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Programming with Actuate Basic

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A b o u t P r o g r a m m i n g w i t h A c t u a t e B a s i c

Programming with Actuate Basic provides information for using the functions and statements in the Actuate Basic programming language.

Programming with Actuate Basic includes the following chapters:

- *About Programming with Actuate Basic.* This chapter provides an overview of this guide.
- *Part 1. Working with Actuate Basic.* This part describes and provides information about the elements of Actuate Basic, working with variables, procedures, and external functions in Actuate Basic.
- *Chapter 1. Introducing Actuate Basic.* This chapter describes the elements of Actuate Basic and its syntax and coding conventions.
- *Chapter 2. Understanding variables and data types.* This chapter provides information about working with variables in Actuate Basic.
- *Chapter 3. Writing and using a procedure.* This chapter provides information about working with procedures in Actuate Basic.
- *Chapter 4. Calling an external function.* This chapter describes how to call a C function in an Actuate Basic report.
- *Part 2. Actuate Basic Language Reference.* This part provides lists of functions and statements and information about keywords, operators, and trigonometric identities.
- *Chapter 5. Language summary.* This chapter provides grouped lists of functions and statements that are frequently used together to perform specific programming tasks.
- *Chapter 6. Statements and functions.* This chapter contains an alphabetical reference for all functions and statements.

- *Appendix A. Operators.* This appendix contains information about Actuate Basic operators.
- *Appendix B. Keywords.* This appendix contains information about Actuate Basic reserved words.
- *Appendix C. Trigonometric identities.* This appendix contains information about trigonometric identities.

Part One

Working with Actuate Basic

Introducing Actuate Basic

This chapter contains the following topics:

- About Actuate Basic
- Programming with Actuate Basic
- Understanding code elements
- Adhering to coding conventions
- Using the code examples

For an alphabetical list of all Actuate Basic functions and statements, including a general description, syntax, and parameters and return values, see Chapter 6, “Statements and functions.”

About Actuate Basic

Actuate Basic is an object-oriented programming language you can use for creating sophisticated e.reports and distributing them over the web. Actuate Basic consists of standard Actuate Basic functions and statements and uses object-oriented language extensions. Developers use Actuate Basic to augment and extend the functionality of e.Report Designer Professional.

Actuate Basic is similar to other structured programming languages. It provides built-in functions and control structures, such as If...Then...Else constructs and For and While loops. It also supports using variables and creating your own methods and procedures. Actuate Basic is modeled after Microsoft Visual Basic, Version 3. It is designed for programming reports and has none of Visual Basic's form-related syntax.

This chapter describes the elements of Actuate Basic and its syntax and coding conventions. Table 1-1 lists key features of Actuate Basic.

Table 1-1 Actuate Basic features

Feature	Functionality	For information, see
Strong data typing	Detecting mismatched type errors when the report compiles instead of when it runs.	Chapter 2, "Understanding variables and data types"
User-defined data types	Combining variables of different types into a single type.	Chapter 2, "Understanding variables and data types"
Calls to external functions	Using a function stored in an external library. For example, you can create and access a Java object, call a C function, and convert an Actuate Basic string to a Java String.	Chapter 4, "Calling an external function"
Portability	Running a report on a Windows or UNIX server.	Chapter 6, "Statements and functions"

Programming with Actuate Basic

Actuate e.Report Designer Professional provides design tools that support dynamic content delivery. Using e.Report Designer Professional, you create a report by placing components in a report design and setting properties to customize their appearance. e.Report Designer Professional translates the report design into corresponding Actuate Basic code.

You can also write code in Actuate Basic to control the report generation process, add application-specific logic, or design a report that responds to user-triggered events. To accomplish these tasks, you typically override predefined methods in the Actuate Foundation Classes (AFCs) or create new methods. For information about AFC classes and methods, see *Programming with Actuate Foundation Classes*.

Programming in Actuate Basic involves writing procedures. The procedures you write can be methods or general procedures available to the entire report. You declare a method in a class. You store a general procedure in an Actuate Basic source (.bas) file. When you include a BAS in your report design, you can use the general procedures in it the same way you use Actuate Basic's built-in statements and functions. For more information about procedures, see Chapter 3, "Writing and using a procedure."

Understanding code elements

To program in Actuate Basic, you must familiarize yourself with its syntax, naming conventions, control structures, and so on. This section provides an overview of the following standard Actuate Basic code elements:

- About statements
- About expressions
- About operators

About statements

A statement is a complete set of instructions directing Actuate Basic to execute a specific task within a procedure. A procedure typically contains a series of Actuate Basic statements that perform an operation or calculate a value. Figure 1-1 shows an example of statements within a procedure.

The simplest and most common statement in a procedure is the assignment statement. It consists of a variable name followed by the equal sign and an expression:

```
<variable> = <expression>
```

```

Sub SetLabelBackgroundColor( anyControl As
    AcLabelControl )
    Dim Label As MyLabel
    If GetClassName(anyControl) = "MyLabel" Then
        Set Label = anyControl
        Label.BackgroundColor = Red
    End If
End Sub

```

Statements

Figure 1-1 Procedure

The expression can be as simple or complex as necessary but it must evaluate to a valid data type. For more information about data types, see Chapter 2, “Understanding variables and data types.”

For example, the following assignment statements are valid:

```

Area = PI * Radius ^ 2
StartTime = StopTime - Now
Net_Worth = Assets - Liabilities
Label.Text = "Page " + Str$(curPageNum) + " of " & NumPages

```

In these examples, the assignment statement stores information. The examples compute the value of an expression, which appears to the right of the assignment operator (=). They store the result in the variable, which appears to the left of the operator. The data type of the variable must be the same as the data type the computed expression returns. For example, assigning a double value to an integer variable rounds the double to the nearest integer.

