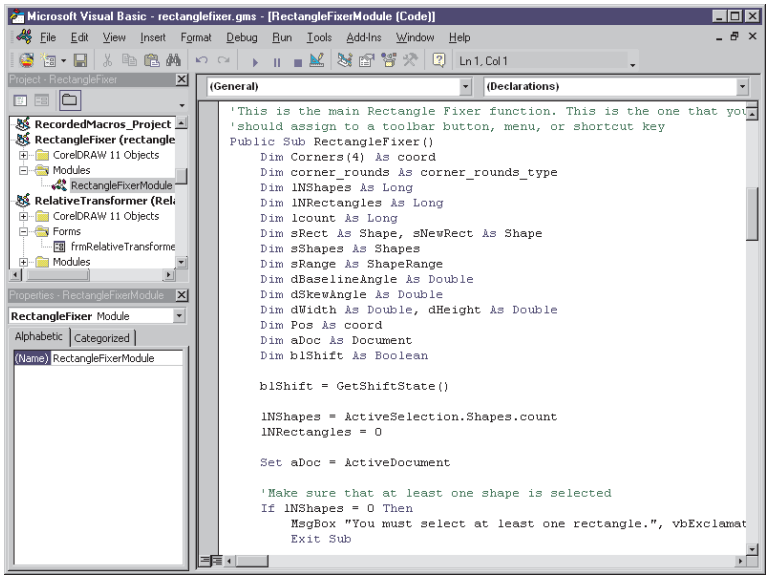
To switch between CorelDRAW and the VB Editor without closing the editor, either use Windows' Taskbar (the 'Start-button bar'), or press Alt+F11, or Alt+Tab.

Visual Basic Editor user interface

There are many aspects to the VB Editor's user interface: there are several windows for developing code and dialog boxes, and for browsing the object tree; there are also quite a few ancillary windows for browsing the modules within each project, windows for setting individual properties of objects, and windows for debugging.

The VB Editor has several child windows and several toolbars. The child windows that are normally visible are the main Code window, and to the left of that the Project Explorer (upper-left window) and the Properties window

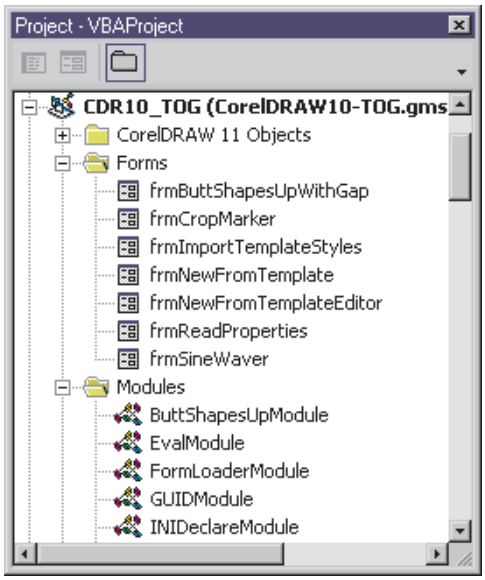
(lower-left window). There are four toolbars available, of which the Standard and Debug toolbars are the most useful.



The VB Editor

Project Explorer

The Project Explorer is essential for navigating around VBA projects and their constituent modules.



The Project Explorer window with an open module list and one of the modules selected.

To show the Project Explorer window, click View ▸ Project Explorer, or press Ctrl+R.

Each item in the Project Explorer window is given an icon.

Icon	Meaning
	project
	folder
	class module
	module
	form
	document

Project

A Global Macro Storage (GMS) file, also known as a project file, exists in the **\Corel\Corel Graphics 11\Draw\GMS** folder which is typically under **C:\Program Files**. The VB Editor stores all of the modules for that project in the project's GMS file; one GMS file may contain dozens of modules. The default **coreldraw11.gms** file is stored in the folder **\Corel\Corel Graphics 11\Draw**.

Different localized versions of Windows use different names for the Program Files folder.

Each project that you create can have many modules within it. There are three types of modules:

- *Modules* for general code and macros
- *Forms* for custom dialog boxes and user interfaces, including the code to control them
- *Class Modules* for object-oriented Visual Basic classes (which are not discussed in this guide)

There is also a fourth item 'CorelDRAW 11 Objects', which contains a single item, ThisDocument. This is mostly used for event handling, and is discussed in the chapter titled "Using objects in CorelDRAW".

The Project Explorer presents each module type in its own folder. It is not possible to move a module from one folder to another within the same project; you can drag a module to another project, which makes a copy of it there.

Creating a new, empty project

Creating a new project (**GMS**) file is done in Windows Explorer.

To create a new project

1 In Windows Explorer, navigate to the GMS folder inside the CorelDRAW programs folder, as given above.

2 Click **File ▸ New ▸ Text Document** to create a new, empty text document in this folder.

3 Rename the file to **your-name.gms** where 'your-name' can be any valid Windows file name.

4 Restart CorelDRAW.

When you launch the VB Editor, your new GMS file will be listed in the Project Explorer window as **Global Macros (your-name.gms)**.

To change the internal name – Global Macros – of the project

1 Click on the project you want to rename in the Project Explorer window.

2 In the Properties window edit the '(name)' value to what you want it to be. Names must follow normal variable-naming conventions: no spaces, must start with a letter, cannot contain punctuation (except underscore), etc.

3 Press **Enter** to confirm.

Creating a new module or form

Every new GMS project file contains a single module inside the modules folder called 'CorelDRAW 11 Objects'. This default module is called 'ThisDocument'. This module has a special purpose and should not be used for normal code. Instead, code should be developed in a module, class module, or form.

To create a new module

1 In the Project Explorer window, right-click anywhere on the project to which you want to add a module.

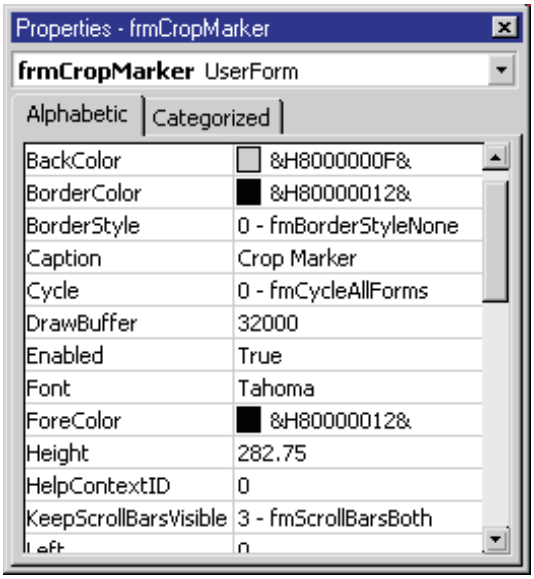
2 Click one of the following

- **Insert ▸ Module** - inserts a normal code module;
- **Insert ▸ UserForm** - insert a new form (dialog);
- **Insert ▸ Class Module** - insert a new class code module.

The new module will be placed in the project's folder for that type of module.

Properties Window

The Properties window lists all of the editable properties for the currently selected object. Many objects in VBA have property sheets that can be modified, including projects, modules, and forms and their controls.



The Properties window, showing the properties of a form object

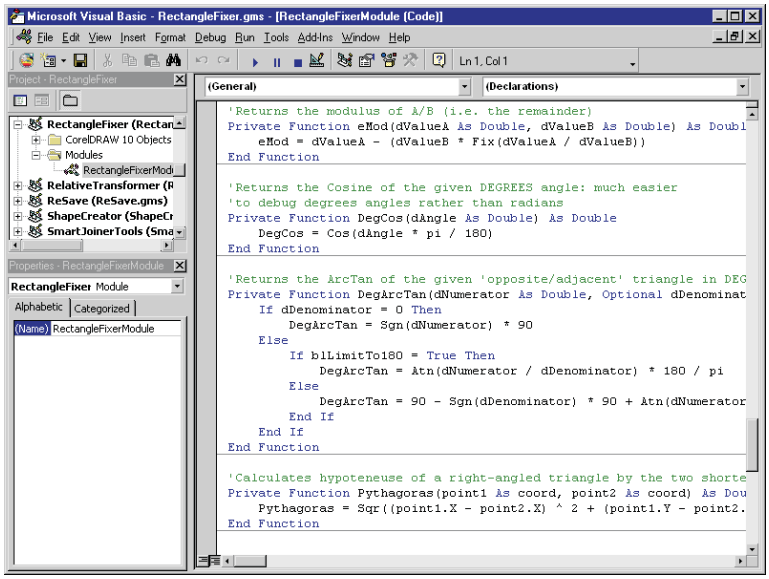
The Properties window updates itself automatically when you change which object is selected, and when you change properties of that object using other methods, for example using the mouse to move and resize form controls.

To show the Properties window, click View ▸ Properties Window or press F4.

Code window

The Code window is where most of the work takes place. This is a standard code editor, in the style of Microsoft Visual Studio®, which includes automatic formatting, syntax highlighting, automatic syntax checking, automatic

completion, and more. If you are already familiar with any of the Microsoft Visual Studio editors, the VBA Code window will be entirely familiar.



The VBA Code window

Automatic code formatting

The VB Editor does not allow code to be custom-formatted. Even the capitalization of keywords, functions, subroutines, and variables is taken care of by the editor, irrespective of what you type.

The most formatting you can do is to decide how much indentation each line has, and where custom line breaks are placed.

The one formatting issue that catches many developers off guard is calling functions and subs. The rules are:

- If you are calling a function and you are using the returned value, the parentheses around the parameters are mandatory, just as in most modern programming languages. For example:

```
a = fooFunc (b, c)
```

- However, if the returned value from a function call is being thrown away, or if you are calling a sub, the parentheses must be left out, unlike most other languages:

```
barFunc d, e

fooBarSub f
```

- If you prefer to see the parentheses every time, use the `Call` keyword before the function or sub call:

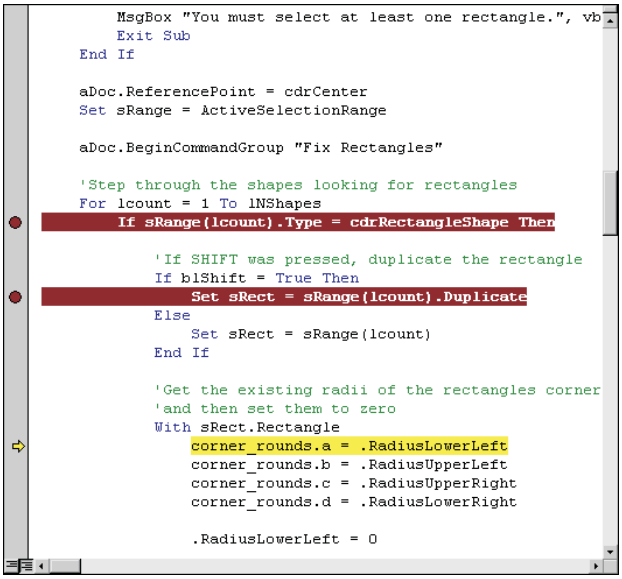
```
Call barFunc (d, e)

Call fooBarSub (f)
```

Syntax highlighting

When you develop code in the Code window, the editor colorizes each word according to its classification: VBA

keywords and programming statements are usually blue, comments are green, and all other text is black. This colorization makes the code much easier to read.



Syntax highlighting and coloring

Lines of code containing errors are shown in red, selected text is white on blue, the line where execution is paused when debugging is shown as a yellow highlight.

If you set a breakpoint on a line of code for debugging purposes, a red dot is shown in the left-hand margin with the code in white on a red background. If you set bookmarks in the code so that you can find your place when you have to navigate away from it, a blue dot will be placed in the left-hand margin.

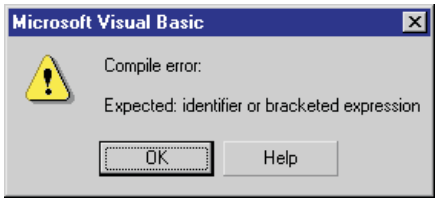
Both breakpoints and bookmarks are lost when you exit CorelDRAW.

You can modify the syntax highlighting colors by clicking **Tools ▸ Options**, clicking the Editor Format tab, and making your changes.

Automatic syntax checking

Every time you move the cursor out of a line of code, the editor checks the syntax of the code in the line you just left. If there are any syntax errors, the editor changes the color of the text of that line to red and pops up a warning.

This real-time checking can be very useful, particularly when you are learning VBA, since it indicates many possible errors in the code without having to run the code.



A typical syntax error warning

However, the warning dialog can be quite intrusive for the more experienced VBA developer, since it is often expedient to copy code snippets from other lines into the current line, or scroll to another line to check something, but moving the cursor into the other line to copy the code, or moving between modules, will cause the editor to pop-up an error message, even though you will be returning to fix it in a moment. It is, therefore, nice to know that this message can be suppressed by clicking **Tools ▸ Options**, selecting the **Editor** tab, and clearing the **Auto Syntax Check** check box.

The editor will still check the syntax and highlight erroneous lines in red, but it will stop popping up an intrusive dialog each time you go to paste text from another line of code.

Jumping to variable, function, and object definitions

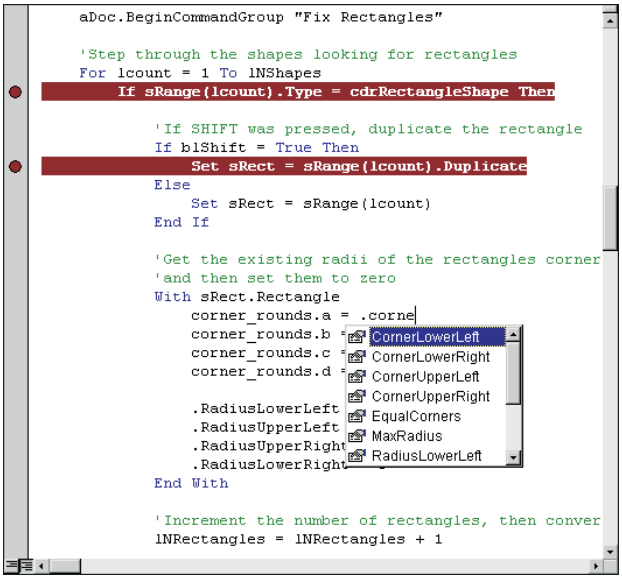
You can jump directly to the definition of a variable, function, or object merely by right-clicking on it in the code window and choosing **Definition** from the pop-up menu. This will either take you to the definition of the variable or function in the code, or it will take you to the object's definition in the Object Browser window.

To return to the place where you requested the definition, right-click again and click **Last Position** in the Code window.

Contextual pop-up lists and automatic completion

As you write more functions and create more variables, the VB Editor adds these items to an internal list that already contains all of its built-in keywords and enumerated values. Then, as you are typing, the editor often

presents you with a list of candidate words that you may want to insert at the current position. This list is contextual, so the editor will usually present only the words that are valid for this position.



Auto-completion pop-up menu

This list makes code development quicker and more convenient, particularly since you do not have to remember every function and variable name, but can choose one from the list when you cannot remember it. You can help the menu find the word you want by entering the first few characters of the word; the list will scroll to the nearest candidate that matches the first few characters you entered.

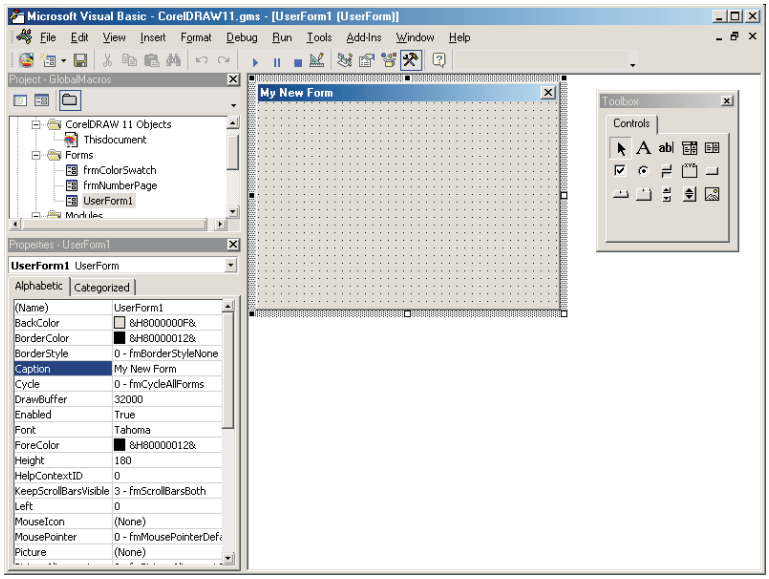
Choose an item from the list and enter the character that will follow the word – typically a space, line feed, parenthesis, period, or comma – the word is inserted with the following character. To insert without any additional characters, press **Tab**, or **Ctrl+Enter**, or click on the word with the mouse.

To force this menu to pop up when occasionally it does not do so automatically, press **Ctrl+Space bar**. The menu will scroll to the word that most closely matches the characters that you have typed so far. This is also useful for filling parameter lists when calling a function or subroutine. If there is only one exact match, the editor will insert the word without popping up the list. To pop up the list at any time for the selected keyword without auto-filling it, press **Ctrl+J**.

Form Designer window

The Form Designer window enables you to create custom dialog boxes for use in your solutions. Dialog boxes can be modal, in which case the user must dismiss the dialog box before doing anything else in CorelDRAW, or they can be modeless, in which case they are similar to the CorelDRAW Docker™ Window.

To create a new form, right-click within the project in the Project window and click **Insert ▸ UserForm.** This creates a new, blank form.



A blank form in the Form Designer window

The form can be immediately tested by pressing **F5** to run it – it's not very interesting, since the only control on the form is the **Close** button in the upper-right corner of the title bar. Click the **Close** button to dismiss the form.