If necessary, you can use a function to convert elements of different data types to one common type. The last statement in the previous example uses the Str\$ function to convert a numeric expression to a string.

Actuate Basic statements can be recursive, meaning that they can call themselves repeatedly to perform a task. Actuate Basic sets a run-time stack limit of 200. A report that exceeds this limit causes a fatal error in e.Report Designer Professional and e.Report Designer. A report using recursion with a large number of iterations can exceed this limit.

About expressions

An expression consists of values and operators combined in such a way that the expression evaluates to one of the Actuate Basic data types. The type of the operands in an expression determines the expression type.

In an expression that contains an operation, Actuate Basic considers the types of all operands to determine the type of the result. For example, if you add two integers, the result of the expression is an integer. If you mix data types in an expression, the result is the type of the widest range. For example, the expression $3 * 4.55$ produces a double.

To avoid mixing types in an expression, use type-declaration characters with numeric constants. These characters force a constant to take on a specific type. For example, 10 is an integer, but 10@ is a currency value. Thus, 10@ + 20@ yields a currency value of thirty dollars on the U.S. English locale. For more information about type-declaration characters, see “Using a type-declaration character” in Chapter 2, “Understanding variables and data types.”

In an expression that contains a variable that evaluates to Null, the result of the expression is Null. For example, if the value of the variable NextOrderQuantity is Null, the expression 2 * NextOrderQuantity produces a value of Null. Only the concatenation operator treats Null values differently, as described in “Using the concatenation operator.” Actuate Basic functions also return Null when you provide an argument that evaluates to Null. For example, if the value of VacationStartDate is Null, the function call, DateAdd("d", 5, VacationStartDate) returns Null.

About operators

An operator is a symbol or keyword that performs an operation, such as adding or comparing, on an expression. Actuate Basic provides the following types of operators:

- Arithmetic
- Comparison
- Logical
- Concatenation

For more information about operators Actuate Basic supports, see Appendix A, “Operators.”

Using an arithmetic operator

Use an arithmetic operator with a numeric expression. You can also use an arithmetic operator with a date expression to subtract one date from another and to add or subtract a number from a date.

Table 1-2 lists the arithmetic operators that Actuate Basic supports.

Table 1-2 Supported arithmetic operators

Operator	Description	Syntax
^	Exponentiation. Supports computing powers and roots. Actuate Basic computes the	number ^ exponent

(continues)

Table 1-2 Supported arithmetic operators (continued)

Operator	Description	Syntax
\wedge (continued)	power using a positive exponent and computes a root using a negative exponent. For example, $10 \wedge 3$ evaluates to 1000.	
*	Multiplication	expression1 * expression2
/	Floating point division. Performs standard division and returns a floating point number. For example, $3/2$ returns 1.5 as a floating point, even though both operands are integers.	expression1 / expression2
\	Integer division. Returns only the integer portion of the division. For example, $10 \setminus 2$ evaluates to 5 and $3 \setminus 2$ evaluates to 1.	expression1 \ expression2
Mod	Modulus (remainder)	expression1 Mod expression2
BAnd	Bitwise And	expression1 BAnd expression2
BOr	Bitwise Or	expression1 BOr expression2
+	Addition	expression1 + expression2
-	Subtraction	expression1 - expression2

Using a comparison operator

Use a comparison operator to compare two expressions of the same type and return True or False. Table 1-3 lists the comparison operators that Actuate Basic supports.

Table 1-3 Supported comparison operators

Operator	Description	Syntax
>	Greater than	expression1 > expression2
<	Less than	expression1 < expression2
>=	Greater than or equal to	expression1 >= expression2
<=	Less than or equal to	expression1 <= expression2
=	Equal to	expression1 = expression2
	Although the equal to operator is the same as the assignment	

Table 1-3 Supported comparison operators

Operator	Description	Syntax
= (continued)	operator, the context of the operator determines which one Actuate Basic uses. The assignment operator is valid only when it immediately follows a variable in an assignment statement. For all other contexts, the = operator is a comparison operator. The expressions are case-sensitive.	expression1 = expression2
<>	Not equal to	expression1 <> expression2
Like	String comparison Expression and pattern are case-sensitive.	expression Like pattern
Is	Object reference variable comparison	objectref1 Is objectRef2

Using logical operators

Use logical operators to compare two logical expressions and return True or False. Table 1-4 lists the logical operators Actuate Basic supports.

Table 1-4 Supported logical operators

Operator	Description	Syntax
Not	Performs a logical negation on an expression. Returns False if the expression is True.	Not expression
And	Performs a logical conjunction on two expressions. Returns True if both expressions are True. Returns False if either expression is False.	expression1 And expression2
Or	Performs a logical disjunction on two expressions. Returns True if one or both expressions is True.	expression1 Or expression2
Xor	Performs a logical exclusion on two expressions. Returns True if only one expression is True.	expression1 Xor expression2

(continues)

Table 1-4 Supported logical operators (continued)

Operator	Description	Syntax
Eqv	Performs a logical equivalence on two expressions. Returns a value of True if both expressions evaluate to the same logical value.	expression1 Eqv expression2
Imp	Performs a logical implication on two expressions. Returns a value of True if both expressions are False or the second condition is True.	expression1 Imp expression2

Using the concatenation operator

The concatenation operator (&) combines two values to produce a string that contains both original values. The original values do not change. Actuate Basic casts each value to a string, then concatenates the strings. If one of the values is Null, the concatenation operator produces a string that is the same as the other value. If both values are Null, the concatenation operator produces Null.

The following examples produce the same result. The difference between the examples is that using a value other than a string produces a variant value, which Actuate Basic casts to a string.

```
6 & 7
"6" & "7"
"6" & Str$(7)
6 & 7 & Null
```

Adhering to coding conventions

Adhering to coding conventions makes your code easy to read and understand. For example, you can comment your code to explain its purpose, use a consistent style to name language elements, and break up long statements at logical places. This section describes the following common coding conventions:

- Commenting code
- Breaking up a long statement
- Adhering to naming rules

Commenting code

Code comments make a procedure easy to understand and maintain, especially if other programmers work with your code. Actuate Basic recognizes two comment markers:

- The apostrophe (')
- Rem

Actuate Basic treats characters to the right of a ' character or Rem as comments and does not execute those lines. A comment can follow a statement or occupy an entire line. A comment cannot follow a line continuation character (+). The following example shows the different types of comment:

```
Rem This is a comment that takes up an entire line.  
'This is a comment that takes up an entire line.  
Text1.BackColor = Red      ' Print negative numbers in red.
```

Breaking up a long statement

Typically, you write code with one Actuate Basic statement to a line and no terminator at the end of the line. Sometimes, however, you must break a long statement over several lines. To do so, use a continuation character (+) at the beginning of any lines after the first one, as shown in the following example:

```
Data1.RecordSource = "SELECT * FROM Titles, Publishers "  
+ & "WHERE Publishers.PubId = Titles.PubID AND  
+ Publishers.State = 'CA'"
```

The continuation character must be the continued line's first character.

Adhering to naming rules

When naming an element such as a variable, constant, or procedure, adhere to the following rules:

- The name can contain up to 40 characters.
- The first character of the variable name must be a letter. A letter is any upper- or lowercase character in the US ASCII (A-Z and a-z) character set and does not include non-English characters such as å or ô.
- The name cannot start with a number, including double-byte numeric characters.
- Subsequent characters in a name can be letters, digits, or the underscore character (_).
- The name cannot duplicate an existing variable name in the same scope.

- The name cannot contain reserved words, such as Function, Type, Sub, If, and End. For a list of reserved words, see Appendix B, “Keywords.”
- The name cannot contain an operator such as *, ^, or %.
- The name cannot contain spaces.

Using the code examples

Actuate products include example code to help you program specific functionality into a report. For more information about using example code, see “Using the code examples” in Chapter 6, “Statements and functions.”

Understanding variables and data types

This chapter contains the following topics:

- About variables
- Declaring an array
- About data types
- Working with Variant data
- Working with String data
- Working with numeric data
- Working with date and time data
- Working with a user-defined data type
- Converting a data type

About variables

A variable is a named location in memory used for temporary data storage. When you write Actuate Basic code, you often store values. For example, you can compare values, perform a calculation and store the result, or store values such as global configuration settings. Actuate Basic uses variables to store these values.

Declaring a variable

You declare a variable using the Dim, Global, or Static statements, as shown in the following examples:

```
Dim Total As Integer
Global FileName As String
Static Counter As Integer
```

Actuate Basic does not support implicit declaration of variables. When you implicitly declare a variable, you can use the variable name in your code without declaring it first. Because good programming practice discourages implicit variable declarations, Actuate Basic requires that you explicitly declare a variable before you use it.

The scope of a variable determines which procedures can access it. Depending on how and where you declare it, a variable has one of three scopes described in Table 2-1.

Table 2-1 Scopes of variables

Scope	Accessed by	Declared using	Declared in
Global	Entire application	Global	Declarations section of an Actuate Basic source (.bas) file included in a report design
Local	The procedure or method in which you declare it	Dim or Static	A procedure or method
Class	The class in which you declare it	Dim or Static	A class

When you add a variable to a class, Actuate Basic generates an appropriate Dim or Static declaration. For more information about the Global, Dim, and Static statements, see Chapter 6, “Statements and functions.” For information about class variables, see *Programming with Actuate Foundation Classes*.

Using a global variable

A global variable is accessible to the entire application. Use a global variable for storing values that apply to an entire application. For example, to store file names and default paths for accessing data.

The following example shows an example of an Actuate Basic source (.bas) file that has global variables defined in a declaration section:

```
Declare
    Global XVar As Integer
    Global YVar As String
End Declare
```

Although global variables are useful in certain situations, minimize their use. Global variables can add complexity to the logic of a report and can contribute to the creation of complex state machines. For this reason, use a local variable when possible.

How to create a global variable using a new source file

To create a global variable using a new source file:

- 1 In e.Report Designer Professional, create the Actuate Basic source (.bas) file:
 - 1 Choose Tools→Library Organizer→New.
 - 2 In New Library, name the file and select Source File (*.bas). Choose Save.
 - 3 In Library Organizer, choose OK.A page for creating the source file appears.
- 2 In the source file, create a declarations section using Declare...End Declare.
- 3 In the body of the declarations section, declare the global variable.
- 4 Save the source file.

The report includes the source file as a library.

How to initialize a global variable

To initialize a global variable after you declare it:

- 1 Write a Sub procedure in your source file that assigns an initial value to the global variable.
- 2 Override the Start method of the report so that it calls the Sub procedure.

When report generation begins, Actuate initializes the global variable.

Using a local variable

A local variable is accessible only within the procedure or method in which you declare it. A local variable is useful for a temporary calculation, such as counting in a For or Do loop. Limiting the scope of a variable supports reusing variable names. For example, if you declare a variable called Total in a procedure and you later write another procedure for a similar task, you can use the variable name Total in the new procedure.

Declare a local variable using Dim or Static, as shown in the following example:

```
Dim intTemp As Integer
Static intPermanent As Integer
```

A variable you declare using Dim exists only as long as the procedure or method is executing. When a procedure finishes executing, Actuate discards the values of local variables and reclaims the memory. The next time the procedure executes, the local variables reinitialize.