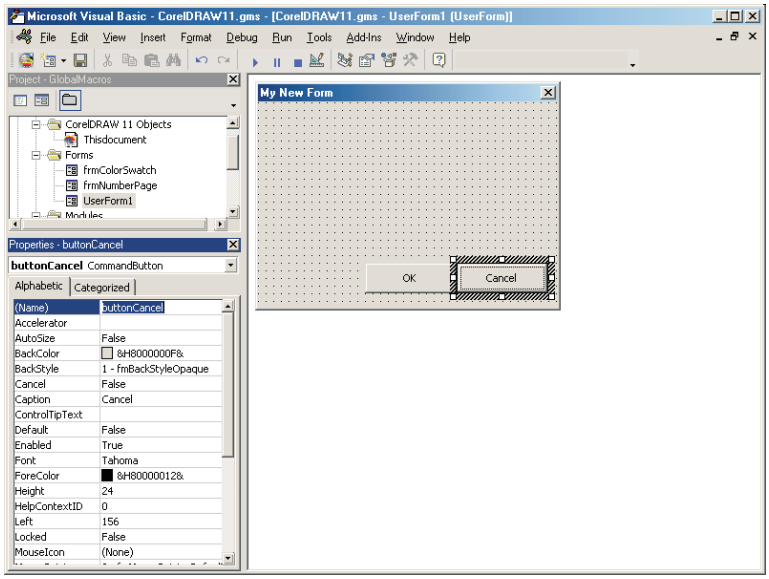
To change the title of the form, click on the form to select it, and then in the Properties window, change the Caption property. While you are there, it is a good idea to give the Form a unique, descriptive name, but remember that this must follow the rules for naming variables in VBA.

Most forms have at least one button – an OK button – plus a Cancel button. To add buttons – or any other controls to a form – drag the appropriate control in the toolbox to the form.

Form Designer toolbox

To add a button, use the **CommandButton** control. Click on the form to add a default-sized button, or drag to create one to your own specifications. Click on the caption to edit it, or edit the Caption property in the Properties

window with the button selected. Also, change the name of the button to something more descriptive, like buttonOK or buttonCancel.



Buttons in a Form Designer window

VBA form controls

The standard Toolbox controls include:

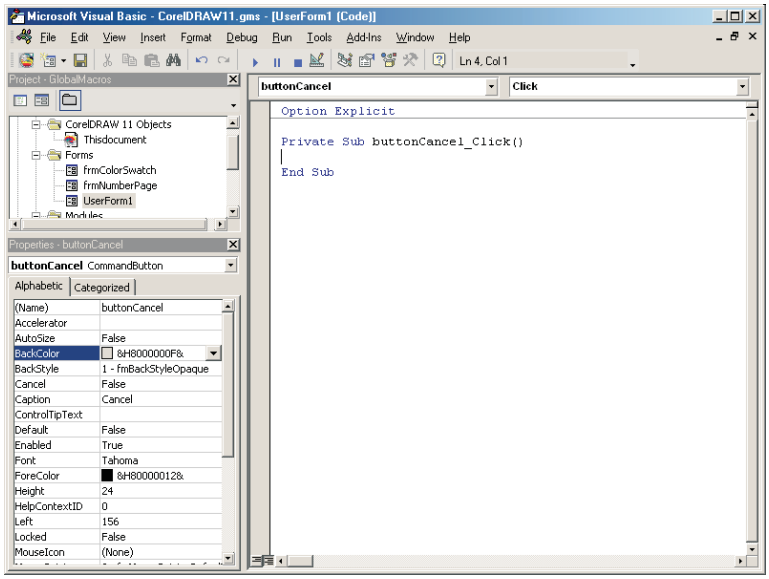
- Static text – for captions and instructions
- TextBox – for the user to type text into
- ComboBox – a list box which the user can also type text into, although this can be disabled to provide a plain list box
- ListBox – an open list in which multiple items may be selected, although the user cannot type into it;
- Checkbox – can be checked, unchecked, or grayed
- OptionButton – several of these with the same GroupName property work so that only one can be selected at once
- ToggleButton – a button that's either in or out
- Frame – groups items together: items drawn on the frame move with the frame
- CommandButton – the button is the most used of all the controls
- TabStrip, MultiPage – useful for creating pages of options, or wizards
- ScrollBar – provides immediate access to a range of values
- SpinButton – works with another control, such as a TextBox, to provide immediate and fast control of the other control's value
- Image – add images to the form

Now, start the form by pressing **F5**. Try clicking the **OK** and **Cancel** buttons – nothing happens! This is because the form does not have any code for handling the buttons' click events.

OK and Cancel buttons

VBA forms are event-driven. This means that they respond to events. Before they respond, you must write some event-handling code. So, the Cancel button is the simplest control: it must just dismiss the form without doing

anything else. Dismiss the dialog, if it is still running, with the Close button. Then double-click on the Cancel button. This displays the form's code in the Code window and creates a new Sub called `buttonCancel_Click`:



The Code window with code for a Cancel button

Add the following code to the Sub:

```
Private Sub buttonCancel_Click()
    Unload Me
End Sub
```

Re-run the form and click the Cancel button – the form is dismissed. While you are setting up the Cancel button, select it in the Form and then set its Cancel property to `True`. Now, when the user presses **Escape**, the `buttonCancel_Click` event will be triggered and the above code will unload the Form.

Similarly, select the OK button and set its Default property to True – when the user presses **Enter** to activate the form, the OK button's event handler will be called. The OK button's Click-event handler performs the form's functionality and then it must unload the form. If the form is used to set the size of the selected shapes by setting their width and height, the OK button's click-event handler may look as shown below. This code sample assumes you have already created two text boxes called txtWidth and txtHeight.

```
Private Sub buttonOK_Click()
  Me.Hide
  Call SetSize(txtWidth.Text, txtHeight.Text)
  Unload Me
End Sub
```

And the size-setting Sub might look like:

```
Private Sub SetSize(width As String, height As String)
  ActiveDocument.Unit = cdrInch
  ActiveSelection.SetSize CDbl(width), CDbl(height)
End Sub
```

From inside the Form's own code module, the Form object is implicit and so all the controls can be simply accessed by name. From other modules, the controls must be accessed via their full name, which would be `UserForm1.buttonOK`.

When the form loads

The code to load a form is given the chapter titled "Creating User Interfaces for Macros". However, as the form is loading, it triggers its own `UserForm_Initialize` event. You should initialize all the controls on the form that need to be initialized from this event handler.

TextBoxes

TextBoxes are the mainstay of user input. They are simple to use, quick to program, and very flexible.

To set the text in a TextBox when initializing it, set the TextBox's Text property, which is its default or implicit property:

```
txtWidth.Text = "3"
txtHeight = "1"
```

To get the value of the TextBox, get its Text property:

```
Call SetSize(txtWidth.Text, txtHeight.Text)
```

Combos and lists

In a ComboBox, the user can either choose an item from the list or type something into the textbox. The editing functionality can be disabled by setting the ComboBox's `Style` property to `fmStyleDropDownList`. List boxes on the other hand are always open, typically displaying between three and ten items at once.

To populate a list of any type, you must call the list's member function `AddItem`. This function takes two parameters, the string or numerical value, and the position in the list. The position parameter is optional; leaving it off inserts the item at the last position in the list. For example, the following code populates the list `ComboBox1` with four items:

```
ComboBox1.AddItem 1
ComboBox1.AddItem 2
ComboBox1.AddItem 3
ComboBox1.AddItem 0, 0
```

To test which item is selected when the OK button is clicked, test the list's `ListIndex` property. To get the value of a selected item's caption, test the ComboBox or Listbox's `Text` property:

```
Dim retList As String
retList = ComboBox1.Text
```

Using images

The Image control is used to place graphics on the form. The image, a bitmap, is contained in the `Picture` property – you can either load an RGB image from a file, such as a GIF, JPEG, or Windows Bitmap BMP file, or you can paste one into the property.

At run-time, new images can be loaded into the Image control by changing the `Picture` property using the VBA function `LoadPicture` and providing a path to the new image file:

```
Image1.Picture = LoadPicture("C:\Images\NewImage.gif")
```

Other controls

To find out about the above controls in more detail, or about the other controls supported by VBA, draw one in a form and then press **F1** for the VBA Help.

Launching a form from a form

It is possible to launch other forms from the current form simply using the form's `Show` member function:

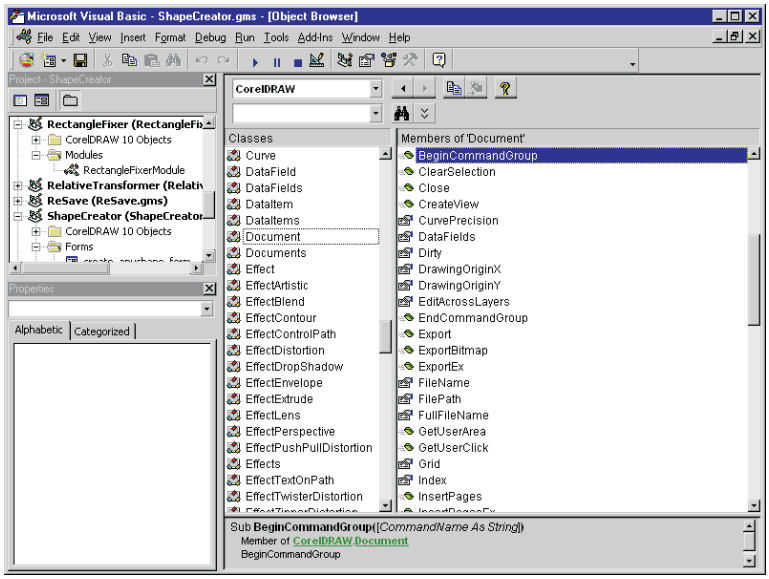
```
UserForm2.Show vbModal
```

You should note, though, that VBA will not return control until all open forms have been unloaded.

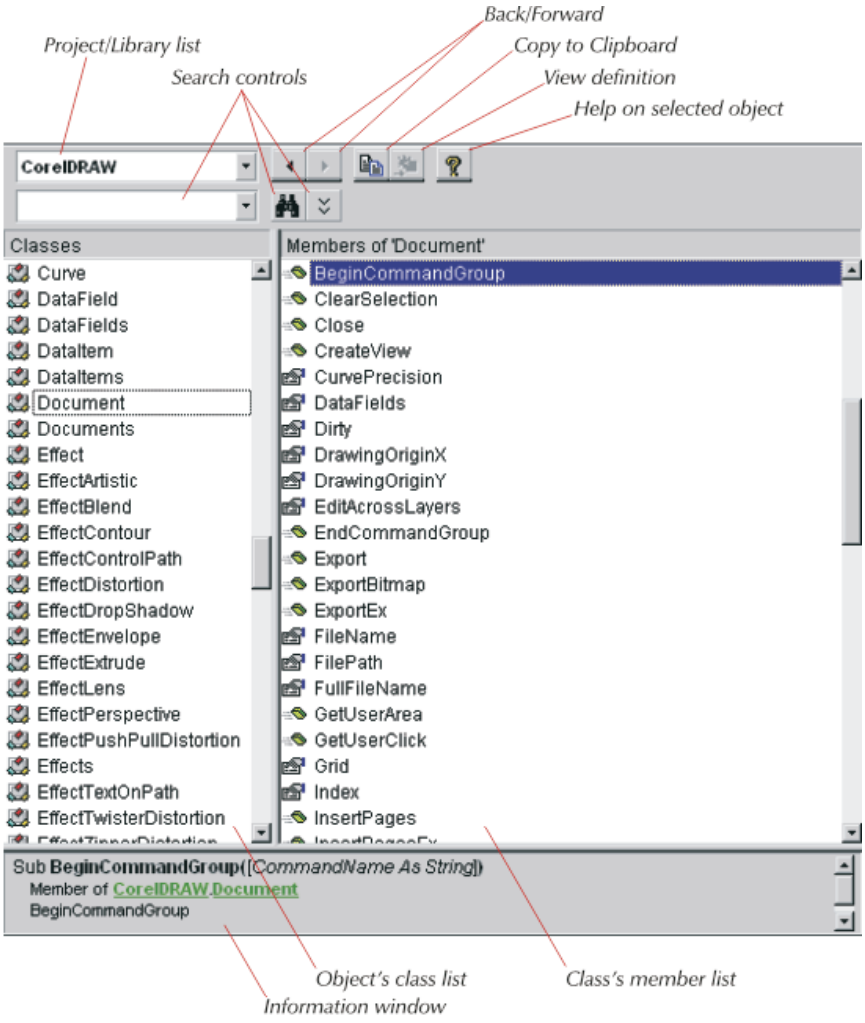
Object Browser window

The Object Browser is one of the most useful tools provided by the VB Editor. The Object Browser displays the entire object model of all *referenced* components (all ActiveX® or OLE objects that are used by the project) – most importantly, it displays the object model of CorelDRAW in an easy-to-use, structured format.

To open the Object Browser window, click **View ▸ Object Browser**.



The Object Browser window



The parts of the Object Browser window

To reference other applications' object models, click Tools ▸ References. Referenced components can be accessed by the VBA code.

Browsing an object model

All of the referenced objects – plus the current module – are listed in the **Project/Library** list box in the upper-left corner of the Object Browser window. By default all of the referenced objects' member classes are listed in the **Class** list.

It is easier to use the Object Browser when only one project or library is selected. Open the Project/Library list and select 'CorelDRAW'. Only CorelDRAW classes will be listed.

The Class and Member lists

The Class list shows all of the classes in the current project or library. The Member list shows all of the members of the selected class.

When you select a class in the Class list, the members of that class are shown in the Member list.

The Class list

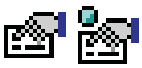
Every project or library – 'object model' – has a number of member classes. The Class list gives an icon next to each item in the list according to what type of class it is.

Class icon	Type
	Global values
	Class
	Enumerated types
	Type
	Module

Global values are values that are global within the selected project, and these include individual members from enumerated types. Member classes of an object have their own members. Enumerated types define the global enumerated types, such as text paragraph alignments, CorelDRAW shape types and import/export filters.

The Member list

The Member list shows all of the properties, methods, and events that are members of the current class. Each member is given an icon according to its type.

Member icon	Type
	Property, Implied/Default Property
	Method
	Event
	Constant

Properties and default properties

Property members may be simple types, such as Booleans, integers, or strings, or they may be a class or enumerated type from the Class list. A property that is based on a class from the Class list then, obviously, inherits all the members of that class.

Many classes have a 'default' property; this property is indicated with a blue dot in its icon. The default property is implied if no property name is given when getting or setting the value of the parent object. For example, collection types have the default property '`Item`', which can be indexed like an array. However, since '`Item`' is usually the default property, in such instances it is not necessary to specify the item property:

```
ActiveSelection.Shapes.Item(1).Selected = False
```

is the same as the shorter:

```
ActiveSelection.Shapes(1).Selected = False
```

since '`Item`' is the default or implied property of a collection of shapes.

Methods and member functions

Methods are commonly known as 'member functions' – these are the functions that the class can do to itself. A good example is the `Move` method of the `Shape` class, which is used to move a CorelDRAW shape using an [x, y] vector; the following code moves the currently selected shapes two measurement units to the right and three measurement units upwards:

```
ActiveSelection.Move 2, 3
```

If the return value of a function is not used, the function call does not take parentheses around the argument list, unless the `Call` keyword is used.

More information about `ActiveSelection` is provided the chapter titled Using objects in CorelDRAW.

Events

Some classes have various events associated with them. By setting up an event handler for a class's event, when that event occurs in CorelDRAW, the event's handler is called. This functionality enables sophisticated applications to be developed that actually respond automatically to what is happening within CorelDRAW.

Commonly handled events include: `BeforeClose`, `BeforePrint`, `BeforeSave`, `ShapeMoved`, `PageSelected`, and `SelectionChanged` of the `Document` class.

Only the `Document`, `GlobalDocument`, and `AddinHook` classes have events in CorelDRAW. The `AddinHook` class is not discussed in this guide.

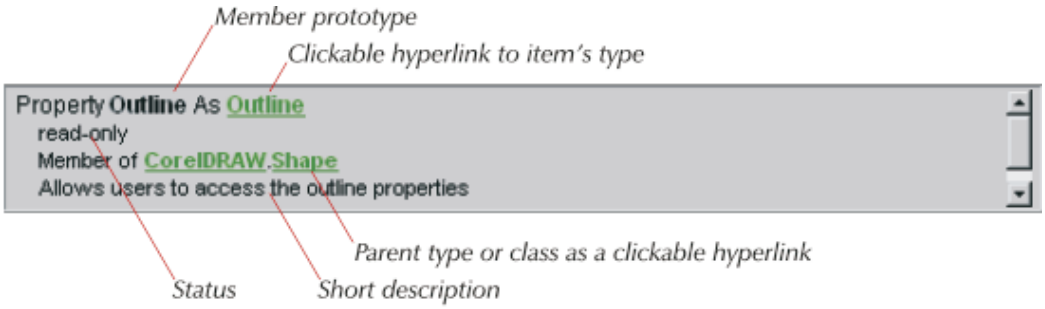
Constants

The only constants listed in the Member list are members of enumerated types and those defined as `Public` in a module. Enumerated types are used to group related items from a closed list, such as CorelDRAW shape types, import/export filters, and alignments. These constants can be used anywhere an integer value is required.

Most CorelDRAW constants begin with 'cdr', for example: `cdrLeftAlignment`, `cdrEPS`, `cdrOutlineBevelLineJoin`, `cdrCurveShape`, `cdrSymmetricalNode`. Some constants may begin with `'prn'` and `'pdf'`. Visual Basic also has its own constants, including constants for keystrokes, such as `vbKeyEnter`, and constants for dialog box buttons, such as `vbOK`.

The Information window

The Information window gives information about the selected class or class member. This information includes a 'prototype' of the member, its parent (i.e. 'is a member of *parent*'), and a short description of the member. If the member is a read-only property, the phrase 'read-only' is given on the status line, otherwise this line is not included.



The Information window

The types of any function parameters and properties are given as hyperlinks to the type definition or class itself, if the type is defined within the current object model. For example, the `Outline` property in the preceding figure belongs to CorelDRAW's `Shape` class; however, `Outline` is also the property's type, and it is a `CorelDRAW` class – to view the class and its members, click on the green word 'Outline'.

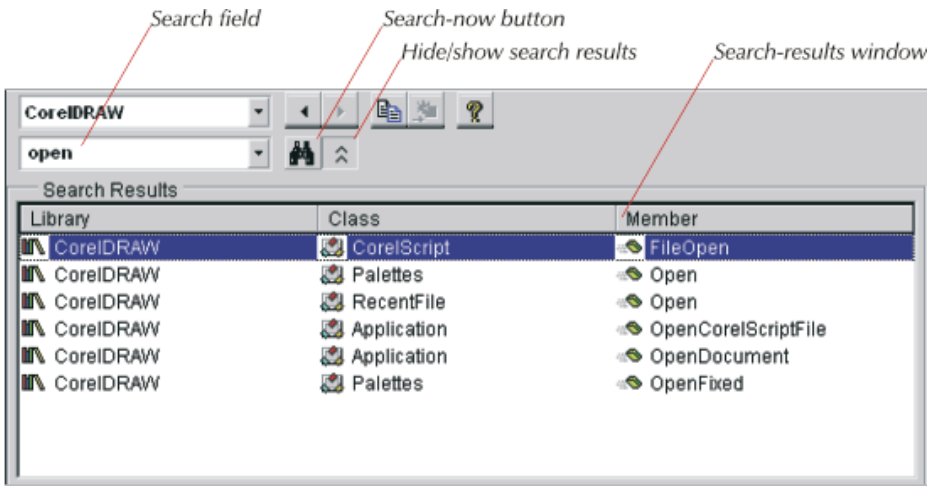
To get more detailed information about the selected class or member, click the Object Browser's Help button.

Sometimes the height of the Information window is not enough to see all of its contents. Drag the top border of the window upwards to reveal its contents, or scroll down using the scrolls bars on the right.

Searching the object model

It is possible to search the object model for a matching string. This is very useful for finding a class or member

whose name you can only partly remember, or for finding classes and members that have similar names, such as names based on or containing the word 'open'.



Searching an object model

To search an object model's classes and members, type a string into the search field and click the Search button. This will open the Search results list, which displays all of the found matches, in alphabetical order. Clicking on one of the found matches will cause the class and member lists to move to the item that was clicked, and the Information window will be updated with this item's information.

To hide the search-results window, click the hide/show button.

Any matches of class names will have a blank member column in the Search results window.

Debugging

The VB Editor provides strong debugging facilities that are common across language editors. It is possible to set breakpoints, to step through code, to make changes to the code while it is running, and to watch and change variables. Some of these are advanced techniques that are not discussed in this guide.

Setting breakpoints

A breakpoint is a marker in the code that causes execution to pause at the line with the breakpoint until you either tell the editor to continue execution, step through the subsequent lines of code, or pause execution.

To set or clear a breakpoint on a line of code, put the cursor into the line and click **Debug ▸ Toggle Breakpoint**. By default the line is highlighted in dark red and a red dot is placed in the margin. To clear all breakpoints, click **Debug ▸ Clear All Breakpoints**.

To restart the code when it pauses at a breakpoint, click **Run ▸ Continue**. To pause execution of the code, immediately exiting from all functions and discarding all return values, click **Run ▸ Reset**.

It is also possible to 'run to cursor'; that is, to execute the code until it reaches the line that the cursor is on, and then pause at that line. To do this, place the cursor on the line where you want execution to pause and click **Debug ▸ Run To Cursor**.

If the line with the breakpoint (or cursor for Run To Cursor) is not executed because it is in a conditional block (if-then-else block), the code will not stop at that line.

Breakpoints are not saved and are lost when you close the VB Editor.

Stepping through the code

When execution pauses at a breakpoint, it is possible to continue through the code one line at a time. This enables you to examine the values of individual variables after each line and determine how the code affects the values and vice versa. This is called 'stepping through the code'.

To step through the code, one line at a time, click **Debug ▸ Step Into**. The execution will visit every line in all called functions and subs.

To step through each line of the current sub or function, but not stepping through the lines of each called sub or function, click **Debug ▸ Step Over**. The called subs and functions are executed, but not line-by-line.

To execute the rest of the current sub or function, but pause when the sub or function returns to the point where it was called, click **Debug ▸ Step Out**. This is a quick way of returning to the point of entry of a function in order to continue stepping through the calling function's code.

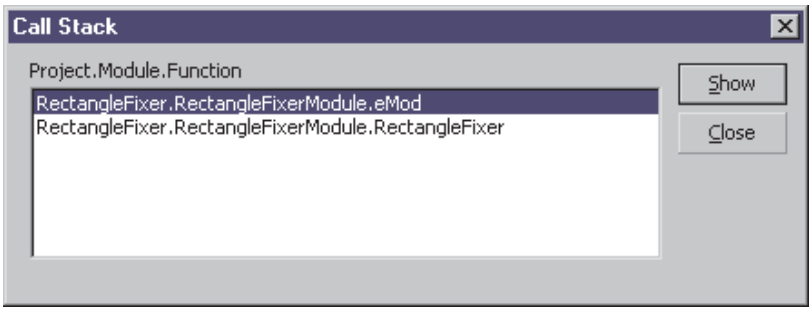
Debugging windows

There are several additional windows that are used while debugging code. These are the Call Stack window, the Immediate window, the Locals window, and the Watches window. All of these windows provide important information about the state of functions and variables while an application is running.

Call Stack window

The Call Stack window is a modal dialog box that lists which function called which function. This can be very useful in long, complicated applications for tracing the steps to a particular function getting called. To visit a function listed in the window, select the function name and click Show, or else click Close.

To display the Call Stack Window, click **View ▸ Call Stack…**.

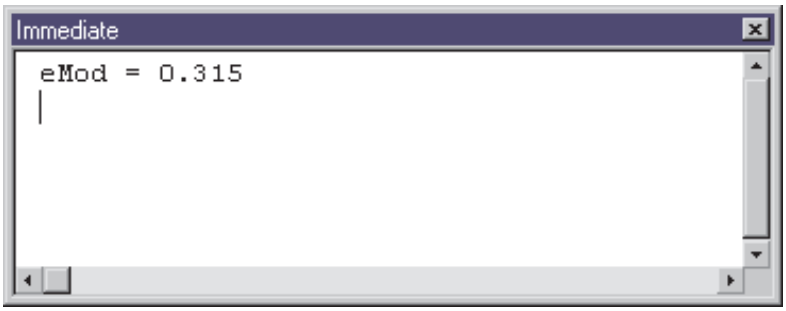


The Call Stack window

Immediate window

The Immediate window allows you to type-in and run arbitrary lines of code while a macro is paused. This is very useful for getting or setting the property of an object in the document, or for setting the value of a variable in the code. To run a piece of code, type it into the Immediate window and press Enter. The code is executed immediately.

To display the Immediate window, click **View ▸ Immediate Window**.

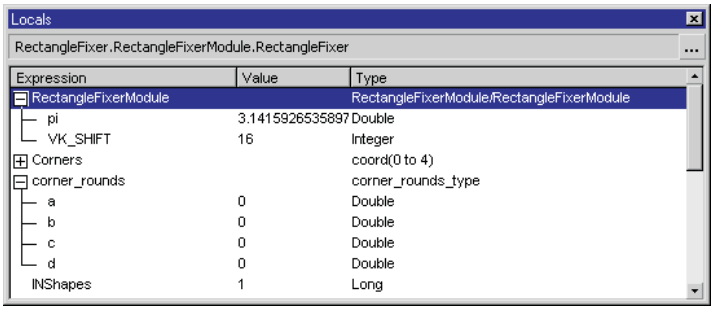


The Immediate window

Locals window

The Locals window displays all of the variables and objects that exist within the current scope. Each variable's type and value are listed in the columns next to the variable's name. Some variables and objects may have several children, which can be displayed by clicking the expand tree button next to the parent. The value of many variables can be changed by clicking on the value and editing it.

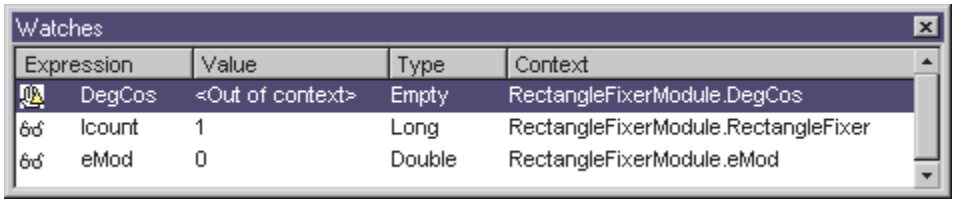
To display the Locals window, click **View ▸ Locals Window**.



The Locals window

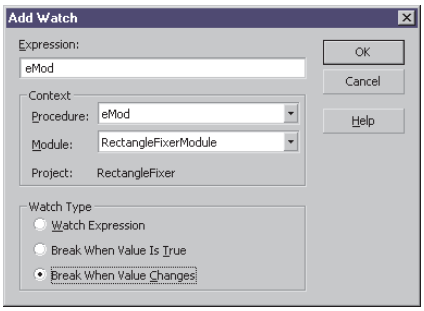
Watches window

The Watches window is used to watch specific variables or object properties. This is very useful for selecting just one or two values to watch as opposed to having to find the value you want in all the values in the Locals window.



The Watches window

To add a value to the Watches window, select the variable or object and its property and drag the selection onto the Watches window, or click on it and choose **Debug ▸ Quick Watch…** which adds the item straight into the Watches window.



The Add Watch dialog box

Select the item you want to watch, select any conditions for this watch, and click **OK**. If the condition becomes true, the application will pause to allow you to examine the code.

About objects and object models 5

VBA relies on an application's object model (OM) in order to communicate with that application and modify its documents. HTML developers who use JavaScript will be familiar with a browser's 'document object model', known as the DOM. Without the DOM it is impossible to access any part of the document and test it or change it using JavaScript. It is exactly the same with VBA and CorelDRAW - without the CorelDRAW OM, it is impossible for VBA to query the document or to change it.

Understanding objects, properties, methods, and events

Anyone who is used to developing object-oriented code in C++, Delphi, or Java, will be immediately familiar with the concept of an 'object' (instance of a class), which has 'properties' and 'methods', and other objects that are its 'members'. But for those who are not familiar with these concepts here is a summary:

- Objects - An object is an instance of a class. A class is a description of something - for example the class 'car' is a small vehicle with an engine and four wheels. This simple description is the class, however you still have to go out and spend money to get an actual object in the class car, in other words, the car that you can drive is an instance of the class car. In the context of CorelDRAW, each open document is an instance of the Document class, each page in the document is an instance of the Page class, and each layer, and each shape on that layer are more instances of more classes.
- Properties - Most classes have properties. For example, the car class has the properties that it is small, it has an engine, and it has four wheels. An instance of the class will also have properties such as color, speed, and number of seats. Some properties are fixed by the design of the class, for example the number of wheels and seats does not (usually) change - these are said to be read-only. However, other properties can be changed after the object has been created - the speed can go up and down, and, with a bit of help, the color can be changed. In the context of CorelDRAW, Document objects have a name, a resolution, horizontal and vertical ruler units; individual shapes have outline and fill properties, as well as position and rotation; and text objects have text properties, which may include the text itself.
- Methods - A method is an operation that the object can do to itself. For the example of the car class, the car can make itself go faster and slower, so the methods would be 'accelerate' and 'decelerate'. In the context of CorelDRAW, documents have methods for creating new pages, layers have methods for creating new shapes, and shapes have methods for applying transformations and effects.

But that's not all. It should also be obvious that one large object is often made from many smaller objects. A car contains four objects of the class 'wheel', two lights of the class 'headlight', and so on. Each of these child objects has the same properties and methods of its class-type - a document object contains page objects, which contain layer objects, which contain shape objects, some of which may contain other objects. This parent/child relationship of objects is important, particularly when referencing an individual object, as will become clear later in this chapter.

Some classes may also 'inherit' features from their parents - for example, the Shape type has many subtypes, or inherited types, including Rectangle, Ellipse, Curve, and Text. All of these subtypes can make use of the basic members of the Shape type, including methods for moving and transforming the shape, and for setting its color. However, the subtypes also have their own specialist members, such as a Rectangle can have corner radii, whereas Text has an associated Font property.

The purpose and benefits of using an object model

Object models in software provide a high level of structure to the relationship between objects and their children. They also allow object types or classes to be used repeatedly in different ways – for example, a Shape object may be of type group and may contain other Shape objects, some of which may also be of type group, or rectangle, or curve,

or text. This high level of organization and re-use makes the OM simple to use and also very powerful. It is also very easy to navigate around the OM using VBA's Object Browser, which has already been described.

Remember, though, that the OM is the map that the VBA language uses to access the different members – objects, methods, and properties – of a document, and to make changes to those members. It is not just a convenience, it is a necessity! Without the object model it is simply impossible to gain access to the objects in the document.

Object hierarchy

In any object model, each object is a child of another object, which is a child of another object. Also, each object has child members of its own – properties, objects, and methods. All of this comprises an object hierarchy that is the object model. In Web browsers, the root object of all the objects is the `Navigator` object; in CorelDRAW it is the `Application` object. In CorelDRAW, all objects are children or grandchildren of the application.

Dot notation

In order to 'drill down' through the layers of hierarchy to get to the object or member that you want, it is necessary to use a standard notation – in VBA, as in many object-oriented languages this is a notation that uses the period, 'full-stop', or dot ('.') to indicate that the object on the right is a member (or child) of the object on the left:

```
Application.Documents(1).Pages(1).Layers(1).Shapes(1).Name _
                                                        = "Bob"
```

It is not usually necessary to use the full hierarchical, or fully qualified reference to an object or its properties. There are several 'shortcuts' that are described later in this chapter.

Creating references to objects using 'Set'

If you want to create a reference to an object so that you can treat that reference as if it was any normal variable, use the `Set` keyword:

```
Dim sh As Shape
Set sh = ActiveSelection.Shapes.Item(1)
```

After creating this reference, it can be treated as if it is the object itself:

```
sh.Outline.Color.GrayAssign 35
```

If the selection is changed while `sh` is still in scope, `sh` will reference the original shape from the old selection and is unaffected by the new selection. Simply assigning the object to the variable is not good enough – the following code will not work:

```
Dim sh As Shape
sh = ActiveSelection.Shapes.Item(1)
```

To release an object, set its reference value to `Nothing`:

```
Set sh = Nothing
```

It is also possible to test whether a variable references a valid object by using the `Nothing` keyword:

```
If sh Is Nothing Then MsgBox "sh is de-referenced."
```

Objects do not have to be explicitly released. In most cases, Visual Basic will release the object when it disposes of the variable when you exit the Sub or Function.

Collections of objects

Many objects are members of collections of objects. A collection is similar to an array, except that it contains objects, not values. Despite this, members of collections can be accessed in the same way as arrays. For example, a collection that is used frequently in CorelDRAW is the collection of shapes on a layer: the object `ActiveLayer` references the current layer, or the layer that is selected in the CorelDRAW Object Manager Docker window.

CorelDRAW contains many collections: a document contains pages, a page contains layers, a layer contains shapes, a curve contains subpaths, a subpath contains segments and nodes, a text range contains lines and words, a group contains shapes, the application contains windows. All of these collections are handled in the same way by VBA.

Item property

To reference the shapes on that layer, the layer's collection of shapes is used: `ActiveLayer.Shapes`. To reference the individual shapes in the collection, the `Item()` property is used:

```
Dim sh As Shape
Set sh = ActiveLayer.Shapes.Item(1)
```

Most elements of a collection start at `1` and increase. For the collection `ActiveLayer.Shapes`, `Item(1)` is the item at the 'top' or 'front' of the layer, in other words, the one that is in front of all the other shapes.

Each item in the above collection is an object of type `Shape`, which means that you can reference the item's members merely by appending the appropriate dot-notated member:

```
ActiveLayer.Shapes.Item(1).Outline.ConvertToObject
```

Sometimes individual items have names. If the item you are looking for has an associated name, and you know what the name is and which collection the item is in, you can reference the item directly using its name:

```
Dim sh1 As Shape, sh2 As Shape
Set sh1 = ActiveLayer.CreateRectangle(0, 5, 7, 0)
sh1.Name = "myShape"
Set sh2 = ActiveLayer.Shapes.Item("myShape")
```

Also, since Item is usually the implied or default member of a collection, it is not strictly required, and the last line of the above code can be rewritten as:

```
Set sh2 = ActiveLayer.Shapes("myShape")
```

Count property

All collections have a property called `Count`. This read-only property gives the number of members in the collection:

```
Dim count As Long
count = ActiveLayer.Shapes.Count
```

The returned value is not only the number of items in the collection, but since the collection starts from `1`, it is also the index of the last item.

Parsing members of a collection

It is often necessary to parse through the members of a collection in order to check or change the items' properties.

Using the `Item()` and `Count` members, it is straightforward to step through a collection of items. With each iteration it is possible to test the current item's properties, or call its methods. The following code restricts all shapes on the layer to no wider than ten units.

```
Dim i As Long, count As Long
count = ActiveLayer.Shapes.Count
For i = 1 to count
  If ActiveLayer.Shapes.Item(i).SizeWidth > 10 Then
    ActiveLayer.Shapes.Item(i).SizeWidth = 10
  End If
Next i
```

There is, though, a more convenient way of parsing a collection in VBA. Instead of using the `Count` property and a `For-Next` loop, this technique uses a `For-Each-In` loop. The above code can be rewritten as:

```
Dim sh As Shape
For Each sh In ActiveLayer.Shapes
  If sh.SizeWidth > 10 Then
    sh.SizeWidth = 10
  End If
Next sh
```

If you want to copy the selection and then parse it later when it is no longer selected, copy the selection into a `ShapeRange` object:

```
Dim sr As ShapeRange
Dim sh As Shape
Set sr = ActiveSelectionRange
For Each sh In sr
  ' Do something with each shape
Next sh
```

Required and implicit objects

When referencing objects, some of the object-syntax in the fully qualified reference is mandatory or required. Other syntax is optional and can either be included for clarity, or omitted for brevity – either by using a 'shortcut', or because the syntax is implicit, or implied. You have already been introduced to several CorelDRAW shortcut objects – `ActiveLayer`, `ActiveSelection` – as well as to one of the most common implicit properties – `Item`.

A shortcut object is merely a syntactical replacement for the long-hand version. For example, the shortcut object `'ActiveLayer'` replaces the long-hand version '`Application.ActiveDocument.ActivePage.ActiveLayer`'; the object shortcut '`ActiveSelection`' replaces the long-hand version '`Application.ActiveDocument.Selection`'.

Using objects in CorelDRAW 6

The VBA object model in CorelDRAW is in its third evolution since it first appeared in CorelDRAW 9. It grew enormously from CorelDRAW 9 to CorelDRAW 10, and with the change from 10 to 11, the object model is now very mature and fully featured.

This chapter describes many ways of using the large number of objects in the CorelDRAW object model.