A variable you declare using Static retains the same data throughout the report generation process. Use Static to retain the value of a local variable to perform tasks such as calculating a cumulative total. In the following example, a function calculates a cumulative total by adding a new value to the total of previous values stored in the static variable Accumulate:

```
Function CumulativeTotal(ByVal Num As Double) As Double
    Static Accumulate As Double
    Accumulate = Accumulate + Num
    CumulativeTotal = Accumulate
End Function
```

If you declare Accumulate using Dim instead of Static, the function does not retain previously accumulated values. The function returns the same value with which you call it.

About class variables

A class variable typically stores values that define the state and attributes of an object of the class. You can declare a class variable using Dim or Static.

Declaring an array

An array is a list of objects of the same size and data type. Each object in an array is called an array element. Array elements are contiguous. You use an index number to differentiate elements. For example, you can declare an array of integers or an array of doubles, as shown in the following example:

```
Dim Counters(14) As Integer ' Integers, indexed 0-14 or 1-14,
                             ' depending on the Option Base statement
Dim Sums(50) As Double      ' Doubles, indexed 0-50 or 1-50
Dim Sums(10 To 20) As Double ' Doubles, indexed 10-20
```

You can also create a Variant array and populate it with elements of different data types, such as integers and strings. For more information about working with data types, see “About data types,” later in this chapter.

Using an array, you can set up loops that efficiently manage a number of cases by using the index number. An array has an upper and lower bounds, such as 1-50 or 10-100. Because Actuate Basic allocates space for each index number, avoid declaring an array larger than necessary.

About multidimensional arrays

You can declare an array with multiple dimensions. For example, a two-dimensional array has rows and columns. The following statement declares an array called Matrix. Matrix is a fixed-size, two-dimensional, 10 x 20 array with bounds.

```
Dim Matrix(1 To 10, 1 To 20) As Double
```

Be aware when adding dimensions to an array that the total storage the array requires increases dramatically, especially for a Variant array.

About dynamic arrays

Sometimes, you do not know in advance how large to make an array. Actuate Basic supports changing the size of an array as the report runs. Such an array is called a dynamic array. A dynamic array helps you efficiently manage memory. For example, you can use a large array for a short time and reallocate memory to the system when the report completes. As an alternative, you can declare a fixed-size array of the largest possible size, which can cause your process to run low on memory.

To declare a dynamic array, use a statement similar to the following declaration:

```
Dim AccordionArray() As Double
```

Place nothing between the parentheses, then size the array later using the ReDim statement. To change the size of an array without losing the data in it, use ReDim with the Preserve keyword. For example, you can enlarge an array by five elements without losing the values of the existing elements.

```
ReDim Preserve MyArray(UBound(MyArray) + 5)
```

You can also use ReDim to decrease the size of an array.

About functions used with an array

Table 2-2 lists the Actuate Basic functions you can use for working with arrays. For more information about these functions, see Chapter 6, “Statements and functions.”

Table 2-2 Functions for arrays

Programming task	Function/Statement
Change default lower limit	Option Base
Declare and initialize	Dim, Global, ReDim, Static
Test the limits	LBound, UBound
Reinitialize	Erase, ReDim

About data types

Actuate products use two categories of data types, those provided by Actuate Basic and those that are defined specifically for use with Actuate Foundation Classes (AFC). This chapter discusses the Visual Basic data types. For information about AFC-specific data types, see *Programming with Actuate Foundation Classes*.

The data type determines the type of data the variable can store. A data type provides a way to classify data stored in a variable by defining rules that govern how you work with data and what the variable can contain. The Actuate Basic data types include the standard Visual Basic data types and data types defined for the Actuate Foundation Classes.

Using a standard data type

Table 2-3 describes the standard Visual Basic data types that Actuate Basic uses.

Table 2-3 Standard Visual Basic data types that Actuate Basic uses

Data type	Storage size	Range/Description
Any	N/A	Used only to suppress type checking of arguments passed to dynamic-link library (DLL) procedures.
CPointer	4 bytes 32 bits	0 to 4,294,966,295. A CPointer data type variable holds a pointer to data allocated in a C function you create.
Currency	12 bytes 96 bits	-39,614,081,257,132,168,796.771975168 to 39,614,081,257,132,168,796.771975167

Table 2-3 Standard Visual Basic data types that Actuate Basic uses (continued)

Data type	Storage size	Range/Description
Date	8 bytes 64 bits	Dates 1 January 100 to 31 December 9999 Times 0:00:00 to 23:59:59
Double	8 bytes 64 bits	-1.797693134862315E308 to -2.23E-308 for negative values. 2.23E-308 to 1.797693134862315E308 for positive values. Double-precision floating point numbers are stored in memory using IEEE 64-bit floating point format. Each floating point value consists of three parts: the sign, the exponent, and the mantissa. In a double-precision number, the sign takes 1 bit, the exponent takes 11 bits, and the mantissa uses the remaining 52 bits plus an additional implied bit.
Integer	4 bytes 32 bits	-2,147,483,648 to 2,147,483,647 Can represent Boolean values. For Boolean values, 1 represents True and 0 represents False. You can also use the Actuate Basic reserved words True and False, which return 1 and 0, respectively. Can represent enumerated values. An enumerated value can contain a finite set of unique whole numbers, each of which has special meaning in the context in which it is used. Enumerated values provide a convenient way to select among a known number of choices.
Long	4 bytes 32 bits	-2,147,483,648 to 2,147,483,647
Single	8 bytes 64 bits	$\pm 2.2250738585072014E-308$ to $\pm 1.7976931348623158E+308$
String	1 byte per character	0 to approximately 2,147,483,647 characters or memory limit. Because some storage overhead is required, a string cannot actually be 2,147,283,647 characters long. For more information about the String data type, see "Working with String data," later in this chapter.
User-defined (defined with Type)	Defined by elements	Range of each element depends on its fundamental type.