Working with basic objects

In CorelDRAW, the root object is the `Application` object and all objects stem from this one. There are, though, several key, basic objects that encapsulate most of the other objects in the object model.

Application Object

The CorelDRAW `Application` object is the root object for all other objects. To reference the CorelDRAW object model from an out-of-process controller, use its `Application` object. For example, in Visual Basic you would use:

```
Dim cdr As CorelDRAW.Application
Set cdr = CreateObject("CorelDRAW.Application.11")
```

Although you can use the above code inside VBA, there is no point in doing so within the VBA for CorelDRAW, since the `Application` object is used by default if no other root object is specified.

The `Application` object contains all of the open `Document` objects, as well as all `Window` objects.

Document Structure

The `Application` object contains all the `Document` objects that are created when documents are opened in its property `Documents`. Each `Document` object contains a collection, `Pages`, of all its `Page` objects. Individual `Page` objects contain `Layers` collections containing all their `Layer` objects. `Layer` objects contain `Shapes` collections of all their `Shape` objects. This is the basic structure of documents.

However, `Document` objects have many more features than just the shapes that you see in the editing window, and these are discussed throughout the rest of this chapter.

The object model hierarchy

To view the CorelDRAW object model hierarchy, refer to the Object Model Diagram in the VBA Help for CorelDRAW.

Document objects

Whenever a CorelDRAW (CDR) file is opened, a new `Document` object is created in the `Application` object for that document. `Application` contains a collection, `Documents`, that provides access to all of the open documents. The order of the documents in the collection is set to the order that the documents were created and opened.

`Document` objects have many member properties and methods, including methods for saving, closing, adding pages, printing, exporting, and getting the selection. There are also properties that can be used to get or set the drawing measurement units, rulers, reference point, the document's windows and views (including zoom factors), filename, grid, and so on.

Useful document members

`Document` objects have many members – the full list of which can be browsed in the Object Browser. The most useful ones are listed in the following table:

Document Member	Description
`Activate`	Activates the given document, which brings it to the front of the pile in CorelDRAW. `ActiveDocument` is set to reference it.
`ActiveLayer`	Represents the active layer in the document, in other words the layer that is set as active in the CorelDRAW Object Manager.
`ActivePage`	Represents the active page in the document; in other words, the one that is being edited in CorelDRAW.
`AddPages` `AddPagesEx`	Adds pages to the document.
`Pages`	Provides access to the pages collection.
`BeginCommandGroup` `EndCommandGroup`	Creates a 'command group' – a series of actions which appear as a *single* item on the Undo list.
`ClearSelection`	Clears the document's selection; in other words, deselects all shapes in the document.
`Selection`	Gets the selection as a `Shape`.
`SelectionRange`	Gets the selection as a `ShapeRange`.
`Close`	Closes the document.
`Export`	Performs a simple export from the document.
`ExportEx`	Performs a highly configurable export from the document.
`ExportBitmap`	Performs an export to a bitmap with full control.
`FileName`	Gets the filename.
`FilePath`	Gets the path to the file.
`FullFileName`	Gets the full path and filename of the document.
`GetUserArea` `GetUserClick`	Allows the user to drag an area or give a single click back to the macro. Very useful for highly interactive macros.
`InsertPages` `InsertPagesEx`	Inserts pages in the document.
`PrintOut` `PrintSettings`	Prints the document using the document's print settings.
`PublishToPDF`	Publishes the document to PDF format.
`PDFSettings`	

Document Member	Description
`ReferencePoint`	Gets/sets the reference point used by many shape functions, including ones that transform the shape, functions for getting the shape's position, and so on.
`Save`	Saves the document using the current filename.
`SaveAs`	Saves the document to a new filename or using new settings for the CorelDRAW (CDR) file.
`Unit` `WorldScale`	Sets the document units used by functions that take a measurement value, such as size- and position-related functions; this is independent of the units that the rulers are set to use. Also gets/sets the drawing scale. This changes the value in the document, however, it must be explicitly calculated into functions that take a measurement value, which use 1:1 by default.

Some of these members are discussed in the following subsections and chapters.

Creating documents

The `Application` object has two methods for creating new documents:

```
Application.CreateDocument() As Document
Application.CreateDocumentFromTemplate(Template As String, _
                  [IncludeGraphics As Boolean = True])As Document
```

The first function creates a new, empty document based on the CorelDRAW default page size, orientation, and styles. The second function creates a new, untitled document from a specified CorelDRAW **.CDT** template. The new document becomes active immediately and `ActiveDocument` will reference the new document, not the old one.

Both of these functions return a reference to the new document, and so are typically used in the following manner:

```
Dim newDoc as Document
Set newDoc = CreateDocument
```

The `Document` class does not have a method for creating an instance (object) of itself; only the `Application` object can create documents.

The ActiveDocument property

The property `ActiveDocument` provides direct access to the document that is in front of all the other documents in the CorelDRAW window. `ActiveDocument` is an object of type `Document` and, therefore, has all of the same members – properties, objects, and methods – as the `Document` class.

If there are no open documents, `ActiveDocument` returns `Nothing`. You should test for this with the following code:

```
If Documents.Count = 0 Then
  MsgBox "There aren't any open documents.", vbOK, "No Docs"
  Exit Sub
End If
```

Switching between documents

The Document class has a method, `Activate`, which activates the document and brings it to the front of all the open documents in CorelDRAW. `ActiveDocument` will now reference the document that was activated. The following code sample will activate the third open document, providing that three or more documents are open in CorelDRAW.

```
Documents(3).Activate
```

Using the `Activate` method on the `ActiveDocument` has no effect.

You can test the `FilePath`, `FileName`, and `FullFileName` properties of the document to activate the correct one:

- `FilePath` – just the path of the file, for example **C:\My Documents**.
- `FileName` – just the name of the file, for example **Graphic1.cdr**.
- `FullFileName` – the full path and name, **C:\My Documents\Graphic1.cdr**.

You can test the name using the following code:

```
Public Function findDocument(filename As String) As Document
  Dim doc As Document
  For Each doc In Documents
    If doc.FileName = filename Then Exit For
    Set doc = Nothing
  Next doc
  Set findDocument = doc
End Function
```

You can then call the returned document's `Activate` method.

The documents in the `Documents` collection are in the order that they were created and opened; the order does not reflect the current stacking order of the documents within CorelDRAW. You must use Windows collection to achieve this.

Changing content in active and inactive documents

You can modify content in inactive documents as easily as in the active document. For example, if you have a reference to a document, you can add a new layer called 'fooLayer' with the following code:

```
Dim doc As Document
Set doc = Documents(3)
doc.ActivePage.CreateLayer "fooLayer"
```

If you want to create the new layer in an inactive document whose name you know (in the following example it is **barDoc.cdr**), you might use the following code, which calls the function `findDocument()` from the previous section:

```
Dim doc As Document
Set doc = findDocument("barDoc.cdr")
If Not doc Is Nothing Then doc.ActivePage.CreateLayer "fooLayer"
```

Modifying content in an inactive document does not make that document active. To make the document active, call its `Activate` method.

Closing documents

To close a document, call its `Close` method:

```
ActiveDocument.Close
```

In the above code, the active document is closed and the document that was behind it in CorelDRAW becomes the new active document. If the code closes a document that is not the active document, the document referenced by `ActiveDocument` does not change.

In CorelDRAW 10, if the document is 'dirty' and needs to be saved, invoking the `Close` method displays the standard CorelDRAW message 'Save changes to *filename*.cdr?' and execution pauses until the user selects an option. In CorelDRAW 11, the document will be closed without prompting the user to save changes. In CorelDRAW 11, you must explicitly test the document's `Dirty` property and take appropriate action if the document has changed.

Setting the undo string

Two very useful member functions of the Document object allow any number of programmed CorelDRAW actions to appear as a *single* action on the undo list. These methods are `BeginCommandGroup()` and `EndCommandGroup()`:

```
Dim sh As Shape
ActiveDocument.BeginCommandGroup "CreateCurveEllipse"
    Set sh = ActiveLayer.CreateEllipse(0, 1, 1, 0)
    sh.ConvertToCurves
ActiveDocument.EndCommandGroup
```

After running this code, the undo string on the Edit menu will say "Undo CreateCurveEllipse", and selecting undo will not only undo the `ConvertToCurves` operation, but also the `CreateEllipse` operation.

A command group can contain many hundreds of commands, if required. They make your macros appear as if they are truly integrated into CorelDRAW.

Page objects

All the pages in a document are members of the `Document` object's `Pages` collection. All of the layers within the document are contained by the document's `Page` objects. All of the shapes in the document are contained by the document's `Layer` objects.

The pages are given in the same order in the `Pages` collection as they exist in the document, so that page number 5 in the document is the same page as `ActiveDocument.Pages.Item(5)`. If the pages are re-ordered in the Page Sorter view, or if pages are added or deleted, the `Pages` collection is immediately updated to reflect the new order of pages in the document.

This section describes how to perform the most common actions with pages.

The ActivePage property

To access the active page of the active document, use `Application.ActivePage`, `ActiveDocument.ActivePage`, or simply `ActivePage`. This returns a reference to the active page in the active document, of type `Page`:

```
Dim pg As Page
Set pg = ActivePage
```

To access the active page of any document, active or not, use the property `Document.ActivePage` of the given document:

```
Public Function getDocsActivePage(doc As Document) As Page
    Set getDocsActivePage = doc.ActivePage
End Function
```

Creating pages

The member function for creating pages is actually a member of the `Document` class, not of the `Page` class.

Document Member	Description
`Document.AddPages()`	Adds a given number of pages at the default size to the end of the document.
`Document.AddPagesEx()`	Adds a given number of pages at the given size to the end of the document.
`Document.InsertPages()`	Inserts pages at the default size at a given position within the document.
`Document.InsertPagesEx()`	Inserts pages at the given size at a given position within the document.

Examples of the first two functions are given below: the first function adds three default-sized pages to the end of the document, the second function adds three US-letter-sized pages to the end of the document:

```
Public Function AddSomeSimplePages() as Page
    Set AddSomeSimplePages = ActiveDocument.AddPages(3)
End Function
```

```
Public Function AddSomeSpecifiedPages() as Page
    Dim doc as Document
    Set doc = ActiveDocument
    doc.Unit = cdrInch
    Set AddSomeSpecifiedPages = doc.AddPagesEx(3, 8.5, 11)
End Function
```

Both member functions return the *first* page that was added: since you know the first page and the number of pages created, it is possible to access all the created pages, since all of the other created pages will be the pages *after* the returned page in the document's `Pages` collection.

You can use the returned page's `Index` property to find the right place in the `Pages` collection, and then increment that to visit the subsequent pages that were added:

```
Dim firstNewPage As Page, secondNewPage As Page
Set firstNewPage = AddSomeSimplePages
Set secondNewPage = ActiveDocument.Pages(firstNewPage.Index + 1)
```

If you want to use one of the standard page sizes, see the section 'Resizing Pages', later in this chapter.

Deleting pages

Pages can be deleted by calling each page's `Delete` member function:

```
ActivePage.Delete
```

This will delete all of the shapes that exist on that page and will delete the page from the document's `Pages` collection. The collection will be immediately updated to reflect the change. `Delete` must be called individually for each page you wish to delete.

You cannot delete all of the pages in a document. An error will occur if you try to delete the last remaining page from the document. In order to test for this condition, use the following code:

```
If ActiveDocument.Pages.Count > 1 Then ActivePage.Delete
```

Switching between pages

To switch between pages, find the page you want to make visible or active and then invoke its `Activate` member function. The following code activates the third page in a CorelDRAW document:

```
ActiveDocument.Pages(3).Activate
```

It is not necessary to activate a page in order to make changes to it. By explicitly referencing the page you want to make changes to, you can make those changes without having the page active. The following code deletes all of the shapes on page three of the active document without activating that page:

```
Public Sub DeleteShapesFromPage3()
  Dim doc As Document
  Set doc = ActiveDocument
  doc.Pages(3).Shapes.All.Delete
End Sub
```

Activating a page in an inactive document does not activate that document. Use the `Document.Activate` method to activate the document.

Reordering pages

Individual pages can be moved around within the document using the `MoveTo` member function of each of the pages. The following code moves page two to the position of page four:

```
ActiveDocument.Pages(2).MoveTo 4
```

Activating a page in an inactive document does not activate that document. Use the `Document.Activate` method to activate the document.

Resizing pages

This section describes how to resize pages, and how to set the orientation. It also describes how to use the built-in page sizes.

Resizing pages and setting their orientation

Pages can be individually resized using the `SetSize` member function of the `Page` class. This function takes two size values, width and height, and applies them to the page. The following code changes the size of the active page in the active document to A4:

```
ActiveDocument.Unit = cdrMillimeter
ActivePage.SetSize 210, 297
ActivePage.Orientation = cdrLandscape
```

For the `SetSize` method, the first number is always the page width and the second number is always the page height. Reversing the two numbers will cause CorelDRAW to switch the page's orientation.

Setting the default page size

To set the default page size for the document, set the value of the item in the document's `Pages` collection with index zero:

```
Dim doc As Document
Set doc = ActiveDocument
doc.Unit = cdrMillimeter
doc.Pages(0).SetSize 297, 210
```

Using the defined page sizes

All of the page sizes that are defined by CorelDRAW, or custom defined by users, are stored in the `PageSizes` collection of the `Document` class. You can get all of the names of the page sizes by parsing this collection and getting each `PageSize` object's `Name` property:

```
Dim pageSizeName As String
pageSizeName = ActiveDocument.PageSizes(3).Name
```

Page sizes can be specified using their name, for example the following code gets the `PageSize` called 'Business Card':

```
Dim thisSize As PageSize
Set thisSize = ActiveDocument.PageSizes("Business Card")
```

You can get the actual dimensions of each `PageSize` object using the `Width` and `Height` properties. The following code retrieves the third `PageSize`'s width and height in millimeters:

```
Dim pageWidth As Double, pageHeight As Double
Dim doc As Document
Set doc = ActiveDocument
doc.Unit = cdrMillimeter
pageWidth = doc.PageSizes(3).Width
pageHeight = doc.PageSizes(3).Height
```

`PageSize` objects have a `Delete` member function; this can only be used on user-defined page sizes. To test whether a `PageSize` is user-defined or not, test its `BuiltIn` Boolean property:

```
Public Sub deletePageSize(thisSize As PageSize)
    If Not thisSize.BuiltIn Then thisSize.Delete
End Sub
```

If you need the page size in a particular unit of measurement, always set the document's units before getting the width and height.

Layer objects

In CorelDRAW, all visible shapes are held on layers within each page. Although one layer can have different properties on each page, all pages have the same layers and all those layers have the same names on each page.

If you want to create new shapes in CorelDRAW using VBA, you must use the shape-creation member functions of the `Layer` class; these functions are described in the next section, 'Shape Objects'.

This section describes how to manipulate layers in CorelDRAW using VBA.

Creating layers

To create a new layer, use the `Page` class's `CreateLayer` member function. The following code creates a new layer called 'My New Layer':

```
ActivePage.CreateLayer "My New Layer"
```

The new layer is always created at the top of the list of non-master layers.

Moving and renaming layers

Layers can be re-ordered with VBA. The `Layer` class has two member functions `MoveAbove` and `MoveBelow`. Both methods take a `Layer` object as the only parameter – the layer is moved above or below this layer. The following code moves the layer called 'Layer 1' to below the layer 'Guides':

```
Dim pageLayers As Layers
Set pageLayers = ActivePage.Layers
pageLayers("Layer 1").MoveBelow pageLayers("Guides")
```

The change is immediately reflected in the Object Manager in CorelDRAW (sometimes the effects are only apparent when in Layer Manager view). The layer 'Layer 1' is moved so that it is immediately below or behind the layer 'Guides'.

Layers can be renamed by editing the `Name` property of the layer. The following code renames 'Layer 1':

```
ActivePage.Layers("Layer 1").Name = "Layer with a New Name"
```

Deleting layers

Layers can be deleted by calling the Layer class's `Delete` function. The `Layers` collection can only be accessed from the `Page` object.

Calling the `Delete` function removes the layer completely from the document, deleting all of the shapes on that layer on all of the pages in the document. The following code removes the layer called 'Layer 1':

```
ActivePage.Layers("Layer 1").Delete
```

Setting a layer as active

To set a layer as active, call that layer's `Activate` member function:

```
ActivePage.Layers("Layer 1").Activate
```

This makes the layer active, but does not enable the layer or make it visible if it is already disabled or hidden.

Disabling and hiding layers

Layer objects have the properties `Enabled` and `Visible` that control whether you can edit the layer and whether its contents (shapes) are visible in CorelDRAW. Both properties are Boolean. By setting them to True, the layers become visible and can be edited. By setting either to False, the layer cannot be edited. For example, the following code disables the layer on the active page, but makes its contents visible:

```
ActivePage.Layers("Layer 1").Visible = True
ActivePage.Layers("Layer 1").Editable = False
```

The result of any changes to these properties are immediately displayed in the Object Manager Docker window in CorelDRAW.

Layers can have different settings on different pages by specifying a page from the `Pages` collection, or by referencing the `ActivePage`. The above code only affects the active page. To make the changes to all of the pages in the document, use page 'zero' in the document's `Pages` collection:

```
ActiveDocument.Pages(0).Layers("Layer 1").Visible = True
```

Shape objects

Objects of type `Shape` are the actual shapes that exist in the CorelDRAW document. If you change a shape's properties in the document, such as by moving it, by changing its size, or by giving it a new fill, these changes are immediately visible to the VBA Object Model.

Shape objects exist as members of Layer objects. Each Layer object contains a collection, Shapes, which contains all of the shapes on the layer. The first item of this collection is the shape at the top of the layer (in other words, the one that is above all the others), and the last item is the shape at the bottom; if you reorder the shapes on the page, the collection is updated to reflect the change.

Each Page object in the document also has a collection, Shapes, which is the total collection of all the Shapes collections on all the layers on the page (including any master layers). The first shape in the collection is the shape at the very top of the page, and the last shape is the shape at the bottom.

Each Shape object has a property Type that returns the shape's subtype, in other words, what type of shape it is (rectangle, ellipse, curve, text, group, and so on). This is a read-only property. Since some types of shapes have member functions and properties that others do not, it is often necessary to have to test the shape's type before calling a method that might not be there. To test for a shape's type, use the following code:

```
Dim sh As Shape
Set sh = ActiveShape
If sh.Type = cdrTextShape Then
  If sh.Text.IsArtisticText = True Then
    sh.Rotate 10
  End If
End If
```

The above code tests the shape's type. If it is text, it tests whether it is artistic or paragraph text. If it is artistic text, it rotates it through 10°.

Selections and selecting shapes

To see if a Shape is selected or not, test its Selected Boolean property:

```
Dim sh As Shape
Set sh = ActivePage.Shapes(1)
If sh.Selected = False Then sh.CreateSelection
```

You can add a Shape to the selection simply by setting its Selected property to True – this selects the shape without deselecting all the other shapes. To select just one shape without any other shapes, use the CreateSelection method, as in the above code.

To deselect all the shapes, call the document's ClearSelection method:

```
ActiveDocument.ClearSelection
```

To select all the shapes on the page or layer, use the following code:

```
ActivePage.Shapes.All.CreateSelection
```

This calls the CreateSelection of the ShapeRange object, which is returned by the All member function of the Shapes collection on the active page. Only those shapes on locked or hidden layers will not be selected.

Creating shapes

Shape objects represent the actual shapes in the CorelDRAW document that you create using the CorelDRAW drawing tools. There are quite a few different shapes that can be created, the most common being: rectangles, ellipses, curves, text (artistic and paragraph), and groups.

Since each Shape object is a member of the Shapes collection, which is a member of one of the Layer objects on the Page, the methods for creating new shapes belong to the Layer class, and they all begin with 'Create...'.

Creating rectangles

There are two functions for creating new rectangle shapes: `CreateRectangle` and `CreateRectangle2`; both functions return a reference to the new `Shape` object. The two functions differ only in the parameters that they take. For example, the following code creates a simple two-by-one-inch rectangle positioned six inches up from the bottom and three inches in from the left of the page:

```
Dim sh As Shape
ActiveDocument.Unit = cdrInch
Set sh = ActiveLayer.CreateRectangle(3, 7, 6, 5)
```

The parameters are given as *top*, *left*, *bottom*, *right*. Each one is in the document's units, so it is prudent to explicitly set this before creating the rectangle.

The alternative method, `CreateRectangle2`, creates the rectangle by specifying the coordinates of its lower-left corner and its width and height. The following code creates the same rectangle as above:

```
Dim sh As Shape
ActiveDocument.Unit = cdrInch
Set sh = ActiveLayer.CreateRectangle2(3, 6, 2, 1)
```

The alternative methods are provided to make it simpler to develop solutions, they both provide identical functionality.

Rounding the corners of rectangles

Round-cornered rectangles can also be created using the `CreateRectangle` and `CreateRectangle2` methods: both functions have four optional parameters that set the roundness of the corners when the rectangle is created. However, these values have slightly different meanings for the two functions.

The four optional parameters of the method `CreateRectangle` take integer values in the range 0 to 100 (zero being the default). These values define the radius of the four corners as a whole-number percentage of half the shortest side length. The following code recreates the two-by-one-inch rectangle from earlier, but the four corner radii are set to 100%, 75%, 50%, and 0% of half the shortest side, in other words, the radii will be 0.5 inches, 0.375 inches, 0.25 inches, and a cusp:

```
Dim sh As Shape
ActiveDocument.Unit = cdrInch
Set sh = ActiveLayer.CreateRectangle(3, 7, 6, 5, 100, 75, 50, 0)
```

The four parameters define the radii of the corners in the order *upper-left*, *upper-right*, *lower-left*, *lower-right*.

The method `CreateRectangle2` defines the corner radii in exactly the same order, except that it takes double (floating-point) values that are the radius measurements in the document's units. The following code creates the same rectangle with the same corners as above:

```
Dim sh As Shape
ActiveDocument.Unit = cdrInch
ActiveDocument.ReferencePoint = cdrBottomLeft
Set sh = ActiveLayer.CreateRectangle2(3, 6, 2, 1, _
                                      0.5, 0.375, 0.25, 0)
```

You must limit the radii passed to the method `CreateRectangle2` to less than half the shorter dimension of the rectangle, otherwise an error will occur.

Creating ellipses

There are two methods for creating ellipses: `CreateEllipse` and `CreateEllipse2`. They differ in the parameters that they take, making it simpler to create ellipses, whether you want to create one based on its bounding box, or on its center point and radius. Both functions also create *arcs* or partial ellipses, or *segments* or pie slices.

CreateEllipse method

The `CreateEllipse` method takes four parameters that define its bounding box in the same way as for `CreateRectangle`, in other words, *left*, *top*, *right*, *bottom*, in the document's units. The following code creates a 50mm circle:

```
Dim sh As Shape
ActiveDocument.Unit = cdrMillimeter
Set sh = ActiveLayer.CreateEllipse(75, 150, 125, 100)
```

To create an arc or a segment, three additional parameters are required – start angle, end angle, and a Boolean value that defines whether it is an arc (False) or a segment (True). Angles are measured with zero being horizontally-right on the page and positive values being degrees from zero moving counterclockwise. The arc or pie is drawn from the start angle to the end angle. The following code creates a letter 'C' shape:

```
Dim sh As Shape
ActiveDocument.Unit = cdrMillimeter
Set sh = ActiveLayer.CreateEllipse(75, 150, 125, 100, _
                                   60, 290, False)
```

CreateEllipse2 method

The CreateEllipse2 method creates ellipses based on their center points, and horizontal and vertical radii (if only one radius is given, a circle is created). The following code creates the same 50 millimeter circle as in the preceding section:

```
Dim sh As Shape
ActiveDocument.Unit = cdrMillimeter
Set sh = ActiveLayer.CreateEllipse2(100, 125, 25)
```

To create an ellipse, give a second radius: the first radius is the horizontal radius, the second is the vertical radius:

```
Dim sh As Shape
ActiveDocument.Unit = cdrMillimeter
Set sh = ActiveLayer.CreateEllipse2(100, 125, 50, 25)
```

To create an arc or a segment, use exactly the same additional parameters as for the `CreateEllipse` method.

Creating curves

Curves are made from several other objects: each `Curve` has one or more `SubPath` member objects; each `SubPath` has one or more `Segment` objects; each `Segment` has two `Node` objects as well as two control-point position/angle properties.

To create a curve shape in CorelDRAW:

1 Create a new curve object using the `CreateCurve` method of the `Application` object.

2 Create a new `SubPath` inside the `Curve` object using the `CreateSubPath` member function – this creates the first `Node` of the curve.

3 Append a new line- or curve-type `Segment` to the `SubPath` using the `AppendLineSegment` and `AppendCurveSegment` member functions – this adds another `Node` as well as setting the positions of the control handles for that `Segment`. Repeat this as often as required to build up the `Curve`.

4 Create the curve shape on the `Layer` using the `CreateCurve` member function.

You can add additional `SubPaths` to the `Curve` and build those up with their own `Nodes`. You can also close a `Curve` by setting its `Closed` property to True.

The following code creates a D-shaped closed curve:

```
Dim sh As Shape, spath As SubPath, crv As Curve
ActiveDocument.Unit = cdrCentimeter
Set crv = Application.CreateCurve(ActiveDocument) 'Create Curve object
Set spath = crv.CreateSubPath(6, 6) ' Create a SubPath
spath.AppendLineSegment 6, 3 ' Add the short vertical segment
spath.AppendCurveSegment 3, 0, 2, 270, 2, 0 ' Lower curve
spath.AppendLineSegment 0, 0 ' Bottom straight edge
spath.AppendLineSegment 0, 9 ' Left straight edge
spath.AppendLineSegment 3, 9 ' Top straight edge
spath.AppendCurveSegment 6, 6, 2, 0, 2, 90 ' Upper curve
spath.Closed = True ' Close the curve
Set sh = ActiveLayer.CreateCurve(crv) ' Create curve shape
```

The `AppendLineSegment` method only requires a single node position for the end of the segment. However, the `AppendCurveSegment` method requires one Cartesian coordinate and two polar coordinates: the Cartesian coordinate is for the end node; the polar coordinates are for the two control handles where the first parameter is the *length* of the handle and the second parameter is the control handle's angle. Alternatively, you can use the `AppendCurveSegment2` method which allows you to specify the coordinates of both control handles.

The `Layer` class has three additional member functions for creating curve objects: `CreateLineSegment`, `CreateCurveSegment`, and `CreateCurveSegment2`. These functions are shortcuts for creating a `Curve` shape along with its first `Segment` on the first `SubPath`, all in a single function.

The new `Segments` are appended to the last `Node` of the `SubPath`. There is an optional parameter that causes the `Segment` to be appended to the *first* `Node` of the `SubPath`.

Text objects

Text objects are another type of `Shape` object. However, handling text is more complicated than handling other shapes.

In CorelDRAW 11, text is manipulated as a `TextRange`. Text ranges can be accessed via any of the following properties of `Shape.Text`:

- `Frames` collection - each `TextFrame`'s default member is a `TextRange` which is the text within the frame
- `Story` - this is a `TextRange` containing all the text in all of the frames linked to the current `Shape` on all pages in the document

The text in a TextRange can be manipulated as a single block of text, and its properties, such as font, size, style and can be set for all the text in one go. Alternatively, the TextRange has several properties which are collections of smaller text ranges: Columns, Paragraphs, Lines, Words, and Characters.

Creating artistic text

To create a new artistic text shape, use the member function CreateArtisticText of the Layer object. The following code creates an artistic text shape, with the left end of the line at one inch and the baseline at four inches from the origin, with the words "Hello World":

```
Dim sh As Shape
ActiveDocument.Unit = cdrInch
Set sh = ActiveLayer.CreateArtisticText(1, 4, "Hello World")
```

There are many optional parameters to this function for setting italic, bold, size, alignment, and so on.

In CorelDRAW 11 the Text object has been greatly enhanced over that in CorelDRAW 10.

Creating paragraph text

To create a new paragraph text shape, use the member function CreateParagraphText of the Layer object. Paragraph text differs from artistic text in that it flows within a rectangular container, rather than being as wide as it needs to be before reaching a line feed. The first four parameters of the function are left, top, right, bottom:

```
Dim sh As Shape
ActiveDocument.Unit = cdrInch
Set sh = ActiveLayer.CreateParagraphText(1, 4, 5, 2, "Hi There", _
                                    Alignment := cdrCenterAlignment)
```

Formatting text

To format text, first get a reference to a TextRange and then apply the formatting. Frames, columns, paragraphs, lines, and the story can all be used to get a reference to a TextRange. The following code formats the first paragraph of the story into a heading style and the second and third paragraphs into a body-text style:

```
Dim txt As TextRange
' Format the first paragraph
Set txt = ActiveShape.Text.Story.Paragraphs(1)
txt.ChangeCase cdrTextUpperCase
txt.Font = "Verdana"
txt.Size = 18
txt.Bold = True
' Format the second and third paragraphs
Set txt = ActiveShape.Text.Story.Paragraphs(2, 2)
txt.Font = "Times New Roman"
txt.Size = 12
txt.Style = cdrNormalFontStyle
```

All of the formatting options from the Format Text dialog box in CorelDRAW can be applied programmatically with VBA. See the Text object in VBA's Object Browser for more information.

Fitting text to a path

The `Text` object has a member function `FitTextToPath`, which simply attaches a text object to the outline of a shape, so that the text flows along the path. The following code creates a new text object and attaches it to the selected shape:

```
Dim sh As Shape, sPath As Shape
ActiveDocument.Unit = cdrInch
Set sPath = ActiveShape
Set sh = ActiveLayer.CreateArtisticText(1, 4, "Hello World")
sh.Text.FitTextToPath sPath
```

Fitting text to a shape

Paragraph text shapes can be flowed inside closed shapes to form non-rectangular frames. This is done by placing the `Text` object inside the `Shape` object using the member function `PlaceTextInside` of the `Shape` object. Given that a text shape – artistic or paragraph – is selected in CorelDRAW, the following code creates a 5×2-inch ellipse and places the selected text inside it:

```
Dim txt As Shape, sh As Shape
ActiveDocument.Unit = cdrInch
Set txt = ActiveShape
Set sh = ActiveLayer.CreateEllipse(0, 2, 5, 0)
sh.PlaceTextInside txt
```

Changing the properties of shapes

Now that you have created new shapes with VBA, you will want to modify those shapes by changing the size, position, rotation, and colors of the shapes.

Size

To get the width or height of a `Shape`, test its `SizeWidth` or `SizeHeight` properties:

```
Dim width As Double, height As Double
ActiveDocument.Unit = cdrMillimeter
width = ActiveShape.SizeWidth
height = ActiveShape.SizeHeight
```

The returned Double value depends on the setting of `ActiveDocument.Unit`, so if you need the size in a specific unit, set it first. The same applies for all of the size properties and methods in the object model.

To get the width and height in a single command, use the member function `GetSize`:

```
Dim width As Double, height As Double
ActiveDocument.Unit = cdrMillimeter
ActiveShape.GetSize width, height
```

To set the size of a `Shape`, set its `SizeWidth` or `SizeHeight` properties to the new values. The following code sets the size of the active shape to 50 × 70mm:

```
ActiveDocument.Unit = cdrMillimeter
ActiveShape.SizeWidth = 50
ActiveShape.SizeHeight = 70
```

Alternatively, use the `SetSize` method, which sets both in one call:

```
ActiveDocument.Unit = cdrMillimeter
ActiveShape.SetSize 50, 70
```

There is an additional method for setting the shape size, which is `SetSizeEx`. This method takes a center point in addition to the width and height – the resize operation will be done relative to this point, as opposed to using the shape's own center point. For example, the following code resizes the selection to 10 × 8 inches about the point (6, 5) in the document:

```
ActiveDocument.Unit = cdrInch
ActiveSelection.SetSizeEx 6, 5, 10, 8
```

The object `ActiveSelection` refers to a `Shape` object that contains all of the selected shapes in the document.

All of the preceding code refers to the object's size in terms of its vector curves and ignores the fact that any shapes with an outline may actually extend beyond the rectangle containing the curves. There is one method that can be used to get the size of the bounding box of the shape with the option of including the widths of any outlines. This method is `GetBoundingBox`:

```
Dim width As Double, height As Double
Dim posX As Double, posY As Double
ActiveDocument.Unit = cdrInch
ActiveDocument.ReferencePoint = cdrBottomLeft
ActiveShape.GetBoundingBox posX, posY, width, height, True
```

The method's main use is to get the shape's bounding box, including the position of its lower-left corner. The final parameter is a Boolean value that indicates whether to return the bounding box of the shape *including* its outline (`True`), or *not* including its outline (`False`). The method for setting the shape's bounding box does not include the necessary parameter for doing so in relation to its bounding box, although by using `GetBoundingBox` twice (once including the outline and a second time excluding the outline) it is possible to calculate the size and position of the bounding box of the vector, not including the outline:

```
Public Sub SetBoundingBoxEx(X As Double, Y As Double, _
                            Width As Double, Height As Double)
  Dim sh As Shape
  Dim nowX As Double, nowY As Double
  Dim nowWidth As Double, nowHeight As Double
  Dim nowXol As Double, nowYol As Double
  Dim nowWidthol As Double, nowHeightol As Double
  Dim newX As Double, newY As Double
  Dim newWidth As Double, newHeight As Double
  Dim ratioWidth As Double, ratioHeight As Double
  Set sh = ActiveSelection
  sh.GetBoundingBox nowX, nowY, nowWidth, nowHeight, False
  sh.GetBoundingBox nowXol, nowYol, nowWidthol, _
                                          nowHeightol, True
  ratioWidth = Width / nowWidthol
  ratioHeight = Height / nowHeightol
  newWidth = nowWidth * ratioWidth
  newHeight = nowHeight * ratioHeight
  newX = X + (nowX - nowXol)
  newY = Y + (nowY - nowYol)
  sh.SetBoundingBox newX, newY, newWidth, newHeight, _
                                          False, cdrBottomLeft
End Sub
```

Stretch or scale

As well as setting specific sizes, shapes can also be scaled by a proportional amount. The `Shape` object has two member functions `Stretch` and `StretchEx` that perform this operation. Both functions take a decimal value for horizontal and vertical stretching, where 1 is 100% (or no change). Zero is not allowed - a very small value must be used instead.

The following code stretches the selection to half its current height, but twice its width, about the midpoint of the bottom edge of its bounding box:

```
ActiveDocument.ReferencePoint = cdrBottomMiddle
ActiveSelection.Stretch 2, 0.5
```

The stretch can also be performed about any point on the page using the `StretchEx` member function. The following code performs the same stretch as above, but about the point (4, 5) on the page in inches:

```
ActiveDocument.Unit = cdrInch
ActiveSelection.StretchEx 4, 5, 2, 0.5
```

Both of the above functions have an optional Boolean parameter that, when `True`, stretches paragraph text characters by the given amount. When it is `False`, only the bounding box of the text is stretched and the text is reflowed within the box.

Position

The position of a `Shape` can be determined with the properties `PositionX` and `PositionY`, and with the methods `GetPosition` and `GetBoundingBox`. The position of a `Shape` can be set by setting the properties `PositionX` and `PositionY`, or using the methods `SetPosition`, `SetSizeEx`, and `SetBoundingBox`. See the previous section for `SetSizeEx`, `GetBoundingBox`, and `SetBoundingBox`.

The following code gets the position of the `ActiveSelection` shape relative to the current `ReferencePoint` property of `ActiveDocument`, which the code explicitly sets to the lower-left corner:

```
Dim posX As Double, posY As Double
ActiveDocument.ReferencePoint = cdrBottomLeft
ActiveSelection.GetPosition posX, posY
```

The above code returns the position of the reference point of the selection without accounting for the widths of any of the selected shapes' outlines. To account for the widths of the outlines, use the function `GetBoundingBox`, as described in the previous section.

The following code sets the position of the lower-right corner of each selected shape in the active document to (3, 2) in inches:

```
Dim sh As Shape
ActiveDocument.Unit = cdrInch
ActiveDocument.ReferencePoint = cdrBottomRight
For Each sh In ActiveSelection.Shapes
  sh.SetPosition 3, 2
Next sh
```

Rotate

Shapes can be rotated using the member functions `Rotate` and `RotateEx` of the `Shape` object.

The `Rotate` member function simply rotates the shape by the given angle (in degrees) about the shape's rotation center. The following code rotates the selection by 30° about its center of rotation:

```
ActiveSelection.Rotate 30
```

Positive rotation angles are always degrees counterclockwise.