(continues)

Table 2-3 Standard Visual Basic data types that Actuate Basic uses (continued)

Data type	Storage size	Range/Description
Variant	As needed	Depends on value stored, up to the range of a Double. The default data type for Actuate Basic. For more information about the Variant data type, see “Working with Variant data,” later in this chapter.

Using an Actuate Foundation Class data type

An Actuate Foundation Class (AFC) data type is either a typedef or a structure.

A typedef is an alias for a Basic data type, typically an Integer. Actuate Foundation Classes use a typedef to create a type that adds rules to those a simple data type provides. These rules govern limitations on range, direct special display formatting, and specify related constants. For example, typedef rules about the numbers that represent colors restrict them to the range of 0 to hexadecimal FFFFFFFF.

Some data types are enumerations, or enums. An enum is a data type in which the value can be only one of its associated constants. For example, a Boolean can be only True or False. Other data types also can have constants. In such cases, the constant provides convenient shorthand for a value.

A structure is a group of variables that describe a single item. The structure member can be an Actuate Basic data type, such as an Integer, Boolean, or other AFC-defined structure. In some cases, structures are nested, as in the following example:

```
AcFont
    AcColor
```

For a complete list of the AFC data types, see *Programming with Actuate Foundation Classes*.

Assigning a data type

A variable has an associated data type. When declaring a variable, you can explicitly assign a data type to it. If you do not assign a data type, Actuate Basic assigns the Variant data type. Use the Option Strict statement to require that all variable declarations have an assigned data type. For more information about Option Strict, see Chapter 6, “Statements and functions.”

You can assign a data type to a variable in one of two ways:

- Using the As keyword
- Using a type-declaration character

Using the As keyword

To declare a variable and assign it a data type using the As keyword, use the following syntax:

```
Dim <variable> [As <type>]
```

The following examples show valid variable declarations:

```
Dim MyAccount As Currency
Dim YourAccount
```

These examples declare both variables and initialize them to the default value of the data type. For these examples, MyAccount is a Currency variable initialized to 0.00. YourAccount is a Variant initialized to Empty.

Using a type-declaration character

You can assign a data type to a variable by appending a type-declaration character to the end of the variable name.

Table 2-4 lists the type-declaration characters Actuate Basic supports.

Table 2-4 Supported type-declaration characters

Data type	Type declaration character
Integer	% (ANSI character 37)
Long	& (ANSI character 38)
Single (real)	! (ANSI character 33)
Double (real)	# (ANSI character 35)
Currency	@ (ANSI character 64)
String	\$ (ANSI character 36)
Variant	None

The following examples show valid variable declarations:

```
Dim OurAccount@      ' declare Currency variable
Dim CustomerName$    ' declare String variable
Dim QuantitySold%    ' declare Integer variable
```

About enums

An enum is a data type whose value is one of a set of named values. For example, the value of a `TrafficLightColor` enum might be `RedLight`, `YellowLight`, or `GreenLight`.

You define an enum using the `Enum` statement. To declare an enum use the following syntax:

```
Enum <user-defined enumeration type>
    <name 1> [= value 1]
    <name 2> [= value 2]
    ...
    <name N> [= value N]
End Enum
```

The following example declares an enum. You place this statement within a `Declare...End Declare` block.

```
Enum CarMotion
    Forward
    Reverse
    Stopped
End Enum
```

To use the enum type, declare a local variable as that type. You can then assign that variable the values specified in the enum declaration.

```
Dim myCarState As CarMotion
myCarState = Stopped
```

An enum is very similar to an `Integer` and a set of global constants. In the above example, `myCarState` behaves like an `Integer`, and `Forward`, `Reverse`, and `Stopped` behave like global constants.

The `Enum` statement syntax also allows an enum value to be assigned an explicit numeric equivalent, as shown in this example:

```
Enum CarMotion
    Reverse = -1
    Stopped = 0
    Forward = 1
End Enum
```

If the constant assignment is missing from an enum value, that value is assigned the previous constant value plus one. If the first enum value assignment is missing, it is set to zero.

In practice, you should never need to know the numeric equivalents of enum values. Instead, you should always use the enum value names.

About constants

A constant is a reserved location in memory for storing a value that does not change during the life of a report.

The following examples set constant values:

```
Const Pi = 3.14159265358979
Const FirstName = "James"
Const MyAccount = 25.43
```

These examples do not contain type declarations. In such cases, Actuate Basic assigns the most appropriate data type. In the example, Pi is a Double, FirstName is a String, and MyAccount can be a Single, a Double, or a Currency. In such a case, Actuate Basic assigns the data type that uses the least amount of space, in this case a Single. To specify that MyAccount is Currency, use the following syntax:

```
Const MyAccount@ = 25.43@
```

Working with Variant data

A Variant variable can change its type depending on the program logic. The Variant is the default data type for Actuate Basic. This means that it is the data type that all variables become if you do not explicitly declare them to be of another type.

A Variant can contain numeric, string, or date data, as well as the special values empty and Null. The Variant maintains an internal representation of the data type it stores. This internal representation determines how Actuate Basic manages the value when you perform an operation on the variable. When you work with a Variant, Actuate Basic typically performs any necessary conversions. Actuate Basic uses the most compact representation possible to represent the variable. Later operations on the variable can result in data type changes. You can determine how Actuate stores the data in a Variant using the VarType function. VarType returns a value that indicates which data type a Variant contains. For more information about VarType, see Chapter 6, "Statements and functions."