To find the center of rotation, get the values of the shape's properties `RotationCenterX` and `RotationCenterY`. Changing the values of these properties moves the center of rotation for the next call to this function.

The function `RotateEx` takes additional parameters that specify the center of rotation. This is a quicker, simpler method than setting each of `RotationCenterX` and `RotationCenterY` and then calling `Rotate`. The following code rotates each of the selected shapes by 15° clockwise about each shape's lower-right corner:

```
Dim sh As Shape
ActiveDocument.ReferencePoint = cdrBottomRight
For Each sh In ActiveSelection.Shapes
  sh.RotateEx -15, sh.PositionX, sh.PositionY
Next sh
```

Skew

Shapes can be skewed using the member functions `Skew` and `SkewEx` of the `Shape` object. These two functions are very similar to the `Rotate` and `RotateEx` member functions, except that they take two angle parameters: the first is horizontal skew (positive values move the top edge to the left and the bottom edge to the right), and the second is vertical skew (positive values move the right-hand edge upwards and the left-hand edge downwards). The horizontal skew is applied *before* the vertical skew.

The following code skews the selection by 30° horizontally, and by 15° vertically:

```
ActiveSelection.Skew 30, 15
```

Skews of angles close to or greater than 90° are not allowed and will produce an error.

Color

Color can be applied to both the fill and the outline of an object, as well as to page backgrounds, lenses, and gradient fills.

You can copy one color to another using the method `CopyAssign`:

```
Dim sh As Shape
Set sh = ActiveShape
sh.Outline.Color.CopyAssign sh.Fill.UniformColor
```

You can get the color model of a color object by getting its `Type` property:

```
Dim colType As cdrColorType
colType = ActiveShape.Outline.Color.Type
```

When you have the type of the color, usually one of `cdrColorRGB`, `cdrColorCMYK`, or `cdrColorGray` (but not limited to those), you can get the components of the color, which are:

- `CMYKCyan`, `CMYKYellow`, `CMYKMagenta`, and `CMYKBlack` for CMYK color;
- `RGBRed`, `RGBGreen`, and `RGBBlue` for RGB color;
- and `Gray` for grayscale.

To convert a Color object's color to a different color model, use the member functions `ConvertToCMYK`, `ConvertToRGB`, `ConvertToGray`, and so on. The color is converted using the CorelDRAW color management settings. For example, the following code converts the fill to RGB:

```
ActiveShape.Fill.UniformColor.ConvertToRGB
```

To set a new color, use the methods `CMYKAssign`, `RGBAssign`, `GrayAssign`, and so on. These methods take different numbers of parameters depending on how many color components are required for that color model. For example, the following code assigns a deep-blue RGB color to the active shape's outline:

```
ActiveShape.Outline.Color.RGBAssign 0, 0, 102
```

Each component's value range depends on the color model.

Some functions in the CorelDRAW Object Model take a `Color` object as a parameter. To create a new `Color` object, use the VBA keyword `New`, as in the following example:

```
Dim col As New Color
col.RGBAssign 0, 255, 102
ActiveShape.Outline.Color.CopyAssign col
```

The color 'none' does not exist. To set the color 'none' to an outline or fill, you must actually set the outline- or fill-type to 'none'.

Outline

Every Shape object has a property Outline, which refers to an Outline object. Outline objects have the properties Type, Width, Color, and Style, as well as many other properties.

Outline type

The property Type sets whether the shape has an outline: if it is set to cdrOutline then the shape will have an outline, and if it is set to cdrNoOutline, the shape will not have an outline. Setting this property to cdrOutline for a shape that does not have an outline will give the shape the document's default outline. Setting this property to cdrNoOutline will remove the outline from the shape. This is the same as setting Width to zero.

Outline width

The property Width sets the width of the outline in the units of the document; to set the width in points, for example, first set the document's Unit property to cdrPoint. For example, the following code sets the outline of the selected shapes to one millimeter:

```
ActiveDocument.Unit = cdrMillimeter
ActiveSelection.Outline.Width = 1
```

Any shapes whose Type property is cdrNoOutline will have that property changed to cdrOutline when the outline color or width is set.

Outline color

The property Color is a color object that defines the color of the outline. For more information about using Color objects, see page 68. Setting the color of the outline automatically sets the Type property of the outline to cdrOutline and gives the outline the default width:

```
ActiveSelection.Outline.Color.GrayAssign 0 ' Set to black
```

Outline style

The Style property of Outline sets the dash properties of the outline. It has four properties, of which only three can be set:

- DashCount sets the number of dashes in the style.
- DashLength is an array of values that gives the length of each dash – this array is the same size as the value of DashCount.
- GapLength is an array of values that gives the length of each gap following each dash – as for DashLength, this array is the same size as the value of DashCount.
- Index is a read-only property that gives the index of the outline style in the document's OutlineStyles collection, which is presented to the user in the Outline dialog box.

The values in the arrays DashLength and DashGap are drawn as multiples of the *width* of the line; therefore, if DashLength(1) is 5 and the line is 0.2 inches in width, the dash's length will be 1 inch; if the line's width is changed to 0.1 inches, the dash's length will become 0.5 inches.

To use one of the application's outline styles, you must reference the style from the OutlineStyles collection by giving an index of the style you want to use. The problem with this is that each user's installation of CorelDRAW can have a different collection of outline styles, if the user has modified them, so it is not guaranteed that a given indexed style will be the same for all users. To use one of the styles, assign it to the outline:

```
ActiveShape.Outline.Style = Application.OutlineStyles(3)
```

`OutlineStyles.Item(0)` is always a solid line; to set an outline to solid, set it equal to this style.

Other properties

`Outline` objects have many other properties, including:

- `StartArrow`, `EndArrow` – sets the arrowhead to use on each end of an open `Curve`
- `LineCaps`, `LineJoin` – sets the type of line caps (butt, round, or square) and joins (bevel, mitre, or round);
- `NibAngle`, `NibStretch` – sets the shape of the nib used to draw the line
- `BehindFill`, `ScaleWithShape` – draws the outline behind the fill, and scales the outline with the shape

Outline objects also have two methods:

- `ConvertToObject` – converts the outline to an object;
- `SetProperties` – a single method that can be used to set most of the outline's properties in a single call, which is much more efficient and quicker than setting each property individually when setting the properties of hundreds or thousands of outlines at the same time.

Fill

There are many types of fills in CorelDRAW, including uniform fills, fountain fills, PostScript® fills, pattern fills, and texture fills. Each type needs to be handled differently. Only uniform and fountain fills are discussed here.

Fill types

The read-only `Type` property of a `Fill` object gives the type of the fill, in other words, whether it is a uniform, fountain, PostScript, pattern, or texture fill, or whether there is no fill. The following code gets the fill type:

```
Dim fillType As cdrFillType
fillType = ActiveShape.Fill.Type
```

The fill type cannot be set with this property. The fill type is set when the fill is created and applied.

To remove any type of fill, use the member function `ApplyNoFill` of the `Fill` object.

Uniform fills

Uniform fills consist of a single, solid color. This color is represented by the fill's property `UniformColor`, which is a `Color` object. For more information on using `Color` objects, see page 68.

To apply a uniform fill to a shape, use the `ApplyUniformFill` member function of the shape's `Fill` property:

```
ActiveShape.Fill.ApplyUniformFill CreateRGBColor(255, 0, 0)
```

Unless you are copying the color from an existing `Color` object, you have to create a new `Color` object first and then apply the color to the shape's `Fill` property.

To change the color of a uniform fill, change the `UniformColor` property of the `Fill` object:

```
ActiveShape.Fill.UniformColor.RGBAssign 0, 0, 102
```

Uniform fills have a `Type` property of `cdrUniformFill`.

Fountain fills

Fountain fills are defined by the property `Fountain`, which is a `FountainFill` object. `FountainFill` objects have many properties, including type, angle, and blend type. The most important property, though, is the collection of colors that comprise the fountain.

To create a new fountain fill, use the `ApplyFountainFill` member function of the `Fill` object. This creates a simple two-color fountain with basic properties. The following code creates a simple linear fountain fill, from red to yellow, at 30° to the horizontal:

```
Dim startCol As New Color, endCol As New Color
startCol.RGBAssign 255, 0, 0
endCol.RGBAssign 255, 255, 0
ActiveShape.Fill.ApplyFountainFill startCol, endCol, _
                                   cdrLinearFountainFill, 30
```

All of the parameters to the `ApplyFountainFill` member function are optional and not all have been used in the preceding code. It is possible to set the midpoint, the number of steps, and the color-blend type in the same function call.

After the fountain fill has been created, you can add more colors to the blend by adding new `FountainColor` items to the `Colors` collection, which is a property of `Fill.Fountain`. For example, the following code adds a yellow color to the `Colors` collection at a position about a third of the way from the red:

```
Dim fFill As FountainFill
Set fFill = ActiveShape.Fill.Fountain
fFill.Colors.Add CreateRGBColor(0, 102, 0), 33
```

Individual colors in the fountain can be moved using the `FountainColor.Move` member function. The following code moves the yellow color from the previous code to a position that is 60% from the red towards the green:

```
ActiveShape.Fill.Fountain.Colors(1).Move 60
```

Color positions are integer values in percent, where 0% is the start-color position and 100% is the end-color position.

The number of colors reported by the `Count` property of the `Colors` collection is the number of colors *between* the start and end colors. So for the fountain fill created above, the value of the `Count` property is `1`. The first color in the `Colors` collection is item `0` and is the start color; it cannot be moved, but its color can be changed. The last color in the `Colors` collection is item `(Count + 1)` and is the end color; it also cannot be moved, but its color can be changed. The following code changes the color of the *end* color from green to blue:

```
Dim cols As FountainColors
Set cols = ActiveShape.Fill.Fountain.Colors
cols(cols.Count + 1).Color.RGBAssign 0, 0, 102
```

There are additional properties that define edge padding, center position (for conical, radial, and rectangular fountains), and the number of steps used to draw the fill, which are not described here.

Fountain fills have a `Type` property value of `cdrFountainFill`.

Duplicating shapes

To duplicate shapes, use the `Duplicate` member function of the `Shape` object:

```
ActiveSelection.Duplicate
```

This function takes two option values that set the offset for the duplicate from the original. The following code positions the duplicate two inches to the right and one inch above the original:

```
ActiveDocument.Unit = cdrInch
ActiveSelection.Duplicate 2, 1
```

Applying effects

Effects can be applied directly to shapes using the appropriate `Create...` member function of the `Shape` object.

Creating blends

The `CreateBlend` member function of the `Shape` object creates a blend between the current `Shape` and the `Shape` in the parameter list. The following code creates a ten-step blend:

```
Dim sh As Shapes, eff As Effect
Set sh = ActiveSelection.Shapes
Set eff = sh(1).CreateBlend(sh(2), 10)
```

The number of shapes in the blend is 12 – the start and end shapes, plus the ten steps created.

There are several optional parameters to the `CreateBlend` method, which are not shown, that control the acceleration of the blend, as well as setting the path along which the blend is created.

The `Effect` object returned by the above code is a reference to the blend. By setting the properties of the `Blend` property of the `Effect` object, the blend can be fine-tuned. The `Effect` object itself has a member function `Separate` for separating the `Blend` effect, as well as `Clear` for removing it.

Creating contours

Contours can be created with the `CreateContour` member function of the `Shape` object. The following code creates a three-step contour at a five millimeter spacing:

```
Dim eff As Effect
ActiveDocument.Unit = cdrMillimeter
Set eff = ActiveShape.CreateContour(cdrContourOutside, 5, 3)
```

There are several optional parameters of the `CreateContour` method, which are not shown, that control the colors and acceleration of the contour shapes.

Creating other effects

The `Shape` object has several other functions for creating effects: `CreateDropShadow`, `CreateEnvelope`, `CreateExtrude`, `CreateLens`, `CreatePerspective`, `CreatePushPullDistortion`, `CreateTwisterDistortion`, and `CreateZipperDistortion`.

Shortcuts to frequently used objects

CorelDRAW provides several 'shortcuts' to frequently accessed objects. These shortcuts are easier to use than their longhand versions simply because they require less typing. Also, since the compiler does not have to determine every object in a long dot-separated reference, they may be slightly quicker at run-time.

The following table gives the shortcuts, their long forms, and a description of each:

Shortcut	Long form	Description
`ActiveWindow`	`ActiveDocument.ActiveWindow`	Gets the active window, which the active document is displayed in
`ActiveView`	`ActiveWindow.ActiveView`	Gets the active view of the document, which is the representation of the document within the ActiveWindow
`ActivePage`	`ActiveDocument.ActivePage`	Gets the current page of the active document
`ActiveLayer`	`ActivePage.ActiveLayer`	Gets the current layer being edited in the current page of the document
`ActiveSelection`	`ActiveDocument.Selection`	Gets the selection in the active document, in other words, the shape that represents the shapes that are selected
`ActiveSelectionRange`	`ActiveDocument.SelectionRange`	Gets the selection range in the active document
`ActiveShape`	`ActiveDocument.Selection.Shapes(1)`	Gets the last-selected shape in the active document

Each of the shortcuts can be used on its own as a property of the CorelDRAW 11 `Application` object. Several of them can also be used as members of a given `Document` object: `ActiveLayer`, `ActivePage`, `ActiveShape`, and `ActiveWindow`. The `Document` object also has the specific properties `Selection` and `SelectionRange` for getting either for a specific document, whether that document is active or not, rather than using `ActiveSelection` or `ActiveSelectionRange`.

ActiveSelection and ActiveSelectionRange

To get the selection, in other words, to access the shapes that are selected in the document, you have a choice: get a reference to a document's `Selection` object or get a copy of the document's `SelectionRange` property. The difference between these two selection-type objects is that `Selection` gets updated whenever the selection changes in the document, and `SelectionRange` is a copy of the selection state at the time and does not get updated.

ActiveSelection

The shortcut for `ActiveDocument.Selection` is `ActiveSelection`. This returns a `Shape` object, which is a reference to the document's `Selection` object. Because this is a reference, whenever the selection in the document is changed, either by the user or programmatically, the shapes that this `Selection` object contains will reflect the change.

```
Dim sel As Shape
Set sel = ActiveDocument.Selection
```

ActiveSelection returns a Shape object of subtype cdrSelectionShape. This Shape subtype has a member collection called Shapes, which is a collection of all of the selected shapes in the document. The items in the ActiveSelection.Shapes collection can be accessed in the normal manner:

```
Dim sh As Shape, shs As Shapes
Set shs = ActiveSelection.Shapes
For Each sh In shs
  sh.Rotate 15 'Rotate each shape thru 15° counterclockwise
Next sh
```

You cannot directly remember and recall the objects that are selected using ActiveSelection. In order to copy the references to the selected objects, you would have to populate an array of Shape, a collection of type Shapes, or use a ShapeRange.

ActiveSelectionRange

ActiveSelectionRange is the shortcut for ActiveDocument.SelectionRange. This is a property of the document of type ShapeRange:

```
Dim selRange As ShapeRange
Set selRange = ActiveDocument.SelectionRange
```

The ShapeRange object returned by ActiveSelectionRange contains a collection of references to the shapes that were selected at the moment when the property was read. Since these references are to the shapes themselves, and not to the selection, if you change the selection, the ShapeRange is not updated.

The shapes referenced by ActiveSelectionRange are held in a ShapeRange object. This collection can be parsed in the usual way:

```
Dim sh As Shape, shRange As ShapeRange
Set shRange = ActiveSelectionRange
For Each sh In shRange
  sh.Skew 15 ' Rotate each shape thru 15° counterclockwise
Next sh
```

Since the SelectionRange is a static copy of references to the objects selected at the time, it is an ideal way of remembering and recalling the selection. Also, shapes can be added to and removed from a ShapeRange object, so it is an ideal way of manipulating the selection.

Comparison of ActiveSelection and ActiveSelectionRange

To get the selection, you have a choice: get a reference to a document's Selection object (of type Shape), which gets updated if the selection changes, or get a reference to a new ShapeRange object, which is like a collection of references to the objects in the selection at that moment in time and does not get updated.

The big advantage of ActiveSelectionRange over ActiveSelection is that, even when the selection changes, the ShapeRange content does not change; whereas the ActiveSelection Shapes collection does change, although ActiveSelection is generally easier to use. Also, ShapeRange can be duplicated, shapes can be added and removed, transformations can be applied, all without the ShapeRange being active at the time.

The individual shapes in a ShapeRange can be selected by calling the range's CreateSelection member function:

```
Dim shRange As ShapeRange
Set shRange = ActiveSelectionRange
shRange.Remove 1
shRange.Remove 2
shRange.CreateSelection
```

The above code creates a `ShapeRange` from the selection, then removes the first and second (actually the third shape of the original range, since it becomes the second shape when you remove the first) shapes from the range, and then creates a new selection from those shapes left in the range (in other words, all the shapes of the original selection, minus the two shapes that were removed from the collection).

If you want to add a `ShapeRange` to the current selection rather than replace the selection, use the `AddToSelection` member function of `ShapeRange`.

Parsing selected shapes

Parsing through the selected shapes is done in the same way for both selections:

```
Dim shs As Shapes, sh As Shape
Set shs = ActiveSelection.Shapes
For Each sh In shs
  ' Do something with the shape, sh
Next sh
```

And selection ranges:

```
Dim sRange As ShapeRange, sh As Shape
Set sRange = ActiveSelectionRange
For Each sh In sRange
  ' Do something with the shape, sh
Next sh
```

However, selection ranges have the advantage that even if the selection subsequently changes, the range is not updated and so the 'memory' of the selection is not lost. However, getting a reference to the `ActiveSelection` does not create a copy of the references to the shapes in the selection but a reference to the intrinsic `ActiveSelection` object. This means that if the selection changes, all references to the `ActiveSelection` are also updated, and so the 'memory' of the selection is lost.

Order of selected shapes in a collection

The order of the `Shape` objects in both the `ActiveSelection.Shapes` and `ActiveSelectionRange` collections is in the reverse order of the order that the shapes were selected by the user. So, the first shape in both collections is the last shape that the user selected, and the last shape in both collections is the first shape that the user selected. This property of these collections is useful for macros that need to know which shape was selected first or last.

Document operations

This section describes how to do various document-related operations from VBA, including opening and closing documents, printing documents, and importing into and exporting from documents.