A Variant variable contains the value Empty until you assign another value to it. A Variant containing Empty is 0 if it is used in a numeric context and a zero-length string if it is used in a string context. Empty is not the same as a Null value. Null indicates that the Variant variable intentionally contains no valid data.

The Variant is a convenient way to declare a variable for a small report or frequently used variable. However, a Variant reduces the performance of the program and can cause unintended data type conversions. For example, the result of the + operator can be ambiguous when you use it with two Variants. If both Variants are numbers, Actuate Basic adds them. If both Variants are strings, Actuate Basic concatenates them. If one Variant is a string and the other is a

number, Actuate Basic first attempts to convert the string to a number. If the conversion fails, a Type mismatch error occurs. To avoid such issues, use fewer Variants and more explicitly typed variables in your code.

Always use a Variant when the data could contain date information, Empty, or a Null. You can also use a Variant in place of any fundamental data type to work with data in a more flexible way. If the contents of a Variant variable are digits, they might either be the string representation of the digits or the actual value, depending on the context. For example:

```
Dim MyVar As Variant
MyVar = 98052
```

In the preceding example, MyVar contains a numeric representation of the actual value 98052. Arithmetic operators work as expected on Variant variables that contain numeric values or string data that can be interpreted as numbers. If you use the + operator to add MyVar to another Variant containing a number or to a variable of a numeric data type, the result is an arithmetic sum.

About numeric Variant data

Generally, Actuate Basic maintains numeric Variant data in its original fundamental data type within the Variant. For example, if you assign an Integer to a Variant, subsequent operations treat the Variant as if it were an Integer. However, if an arithmetic operation is performed on a Variant containing an Integer, a Long, or a Single, and the result exceeds the normal range for the original data type, the result is promoted within the Variant to the next larger data type. An overflow error occurs when Variant variables containing Currency and Double values exceed their respective ranges.

About functions used for a Variant variable

Table 2-5 lists the Actuate Basic functions you can use for working with Variant variables. For more information about these functions, see Chapter 6, “Statements and functions.”

Table 2-5 Functions for working with Variant variables

Programming task	Function/Statement
Determine whether an argument can be converted to a date	IsDate
Test whether a Variant variable contains a value	IsEmpty
Determine whether the Variant contains the Null value	IsNull
Test if the type of a variable is or can be converted to Integer, Long, Single, Double, or Currency	IsNumeric
Determine the data type of a Variant	VarType

Working with String data

A String variable contains text. Although a string can contain digits, you cannot perform mathematical operations on the digits in a string. Within a string, Actuate Basic interprets digits as characters. For example, you can store zip codes and telephone numbers as string data in tables because you do not perform calculations with them.

String characters that all Windows applications use consist of one- or two-byte codes. These codes for String characters depend on the character encoding used by a locale or the encoding explicitly set for a report design. The first 128 characters (0-127) correspond to the letters and symbols on a standard U.S. keyboard. These first 128 characters are the same as defined by the ASCII character set. The second 128 characters (128-255) represent other characters, such as letters in international alphabets, accents, currency symbols, and fractions, and differ depending on the locale. Internally, Actuate products use the two-byte Unicode UCS-2 encoding, which ensures a consistent interpretation of literal strings. Nonetheless, depiction of a character in a report depends on the availability of the code point in the chosen font and the current encoding.

Declaring a String

Declare a variable as a String data type if it always contains text and you never expect to treat it as a number in a calculation.

```
Dim myString As String
```

You can assign a String to this variable and modify the variable using String functions. Use quotation marks to delimit a literal string in an expression.

```
myString = "Actuate Basic"  
newString = Left$(myString, 7)
```

A String variable or argument is a variable-length string. The string grows or shrinks as you assign new data to it.

Using binary string data

A Visual Basic program typically stores binary data in a String variable. This technique works because American National Standards Institute (ANSI) strings are typically single-byte arrays of characters. Actuate Basic code can read and write binary data on a byte-by-byte basis, using strings and manipulating the standard String functions, regardless of whether the data has a meaningful ANSI equivalent.

Manipulating a string

You can manipulate a string, including a string containing binary data, using Actuate Basic String functions. There are three types of String functions, two for character strings and another for binary strings. You can use the character versions without any preparatory steps. You use the AscW and ChrW character String functions for two-byte Unicode characters. The other character String functions interpret character values as one or two bytes according to the current encoding.

Table 2-6 lists the functions you can use for manipulating character strings. For more information about these functions, see Chapter 6, “Statements and functions.”

Table 2-6 Functions for manipulating character strings

Functions	Description
Asc, AscW	Returns the character code for the first character.
Chr, ChrW	Returns a string containing the specified character.
InStr	Returns the first occurrence of one string within another.
Left, Right	Returns a specified number of characters from the right or left sides of a string.
Mid	Returns a specified number of characters from a string.

How to use a binary String function

To use a binary String function:

- 1 Place the binary data in a byte array using Get or another function.
- 2 Assign the byte array to a string.
This assignment copies the data into a string variable. It does not translate the binary data.
- 3 Use one of the functions listed in Table 2-7 to manipulate the binary data in the string.

Table 2-7 Functions for manipulating binary data in a string

Function	Description
InStrB	Returns the first occurrence of a byte in a binary string.
MidB	Returns a specified number of bytes from a binary string.
LeftB, RightB	Returns a specified number of bytes from the left or right side of a binary string.

- 4 Assign the contents of the manipulated binary string back to a byte array.

For more information about the functions you use for manipulating binary data, see Chapter 6, “Statements and functions.”

For information about working with a multibyte character string, see *Working in Multiple Locales using Actuate Basic Technology*.

Formatting a string using Str or Str\$

The simplest way to format a string is to use the Str or Str\$ functions. The syntax is:

```
Str(<expression>)  
Str$(<expression>)
```

Str returns a Variant data type. Str\$ returns a String data type. Str and Str\$ do not perform a conversion if you pass them a String value.