Opening and closing documents

To open a document, use the `OpenDocument` member function of the global `Application` object:

```
Dim doc As Document
Set doc = OpenDocument("C:\graphic1.cdr")
```

To close a document, use the `Close` member function of the `Document` object itself:

```
doc.Close
```

Printing

Printing documents is straightforward with VBA: almost all of the settings that are available in the CorelDRAW Print dialog box are available as properties of the `Document` object's `PrintSettings` member. And then, when the properties are set, to actually print the document is simply a case of calling the document's PrintOut member function. For example, the following code prints three copies of pages one, three, and four, to a level-3 PostScript printer:

```
With ActiveDocument.PrintSettings
  .Copies = 3
  .PrintRange = prnPageRange
  .PageRange = "1, 3-4"
  .Options.PrintJobInfo = True
  With .PostScript
    .DownloadType1 = True
    .Level = prnPSLevel3
  End With
End With
ActiveDocument.PrintOut
```

For each of the pages of the Print dialog box in CorelDRAW, there is a corresponding object in the object model. The following table gives the objects that correspond to each page in the Print dialog:

Options page in dialog box	Member of `PrintSettings` object
General	Properties of `PrintSettings`
Layout	Not supported by object model
Separations	`Separations` and `Trapping`
Prepress	`Prepress`
PostScript	`PostScript`
Misc	`Options`

Each object contains all of the properties from the corresponding page of the Print dialog box. The only print options that cannot be set in VBA are the layout options. However, if it is necessary, it is possible to launch the Print dialog box with the `PrintSettings` object's `ShowDialog` member function.

To reset the print settings, call the `PrintSettings` object's `Reset` member function:

```
ActiveDocument.PrintSettings.Reset
```

Your code can also access any printing profiles that have been saved by the user from the Print dialog box using the `PrintSettings` object's `Load` member function:

```
ActiveDocument.PrintSettings.Load "C:\CorelDRAW Defaults.prs"
```

This function takes a full path to the printing profile, so you have to know that path beforehand. It is also possible to save printing profiles using the `Save` member function.

To just print the selected shapes, set `Document.PrintSettings.PrintRange` to `prnSelection`. To select a specific printer, set `Document.PrintSettings.Printer` to refer to the appropriate printer in the collection `Application.Printers`.

Importing and exporting files

Files of all supported formats can be imported into and exported from CorelDRAW.

Importing files

Files are imported onto layers, therefore the `Import` and `ImportEx` functions are members of the `Layer` object. The following code imports a file onto the active layer:

```
ActiveLayer.Import "C:\logotype.gif"
```

The file is imported onto the active layer at the center of the page. Any shapes that were previously selected are deselected, and the contents of the imported file are selected. To reposition or resize the imported shapes, get the document's selection:

```
ActiveDocument.Unit = cdrInch
ActiveSelection.SetSize 3, 2
```

Some file formats – notably EPS and PDF – can be imported with one of two filters. In the case of EPS, it is possible to import the EPS file as a placeable object that will be printed, but cannot be modified; it is also possible to interpret the PS part of the EPS file, importing the actual artwork from within the EPS, rather than just the low-resolution TIFF or WMF placeable header, which can be subsequently edited by the user. To specify which filter to use, include the optional parameter `Filter`:

```
ActiveLayer.Import "C:\map.eps", cdrPSInterpreted
```

The filter can also be set to preserve pages and layers by setting the third parameter to `True`:

```
ActiveLayer.Import "C:\map.eps", cdrPSInterpreted, True
```

The `ImportEx` function provides much better control over the import filter through its optional use of a `StructImportOptions` object. The following code imports the file as a linked file:

```
Dim iFilt As ImportFilter
Dim importProps As New StructImportOptions
importProps.LinkBitmapExternally = True
Set iFilt = ActiveLayer.ImportEx("C:\world-map.tiff", _
                                 cdrAutoSense, importProps)
iFilt.Finish
```

Exporting files

Files are exported from the `Document` not `Layer` objects, since the range of shapes exported often extends over multiple layers, and even over multiple pages. The `Document` object has three export functions: `Export`, `ExportBitmap`, and `ExportEx`. All three methods can be used to export to both bitmap and vector formats.

A simple export of a page only requires a filename and a filter type. The following code exports the current page to a TIFF bitmap file:

```
ActiveDocument.Export "C:\ThisPage.tif", cdrTIFF
```

However, this gives little control over the output of the image. More control is obtained by including a `StructExportOptions` object, as in the following code:

```
Dim expOpts As New StructExportOptions
expOpts.ImageType = cdrCMYKColorImage
expOpts.AntiAliasingType = cdrNormalAntiAliasing
expOpts.ResolutionX = 72
expOpts.ResolutionY = 72
expOpts.SizeX = 210
expOpts.SizeY = 297
ActiveDocument.Export "C:\ThisPage.tif", cdrTIFF, _
                                    cdrCurrentPage, expOpts
```

A `StructPaletteOptions` object can also be included in the function call for palette-based image formats, which gives the settings for auto-generating the palette.

The function `ExportEx` is the same as `Export`, except that it can pop up the filter's dialog box, retrieve the settings, and then export the file:

```
Dim eFilt As ExportFilter
Set eFilt = ActiveDocument.ExportEx("C:\ThisPage.eps", cdrEPS)
If eFilt.HasDialog = True Then
  If eFilt.ShowDialog = True Then
      eFilt.Finish
    End If
Else
  eFilt.Finish
End If
```

The third function, `ExportBitmap`, is similar to `ExportEx` in that it returns an `ExportFilter` object that can be used to show the Export dialog box to the user. However, this function takes the individual members of the `StructExportOptions` object as parameters, thereby simplifying using the function:

```
Dim eFilt As ExportFilter
Set eFilt = ActiveDocument.ExportBitmap("C:\Selection.tif", _
              cdrTIFF, cdrSelection, cdrCMYKColorImage, _
              210, 297, 72, 72, cdrNormalAntiAliasing, _
              False, True, False, cdrCompressionLZW)
eFilt.Finish
```

Publishing to PDF

Publishing to PDF is a two-stage process. The first part is to set the PDF settings. If the user has already set the settings in CorelDRAW for the document, or chooses to use the default settings, this stage does not need to be done. The second part is to export the file.

To set the PDF settings, modify the properties of the `Document` member `PDFSettings`. This member is an object of type `PDFVBASettings` and has properties for all the PDF settings that can be set in the CorelDRAW PublishToPDF dialog box. The following code exports pages 2, 3, and 5 to a PDF file called **MyPDF.pdf**:

```
Dim doc As Document
Set doc = ActiveDocument
With doc.PDFSettings
  .Author = "Corel Corporation"
  .Bookmarks = True
  .ColorMode = pdfRGB
  .ComplexFillsAsBitmaps = False
  .CompressText = True
  .CropMarks = False
  .DownsampleGray = True
  .EmbedBaseFonts = True
  .EmbedFonts = True
  .FileInformation = True
  .Hyperlinks = True
  .Keywords = "Test, Example, Corel, CorelDRAW, PublishToPDF"
  .Linearize = True
  .PageRange = "2-3, 5"
  .pdfVersion = pdfVersion13
  .PublishRange = pdfPageRange
  .TrueTypeToType1 = True
End With
doc.PublishToPDF "C:\MyPDF.pdf"
```

You can give more control to the user by popping up the PDF Settings dialog box with the following code:

```
Dim doc As Document
Set doc = ActiveDocument
If doc.PDFSettings.ShowDialog = True Then
  doc.PublishToPDF "C:\MyPDF.pdf"
End If
```

PDF settings profiles can be saved and loaded using the `Save` and `Load` member functions of the `PDFSettings` object.

Windows and views

In CorelDRAW the user can have several windows onto the same document. For a large document, one view might be zoomed in to the upper-right corner, and another zoomed in to the lower-right corner. The individual windows can be zoomed and panned independently, although turning the page in one turns the page in them all.

The user can also save individual zoom settings, including which page, using the View Manager. Selecting a view re-zooms CorelDRAW to that location on that page.

In VBA, the main differences between the `Window` object and the `View` object is that the `Window` object provides access to the windows that contain each `View` of the document. The `Window` is the chrome, title bar, and so on; the `View` is the rectangular view of the document just inside the chrome.

Windows

Each `Document` object has a collection `Windows` that gives all of the windows onto the document. To switch between windows, use a window's `Activate` method:

```
ActiveDocument.Windows(2).Activate
```

The next and previous windows for the current document are referenced in a window's `Next` and `Previous` properties:

```
ActiveWindow.Next.Activate
```

To create a new window, call the `NewWindow` member function of a `Window` object:

```
ActiveWindow.NewWindow
```

To close a window, call its `Close` member function. If it is the document's last window, the document will be closed as well:

```
ActiveWindow.Close
```

Views and ActiveView

`Views` and `ActiveViews` are, literally, views onto the document. The difference between an `ActiveView` and a `View` is that each `Window` object has just one `ActiveView`, and that is the current view onto the document; whereas a `View` is just the recorded memory of one particular `ActiveView`, such that re-activating that `View` will zoom and pan the `Window` object's `ActiveView` to the location and zoom setting that is stored in the properties of the `View` object.

Each `Window` object has an `ActiveView` member. Each `Document` object has a collection of `View` objects in its `Views` member.

The only way to access an `ActiveView` is from a `Window` object's `ActiveView` property.

Zooming with the ActiveView

To zoom in to a set amount, set the `Zoom` property of the `ActiveView`. The zoom is set as a double value in percent. For example, the following code sets the zoom to 200%:

```
ActiveWindow.ActiveView.Zoom = 200
```

You can also zoom the `ActiveView` with various member functions: `ToFitAllObjects`, `ToFitArea`, `ToFitPage`, `ToFitPageHeight`, `ToFitPageWidth`, `ToFitSelection`, `ToFitShape`, `ToFitShapeRange`, and `SetActualSize`.

Panning with the ActiveView

To pan the `ActiveView`, move its origin. This can easily be done by modifying the `OriginX` and `OriginY` properties of the `ActiveView`. The following code pans the document five inches left and three inches upwards:

```
Dim av As ActiveView
ActiveDocument.Unit = cdrInch
Set av = ActiveWindow.ActiveView
av.OriginX = av.OriginX - 5
av.OriginY = av.OriginY + 3
```

You can also use the member function `SetViewPoint`:

```
Dim av As ActiveView
ActiveDocument.Unit = cdrInch
Set av = ActiveWindow.ActiveView
av.SetViewPoint av.OriginX - 5, av.OriginY + 3
```

Working with views

You can create a new `View` object and add it to the `Document`'s `Views` collection from the collection itself. The following code adds the current `ActiveView` settings to the `Views` collection:

```
ActiveDocument.Views.AddActiveView "New View"
```

You can also create a new view with specific settings using the `CreateView` member function of the `Document` object. The following code creates a new `View` whose view point is at the position (3, 4) in inches, the zoom is 95%, and it is on page 6:

```
ActiveDocument.Unit = cdrInch
ActiveDocument.CreateView "New View 2", 3, 4, 95, 6
```

To restore a view, call that view's `Activate` member function. The document's active window will be set to that view:

```
ActiveDocument.Views("New View").Activate
```

CorelDRAW events

CorelDRAW raises various events while it is running, to which VBA can respond through the use of 'event handlers'. Event handlers are Subs with specific, defined names, within a ThisDocument module – every VBA Project (GMS) file has one ThisDocument module, within its CorelDRAW 11 Objects subfolder within the project.

The `GlobalDocument` object is a virtual object that represents each and all open CorelDRAW documents. The `GlobalDocument` has several events that are raised at the time of any event, such as opening, printing, saving, or closing a CorelDRAW document – the range of events is actually greater than this, since each one has a 'before' and 'after' event.

Responding to events

To respond to an event, you must provide an event handler. An event handler is simply a Sub in any ThisDocument module with a specific name – CorelDRAW only looks for known event-handler names in ThisDocument modules. However, CorelDRAW does check all ThisDocument modules in all installed projects, so you can create an event-driven solution and distribute it as a single Project (GMS) file just as you would provide any other form of solution. Each project can only have one ThisDocument module, which is created automatically when the project is first created.

For example, a solution may need to respond to a document closing by logging the closure in a file as part of a workflow-management and recording system. To respond to a document opening, you must respond to the GlobalDocument's `OpenDocument` event. To do this, open a ThisDocument module for editing in the VB Editor. In the Object list box at the top of the code window, select GlobalDocument and in the Procedure list box, select `DocumentOpen` – the VB Editor creates a new, empty Sub called `GlobalDocument_DocumentOpen()`, or, if it exists already, places the cursor into it. Now all you need to do is to write some code that adds the name of the opened file to the log. The tidiest way to do this is to create a Public Sub in a *different* module that actually does the work, and the event handler simply calls that Sub when it has to – this keeps the size of the ThisDocument module as small as possible, so the run-time interpreter does not have to spend as much time parsing all the ThisDocument modules each time an event is raised:

```
Private Sub GlobalDocument_OpenDocument( _
                                ByVal Document As IDrawDocument)
    Call LogFileOpen(Document.FullFileName)
End Sub
```

The `IDrawDocument` type in the above code is the internal name for a CorelDRAW `Document` object. This is used because the GlobalDocument is not directly a member of the CorelDRAW object model. However, VBA will treat `IDrawDocument` exactly as a `Document` object.

The full list of CorelDRAW 11 events is given in the following table:

Event	Description
`Start` `Quit`	These two events are raised whenever the user starts CorelDRAW or quits from it.
`NewDocument` `OpenDocument`	These `GlobalDocument` events are raised whenever a document is created or opened; both events pass a reference to the document.
`BeforePrint` `AfterPrint`	These `Document` events are raised before the Print dialog box is displayed and after the document is printed; it is not possible to cancel a user-initiated print job from the `BeforePrint` event handler.

`BeforeSave`
`AfterSave`
`BeforeSaveAs`
`AfterSaveAs`
	These `Document` events are raised before the document is saved or before the SaveAs dialog box is displayed, and after the document is saved; the file name of the document being saved is passed as a parameter to `AfterSave` and `AfterSaveAs`; it is not possible to cancel a Save or SaveAs from the `BeforeSave` or `BeforeSaveAs` event handlers.

`BeforeClose`	This `Document` event is raised before the document is closed; however, there is no mechanism for discovering which document is about to be closed.

`PageCreated`
`PageSelected`
`PageDeleted`
	These `Document` events are raised whenever a `Page` is created, selected, or deleted; in the case of `PageDeleted`, this event is immediately followed by a `PageSelected` event if the layer that was deleted was the active page; a reference to the `Page` object is passed as a parameter to each event handler.

`LayerCreated`
`LayerSelected`
`LayerDeleted`
	These `Document` events are raised whenever a `Layer` is created, selected, or deleted; in the case of `LayerDeleted`, this event is immediately followed by a `LayerSelected` event if the layer that was deleted was the active layer; a reference to the `Layer` object is passed as a parameter to each event handler.

`ShapeCreated`
`ShapeSelected`
`ShapeDeleted`
	These `Document` events are raised whenever a `Shape` is created, selected, or deleted; a reference to the `Shape` object is passed as a parameter to each event handler

`SelectionChanged`	This `Document` event is raised whenever the selection changes; it may also be accompanied by a `ShapeSelected` event, if a `Shape` was added to the `Selection`.

Any event handlers for frequent events, such as `Shape`-related events, should be as efficient as possible, otherwise CorelDRAW will run very slowly because VBA will have to run the handler so often.

Creating user interfaces for macros 7

An important part of many VBA solutions is the user interface. A well-designed user interface will make the solution so easy to use – or so powerful – that the user will not think twice about using your macros.

Most user interfaces for complex solutions will be based on a dialog box or form of some description. Some simpler user interfaces can be created using toolbars and buttons. Other user interfaces rely on getting a click or drag from the user. And providing the user with some sort of help always makes a solution easier to deploy and support.

This chapter describes all of these aspects of user interfaces.

Working with dialog boxes

There are two forms of dialog boxes - modal and modeless:

- Modal dialog boxes must be acted upon before continuing with the rest of the macro - the application is locked until the dialog box is dismissed, either by submitting it, or by cancelling it;
- Modeless dialog boxes do not lock the application, and it can be kept open while the user continues working in CorelDRAW - although they are not Docker windows, they do behave like Docker windows in that they are visible without locking the application.

Both forms of dialog boxes have their uses when creating solutions and exactly which type you use depends on what you are trying to achieve. For example, if you are creating a solution that enables an effect or action to be applied to one or more shapes and the user may want to apply the same effect or action to a different selection of shapes subsequently, then the modeless dialog box may be better. The user then only has to 'create' the effect in the dialog box once and then apply it many times.

On the other hand, if you are creating a solution that is a one-shot, end-to-end solution, such as a replacement Print or Save dialog box, then a modal dialog box would be more appropriate: the user must enter a filename, or set the number of copies, before continuing, and the user is unlikely to want to do it repeatedly. Opening the dialog box again will be less convenient than always having to manually dismiss the dialog box.

Creating modal or modeless dialog boxes

All dialog boxes are either built-in dialog boxes, or instances of a form that you have designed with the Forms Editor. Built-in dialog boxes that you can control with VBA are almost always modal. However, custom dialog boxes can be either modal or modeless, and this is determined by the optional Modal parameter of the form's Show method. For example, the form frmFooForm can be displayed with the following code:

```
frmFooForm.Show
```

By default, the optional parameter `Modal` has the value `vbModal` (or `1`), which causes the above form to be a modal dialog box. By setting this parameter to `vbModeless` (or `0`), the form will be modeless, as in the following example:

```
frmFooForm.Show vbModeless
```

To open a dialog box from a macro that is available from within CorelDRAW itself, you must create a public sub within a VBA module – if the sub exists within a form's code, or within a class module, it will not be available from within CorelDRAW. The sub cannot take any parameters. For example, the following sub would launch the frmFooForm form as a modeless form:

```
Public Sub showFooForm()
  frmFooForm.Show vbModeless
End Sub
```

Common dialog box features

Modal and modeless dialog boxes have some features in common and other features that are more appropriate for one method over the other.