When you convert a number using Str or Str\$, the function places either a leading space or a minus sign in front of the string. If the number is positive, the leading space implies the plus sign. If the number is negative, the minus sign is placed in front of the string.

The converted string follows the formatting rules of the user’s locale. The following statement, which passes a numeric value, returns 123,456 with a leading space in a French locale, and 123.456 with a leading space in an English locale:

```
Str$(123.456) ' Passing a numeric value
```

The following statement, which passes a String value, returns 123,456 with a leading space in both French and English locales:

```
Str("123,456") ' Passing a String value
```

Formatting a string using Format or Format\$

The Format and Format\$ functions format a numeric expression, date Variant, or String according to the specified pattern and locale.

Format returns a Variant data type. Format\$ returns a String. The syntax is:

```
Format(<expression to format>)  
Format(<expression to format>, <format pattern>)  
Format$(<expression to format>, <format pattern>, <locale>)
```

where

- <expression to format> is the expression to display according to the specified format pattern.
- <format pattern> is a predefined Actuate Basic keyword or a string of format characters that specifies how the expression appears.

- <locale> is a String expression that specifies the locale to use for determining <format pattern> and the output format.

For more information about the Format and Format\$ functions, see Chapter 6, “Statements and functions.”

Comparing strings

The StrComp function returns a Variant value indicating the result of a string comparison. The syntax for StrComp is:

```
StrComp(<string expression 1>, <string expression 2>[,<compare
method>])
```

where

- <string expression 1> and <string expression 2> are any valid string expressions. Actuate Basic converts these strings to the Variant data type before comparing them.
- <compare method> specifies the type of string comparison. You can omit this argument or use a value of 0 or 1. Use 0, the default value, to perform a binary, or case-sensitive, comparison. Use 1 to perform a textual, or case-insensitive, comparison. If compare method is Null, an error occurs. If you omit this argument, the Option Compare setting determines the type of comparison.

Table 2-8 shows the return values of a string comparison.

Table 2-8 Return values of a string comparison

If	StrComp returns
string1 is less than string2	-1
string1 is equal to string2	0
string1 is greater than string2	1
string1 or string2 is Null	Null

For an example of using StrComp, see Chapter 6, “Statements and functions.”

Changing the capitalization of a string

Table 2-9 lists the functions you can use to change the capitalization of a string. For more information about these functions, see Chapter 6, “Statements and functions.”

Table 2-9 Functions for changing the capitalization of a string

Function	Description
LCase	Returns a Variant in which all letters are lowercase
LCase\$	Returns a String in which all letters are lowercase
UCase	Returns a Variant in which all letters are uppercase
UCase\$	Returns a String in which all letters are uppercase

Removing spaces from a string

Table 2-10 lists the functions you can use to remove leading or trailing spaces from a string. For more information about these functions, see Chapter 6, “Statements and functions.”

Table 2-10 Functions for removing spaces from a string

Function	Description
LTrim	Returns a copy of a String without leading spaces
RTrim	Returns a copy of a String without trailing spaces
Trim	Returns a copy of a String with neither leading nor trailing spaces

Embedding special characters in a string

Actuate Basic supports embedding quotation marks, tabs and new-line characters in a string.

Embedding quotation marks in strings

Actuate Basic supports two techniques of embedding a literal quotation within a string, as shown in the following example:

The CEO said, "Sales are fantastic!"

To make this sentence into a valid string expression using the first technique, insert an additional set of quotation marks to display each set in the string. Actuate Basic interprets two quotation marks in a row as an embedded quotation mark. To assign the previous string to a variable, use the following code:

```
Text.Asides = "The CEO said, ""Sales are fantastic!"""
```

In the second technique, Actuate Basic supports back quotes (```) to delimit string constants. The following code creates a string with the same value as the previous example:

```
Text.Aside = `The CEO said, "Sales are fantastic!"`
```

Embedding tabs and new-line characters in strings

Tab and new-line characters in string constants can also be embedded into strings. Enclose string constants that contain these characters in braces (`{` and `}`). This syntax supports pasting large blocks of text such as HTML, XML, or SQL directly from an external application into method code.

The following example creates a string with both tabs and new-line characters:

```
ObtainSelectStatement = { "  
    SELECT  
        Customers.custID,  
        Customers.name  
    FROM  
        customers  
    "
```

Working with numeric data

Actuate Basic offers several data types that can contain numeric data. The type you choose depends on how you use the numbers. The following sections describe the different types of numeric data and when to use each.

About numerical data types

The Integer and Long data types represent numbers that have no fractional component.

The Single and Double data types can express floating point numbers.

You can express a floating point value as:

`mmmmEeee`

where

- `mmmm` is the mantissa
- `eee` is the exponent, a power of 10

You can assign all numeric variables to each other and to variables of the Variant type. Actuate Basic rounds the fractional part of a floating point number before assigning the floating point number to an Integer.

About the Currency data type

The Currency data type represents a monetary value with a precision of four decimal places. Use the Currency data type for calculations involving money and for fixed point calculations in which accuracy is important. A floating point number has a larger range than a Currency data type. A floating point number is subject to small rounding errors. Because Currency is a scalar data type, it is not subject to rounding errors within its range.

A Currency variable is stored as 96-bit (12-byte) number in an Integer format, scaled by 1,000,000,000 (10^9). This scale produces a fixed point number with 20 digits to the left of the decimal point and 9 digits to the right.