Modal dialog common features

Modal dialog boxes usually have the following features:

- an OK button (the default button), which performs the dialog box's ultimate action and then hides the dialog box;
- a Cancel button, which dismisses the dialog box without performing the dialog box's action; the Close button in the upper-right corner of the dialog box also dismisses the dialog box;
- Some dialog boxes have an Apply button that performs the dialog box's action without making it permanent - subsequently cancelling the dialog box undoes the action;
- If the dialog box is a wizard-style dialog box, it should have a Next and a Previous button, as well as a Cancel button. On the last page of the wizard, the Next button should become the Finish button to indicate that the final page has been reached and on the first page the Previous button should be disabled (its Enabled property set to False).

Modeless dialog box common features

Modeless dialog boxes usually have the following features:

- an Apply or Create button, or any other title that describes the dialog box's action; this button should be the default
- a Close button - the user is not cancelling the dialog box, they are closing it after having applied its action

Features common to all dialog boxes

All dialog boxes should have the following features:

- Controls may have a `ControlTipText` string – this tells the user what the control does when the user hovers the mouse over it.
- The form should have a meaningful title.
- The form should have an obvious method to *cancel* or *close* itself.
- The form should be either obvious in the way it is laid out, or it should have a Help button that activates some help.

Working with toolbars and buttons

Toolbars are the most persistently visible parts of the user interface for any VBA solution, since they are often always visible. Toolbars are very useful, because the graphical icons can be very memorable, yet only occupy a small area. Also, buttons can have meaningful titles that are displayed as part of the face. And buttons can also have helpful tooltips that pop up when the mouse is passed over the buttons.

Creating toolbars

When creating toolbars, you should be organized: it is better to have lots of small toolbars with a few related buttons than one big toolbar containing all of the buttons for all of your macros. By breaking your buttons into small groups, it is much easier later to distribute these groups with the projects that they work with.

To create a new Toolbar in CorelDRAW

1 Click **Tools** ▸ **Options**.

2 Click **Workspace** ▸ **Customization** ▸ **Command Bars**.

3 Click **New**.

4 Type a new name for the toolbar.

5 Enable the check box next to the toolbar's name.

Next you will add some buttons to the toolbar.

Creating new buttons

To add new buttons to a toolbar

1 Click **Workspace** ▸ **Customization** ▸ **Commands**.

2 Choose Macros from the Commands list box. The list below now displays the fully qualified names of all of the public, parameter-free subs from all of the installed project (GMS) files.

3 Drag a macro from the list and drop it on the toolbar. It will appear on the toolbar with the default macro icon.

If the names of the macros are too long to fit in the list box, select a macro and review its name in the edit boxes to the right of the list.

Adding a caption and a tooltip to macros

Each command in the macros list can have both a caption and a tooltip. The caption is displayed whenever the command is used on a menu and can be made visible as part of the button face. The tooltip only appears when the pointer is over the menu item or button.

To change the default caption for a macro

1 Click **Workspace** ▸ **Customization** ▸ **Commands**.

2 Choose **Macros** from the **Commands** list box. The list below now displays the fully qualified names of all of the public, parameter-free subs from all of the installed project (GMS) files.

3 Choose a macro from the **Command** list.

4 Click the **Appearance** tab.

5 Type a string in the **Caption** box.

To associate an accelerator key with a command, which can be activated in combination with the Alt key, place an ampersand (&) in front of the letter in the caption that will be the accelerator character. This will display as an underline under the character in the caption. This accelerator key only applies to commands on menus.

To change the default tooltip

1 Click **Workspace** ▸ **Customization** ▸ **Commands**.

2 Choose **Macros** from the **Commands** list box. The list below now displays the fully qualified names of all of the public, parameter-free subs from all of the installed project (GMS) files.

3 Choose a macro from the **Command** list.

4 Click the **General** tab.

5 Type a string in the **Tooltip help** box.

Adding an image or an icon to a command

Commands can have a small image or icon associated with them. This icon can be visible or hidden for both toolbars and menus. The icon size can be small (16 × 16 pixels), medium (32 × 32 pixels), or large (48 × 48 pixels).

To change the default icon for a command

1 Click **Workspace** ▸ **Customization** ▸ **Commands**.

2 Choose **Macros** from the **Commands** list box. The list below now displays the fully qualified names of all of the public, parameter-free subs from all of the installed project (GMS) files.

3 Choose a macro from the **Command** list.

4 Click the **Appearance** tab.

5 Edit the icon in the icon editor.

Alternatively, you can import a Windows bitmap (BMP) file. The image's colours will be mapped to the closest colour in the colour list for icons.

Interacting with the user

One aspect of user interfaces that is a bit harder to achieve is that of actually getting some interactive input from the user within the CorelDRAW document. The CorelDRAW Object Model provides two functions for getting the positions of either a click, or a drag. These two member functions are `Document.GetUserClick` and `Document.GetUserArea`.

The Object Model also provides methods both for converting between screen and document coordinates, and determining if a set of coordinates is on a shape. These three methods are `Window.ScreenToDocument`, `Window.DocumentToScreen`, and `Shape.IsOnShape`.

Document.GetUserClick

To get the position of a single click from the user, use the `GetUserClick` member function of the `Document` object. This function pauses the macro for a specified period of time or until the user clicks somewhere in the document, or until the user presses **Escape**. An example of using this function is given below:

```
Dim doc As Document, retval As Long
Dim x As Double, y As Double, shift As Long
Set doc = ActiveDocument
doc.Unit = cdrCentimeter
retval = doc.GetUserClick(x, y, shift, 10, True, cdrCursorPick)
```

The above code gives the user just 10 seconds to click somewhere in the document. The position of the click is returned in the variables x and y. The combination of **Shift**, **Ctrl**, and **Alt** that was selected when the click took place is returned in shift: Shift is 1, Ctrl is 2, and Alt is 4, and the values are added together before being returned.

In the above example, SnapToObjects is enabled, in other words, True. The cursor icon to use is defined by the last parameter, in this case the Pick tool's icon; you cannot use custom icons.

The returned value is 0, 1, or 2, depending on whether the user completed the click successfully, the user cancelled by pressing Escape, or the operation timed out, respectively.

The returned coordinates of the click are relative to the origin of the page and are in the document's VBA units, so it is often necessary to explicitly set the units in which you want the value returned.

To get the shapes that are underneath the returned click point, use the function `SelectShapesAtPoint`, which is a member of `Page`:

```
doc.ActivePage.SelectShapesAtPoint x, y, True
```

The value indicates whether to select unfilled objects (True), or not (False).

Document.GetUserArea

To get the position of a drag, or an area or rectangle, from the user, use the `GetUserArea` member function of the `Document` object. This function pauses the macro for a specified period of time or until the user clicks, drags, and releases the mouse somewhere in the document, or until the user presses Escape. An example of using this function is given below:

```
Dim doc As Document, retval As Long, shift As Long
Dim x1 As Double, y1 As Double, x2 As Double, y2 As Double
Set doc = ActiveDocument
doc.Unit = cdrCentimeter
retval = doc.GetUserArea(x1, y1, x2, y2, shift, 10, True,
                                                cdrCursorExtPick)
ActivePage.SelectShapesFromRectangle x1, y1, x2, y2, Falbooleanse
```

The above code gives the user just 10 seconds to select an area somewhere in the document. The position of the area is returned as two opposite corners of a rectangle in the variables `x1`, `y1`, `x2`, and `y2`. The combination of SHIFT, CTRL, and ALT that was selected when the select took place is returned in `shift`: SHIFT is `1`, CTRL is `2`, and ALT is `4`, and the values are added together before being returned. In the above example, SnapToObjects is enabled, i.e. True. The cursor icon to use is defined by the last parameter.

The returned value is `0`, `1`, or `2`, depending on whether the user completed the select area successfully, the user cancelled by pressing Escape, or the operation timed out, respectively.

The returned coordinates of the area are relative to the origin of the page and are in the document's VBA units, so it is often necessary to explicitly set the units you want the value returned in.

The above code finally selects the shapes that lie completely within the area with the `Page` object's `SelectShapesFromRectangle` method.

This method returns two points that are interpreted as the corners of a rectangle. However, the two points can also be used as the start and end points of a drag operation by the user.

Window.ScreenToDocument and Window.DocumentToScreen

When using the above 'click' and 'area' methods, or when developing an exotic solution, it is sometimes useful to be able to convert between screen coordinates and document coordinates. This is done with the member functions `ScreenToDocument` and `DocumentToScreen` of the `Window` object.

The following code takes a coordinate from the screen and converts it into a point in the document that is visible in the active window:

```
Dim docX As Double, docY As Double
ActiveDocument.Unit = cdrMillimeter
ActiveWindow.ScreenToDocument 440, 500, docX, docY
```

The following code returns the screen coordinate of a point in the document on the screen:

```
Dim screenX As Long, screenY As Long
ActiveDocument.Unit = cdrMillimeter
ActiveWindow.DocumentToScreen 40, 60, screenX, screenY
```

In each case, the converted coordinates are returned in the last two parameters.

Screen coordinates start from the upper-left corner of the screen, so positive Y values are down the screen, whereas positive Y values in the document are up the page.

Shape.IsOnShape

You can test whether a point is inside, outside, or on the outline of a curve using the shape's `IsOnShape` member function. This function takes a document coordinate and returns `cdrInsideShape` or `cdrOutsideShape` if the coordinate is inside or outside the shape, or it returns `cdrOnMarginOfShape` if the coordinate is on or near the outline of the shape.

For example, the following code tests where the point (4, 6) is in relation to the `ActiveShape`:

```
Dim onShape As Long
ActiveDocument.Unit = cdrInch
onShape = ActiveShape.IsOnShape(4, 6)
```

Providing help to the user

One of the most useful aids you can give the user is some form of help documentation. This may take the form of a **ReadMe.txt** file, or a printed manual. However, neither of these solutions is *immediate*. An alternative is to have all of the instructions built into the dialog box, but this uses valuable screen real estate. Yet another alternative is to build proper Windows WinHelp or HTMLHelp help files, but both types require tools and a lot of work.

Possibly the most accessible solution is to provide help in the form of plain-text, such as a **help.txt** file. Given that you know where the text file is stored – and you can do this by creating a known Registry value when the project is installed that points to the location of the file – you can use the following function to open it:

```
Public Sub launchNotepad(file As String)
  Shell "Notepad.exe" & " " & file, vbNormalFocus
End Sub
```

Pass the full path to the text file in the parameter file, such as **C:\ReadMe.txt**.

A much more powerful, but still easily created, solution to the problem of help is to use HTML. If you know where the HTML file is installed, you can use the following function to open it:

```
' Put this Declare statement before all Subs and Functions!
 Declare Function ShellExecute Lib "shell32.dll" _
     Alias "ShellExecuteA" (ByVal hwnd As Long, _
     ByVal lpOperation As String, ByVal lpFile As String, _
     ByVal lpParameters As String, ByVal lpDirectory As String, _
     ByVal nShowCmd As Long) As Long

 Public Sub launchBrowser(url As String)
     ShellExecute 0, vbNullString, url, vbNullString, vbNullString, 5
 End Sub
```

HTML is more powerful since you can include graphics as well as direct the user to a specific location in the page using 'hash' references, e.g. **index.html#middle**. Simply pass the file name or URL in the parameter `url`, for example: **C:\Program Files\ReadMe.htm**, or http://www.designer.com.

Organizing, grouping, & deploying CorelDRAW macros 8

Now that you have created your macro masterpiece, it's time to start distributing it.

Organizing and grouping macros

The best way to organize your macros is to use a separate module for each macro - it's not absolutely necessary, but it does help when trying to maintain them in the future. Since it is possible to have many modules in a single project (GMS) file, this makes it very simple to group related macros together into a single project.

To make it easier for the user to find the entry point to your macros, it is useful to place all of the public Subs into a single module and then instruct the user how to find them - these are the subs that the user calls from within CorelDRAW.

Advantages of distributing macros using a GMS file

Every CorelDRAW document has an intrinsic GMS file. This makes it possible to explicitly distribute macros as part of a document so that, when the user opens the document, they immediately have access to the macros, even if they have not installed them. This has only limited use: for tracking how much time has been spent editing the document perhaps.

Deploying and installing project files

You must devise a mechanism for deploying and installing your project (GMS) files. It is possible to distribute modules on their own, but, since this requires the users to manually integrate the module into their existing project file, it is much simpler for the user if you distribute project files instead.

To install a project file, simply save it to the user's GMS folder. This folder is typically **C:\Program Files\Corel\Corel Graphics 11\Draw\GMS**, although different language versions of Windows use different names for the programs folder. The correct method of installing a project file to the correct directory is to get the Registry value **HKEY_LOCAL_MACHINE\Software\Corel\CorelDRAW\11.0\Destination** and append the string '**\Draw\GMS**'. Fortunately, most automated software installers, such as Wise, Microsoft Installer (MSI), InstallShield®, and InnoSetup enable this in a single command, making GMS files simple to install. However, if you use WinZip® or something similar to create a compressed archive for distribution, or if you are going to distribute the files without compression at all, you will have to tell the user exactly where to install the project files themselves.

Distributing workspace features

When you have developed a custom workspace that contains custom toolbars, menus, and shortcut keys, these customizations can form an intrinsic part of your solution. You can distribute the entire workspace, which the user can install and use, or, from CorelDRAW 11 it is possible to export some features of your workspace so the user can import those features into their own workspace.

Distributing workspaces

You can distribute a complete, customized workspace with your solution. All of the CorelDRAW workspaces are stored on your hard disk in a location that is defined by the Registry value LastWorkspaceUsed in the key **HKEY_CURRENT_USER\Software\Corel\CorelDRAW\11**. If you look at this value, you will see that it points to a file with the filename extension **.CW_** - this is the current workspace's description file that contains the short

description of the workspace that you see in the Customize dialog box. There is also a subfolder in the same folder as the workspace description file with exactly the same name as the workspace description file, but without the **.CW_** filename extension - this folder contains the workspace files.

To distribute a workspace, you must get the user to install both the workspace description (**CW_**) file, and the subfolder with the **CFG** files in it, to the correct location on their computer. Only the **CFG** files are needed; the **INI** files are not. The receiver of the workspace must find the correct Registry value and then interpret it in order to work out the correct directory; and then the receiver must either set it during installation by changing the Registry key or go to the CorelDRAW Options dialog box and select your workspace.

Distributing menus, toolbars, and shortcut keys

From CorelDRAW 11 you can distribute components of the user interface without having to distribute complete workspaces. It is possible to distribute individual toolbars and menus, as well as complete sets of shortcut keys.

To export workspace features

1 Right-click anywhere on the toolbars and select **Customize ▸ Workspace ▸ Export workspaces…**

2 In the tree-list, enable the check boxes next to those items you want to export.

3 Click Save, select a directory, and enter a file name. The selected workspace items will be saved into a single Corel Workspace (CWF) file.

4 Click Close.

To save each item to a separate file, repeat this operation for each item in turn, except do not click Close, just change the selected items and then click Save again for each one.

When exporting shortcut keys, all of the shortcut keys are exported. To distribute just a few keys, create a new workspace and remove all the shortcut keys from it; then create just the keys you want to export.

The status bar and sizes and positions of Docker windows can also be exported.

Importing workspace features

To import a workspace, you can use the Application.ImportWorkspace method or the user can import the Corel Workspace (CWF) files manually.

To import a Corel Workspace file manually

1 Right-click anywhere on a toolbar and click **Customize ▸ Workspace ▸ Import workspaces**.

2 Choose a Corel Workspace (CWF) file.

3 Choose which items to import from the file.

4 Choose which workspace to import the items into. If you are creating a new workspace, enter details about the workspace.

5 Confirm the details and click Finish.

The items will be imported into your workspace. If there are any clashes of names of toolbars, the incoming toolbar will be renamed. If the VBA macros are not installed, commands that call those macros will not work.

Where to get more information 9

This document is only meant to be a starting point. This chapter gives information about and links to additional solutions development resources that will be useful to you.

Corel Solution Developers Program

The Corel Solution Developers (CSD) program is a comprehensive resource for developers and consultants interested in providing products, solutions or services to their end users. The CSD program provides the necessary components to successfully design, develop, test, and market custom solutions. The solutions can be related to any of Corel's products, including the creative, business application, technical illustration, and XML products.

Membership in the program includes technical documentation, developer/technical support, developer tools, developer newsletter, complementary software licenses, and marketing opportunities.

For more information, visit us online at http://www.corel.com/partners_developers/csd or email csd@corel.com

Corel Corporate Services

Corel Corporate Services is a group of highly skilled experts from across the company who are dedicated to providing top-notch solutions. They can assist you with your project by providing personalized end-to-end solutions and support throughout all stages of your project. Our wide range of services include: application development and support, software systems integration, and training.

For more information, visit us online at http://www.corel.com/proservices, or email proservices@corel.com.

Corel Customized Training

Do you need high-end technical training, conveniently delivered on-site at your organization? Corel will customize and build a training program for you and your colleagues, based on your learning needs and tailored to your work environment.

For more information, visit us online at http://www.corel.com/customizedtraining, or email training@corel.com.

Other documentation

Apart from this document, the online Help files that are accessed through the VB Editor are a great reference. In the editor, type a keyword, class name, or member, select it, and press **F1** for information about that keyword. You can also select an item in the Object Browser, and press **F1** to access Help.

Web sites

Various enthusiasts around the world have set up Web sites to provide VBA solutions for CorelDRAW. To locate them, enter "CorelDRAW + VBA" into most Internet search engines.

A good place to start for links to Web sites related to CorelDRAW is at Corel's own Web site, http://www.designer.com, in the links section.

Newsgroups

Corel runs a number of newsgroups in support of its products and solutions developers for those products. Corel's news server is at cnews.corel.com. The support newsgroups for CorelDRAW 10 and 11 on this server are corel.graphics_apps.draw10 and corel.graphics_apps.draw11. The newsgroup for VBA (as well as Corel SCRIPT) in CorelDRAW is corel.graphics_apps.draw-script. Any standard news reader can be used to access the groups and access is free.

The newsgroups are frequented by thousands of CorelDRAW users around the world who help each other with their problems. There are also about one hundred 'CTech' volunteers – volunteers recognized by Corel as experts – who are nominated to provide the communication link with Corel within the newsgroups. These people are knowledgeable, helpful, and friendly, and usually the first to respond to questions. They also act as group moderators and maintainers.

The rules of the group are posted on the newsgroups page of the support area on Corel's Web site at http://www.corel.com/support.

Other support

Information about all of Corel's support programs and services can be found at http://www.corel.com/support.

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