To ensure that a Currency value maintains its precision, append the currency type declaration symbol, @, to the value after you define it, as shown in the following example:

```
Dim DollarAmt As Currency
DollarAmt = 922337203685476.5807@
```

The preceding example ensures that DollarAmt is not subject to rounding errors. In this example, if you do not specify the Currency type declaration symbol, DollarAmt evaluates to 922337203685477.

Converting a string to a number

Use the Val function to convert a String to a numeric value. Val returns a Double data type. The syntax for Val is:

```
Val("<string expression>")
```

For information about how Val converts strings, see Chapter 6, "Statements and functions."

Working with date and time data

Actuate Basic stores a Date variable as an IEEE 64-bit floating point number. This number represents dates ranging from 1 January 100 to 31 December 9999 and times from 0:00:00 to 23:59:59. You can assign any recognizable literal date value to a Date variable. You must enclose a literal date within number sign characters (#) in the following format:

```
#1/1/2002# or #11/12/2003#
```

The user's locale determines the interpretation of a literal Date value. If you plan to distribute a report to multiple locales, DateSerial is a better choice.

Using date and time display formats

A Date variable uses the short date format your computer recognizes. The time appears in either 12- or 24-hour format, according to your computer’s time format.

When you convert other numeric data types to Date, values to the left of the decimal represent date information and values to the right of the decimal represent time. Midnight is 0 and midday is .5. A negative number represents a date before December 30, 1899.

Formatting date and time values

You can perform mathematical operations on a date or time value. Adding or subtracting an integer operates on the date. Adding or subtracting a fraction operates on the time. Table 2-11 lists the Actuate Basic date functions. For more information about these functions, see Chapter 6, “Statements and functions.”

Table 2-11 Actuate Basic date functions

Function	Description
DateSerial	Returns a date or date serial number from the year, month, and day numbers entered. Always specify a four-digit year. The supported date range for report scheduling is January 1, 1980 through December 31, 2036. The supported date range for all other data processing and display, including database access, is January 1, 100 through December 31, 9999.
Day	Extracts the day component from a date and returns a number.
Weekday	Determines the day of the week for this date and returns it as a number (1 to 7), where Sunday is 1.
Month	Extracts the month component of a date and converts it to a number.
Date	Returns the current date.
Year	Extracts the year component from a date and returns a number.

You can use date and time literals by enclosing them within number signs (#). For example:

If Today > #2/25/2003# Then ...

You can also include a time.

If Now > #2/25/2003 10:00pm# Then ...

If you do not include a time, Actuate Basic uses midnight as the start of the day. If you do not include a date, Actuate Basic uses December 30, 1899 as the start of the calendar.

To determine whether a Variant or other value can convert to a Date data type, use the `IsDate` function. You can then use the `CDate()` function to convert the value to a Date data type.

For information about working with numeric data in different locales, see *Working in Multiple Locales using Actuate Basic Technology*.

Working with a user-defined data type

You can use Actuate Basic's data types for most data in a report that uses strings, numeric data, and dates. Many reports require logically structuring related data. These reports are less prone to error when you create custom, or user-defined, data types. Actuate Basic supports three user-defined data types:

- Alias
- Structure
- Class

Using an alias

An alias is the simplest type of user-defined data. When you use an alias, you declare a data type that has the properties of an existing data type. The syntax is:

```
Typedef <new data type> As <existing data type>
```

Typically, the new data type is one of the Actuate Basic data types. The following example shows an AFC type:

```
Typedef AcColor As Integer
```

You can also declare an alias to a structure, as shown in the following example:

```
Typedef MyPoint As AcPoint
```

Using a structure

A user-defined data type is a structure in which the elements contain previously defined data types. These data types can be either Actuate Basic data types or user-defined data types.

For example, if you write a program to catalog computers, you can define a structure that represents related information about the computer systems, as shown in the following example:

```
Type SysInfo
    ComputerName As String
    CPU As String
    Memory As Long
    DiskDriveType As String
    DiskDriveSize As Single
    Price As Currency
    PurchaseDate As Date
End Type
```

After you declare a structure, you can declare a variable of this data type in the same way that you declare a variable of a fundamental type.

```
Dim SystemOne As SysInfo, SystemTwo As SysInfo
```

When you declare a variable, you can assign and retrieve values from the elements of the variable using the dot notation, as shown in the following example:

```
SystemOne.Price = 1999.95
SystemOne.PurchaseDate = #2/25/03#
```

If both variables are of the same user-defined type, you can also assign one user-defined variable to another. The following example assigns all elements of the first variable to the same elements of the second variable:

```
SystemTwo = SystemOne
```

You can nest user-defined types. After you define a data type, you can include it in another user-defined type. Nesting can be as complex as your application requires. To keep your code readable and easy to debug, however, keep all nested user-defined types in one module.

Using a class

A class is a user-defined data type that defines the attributes of an object in a report. To create an object, you declare a variable that contains a reference to the object and assign a class as its type. For more information about classes and objects, see *Programming with Actuate Foundation Classes*.

Converting a data type

Actuate Basic provides functions to convert a value into a specific data type. For example, to convert a value to Currency, use the CCur function:

```
WeeklyPay = CCur(hours * rate)
```


Table 2-12 lists the functions you can use for converting a data type. For more information about these functions, see Chapter 6, “Statements and functions.”

Table 2-12 Functions for converting a data type

Function	Converts an expression to
CCur	Currency
CDate	Date
CDBl	Double
CInt	Integer
CLng	Long
CSng	Single
CStr	String
CVar	Variant
CVDate	Variant of VarType 7 (Date)

For each locale, these functions convert separators in a numeric expression according to the locale’s rules. The Decimal, Grouping, CurrencyDecimal and CurrencyGrouping parameters of localemap.xml define locale-specific rules.

For more information about locale-specific data, see *Working in Multiple Locales using Actuate Basic Technology*.

Writing and using a procedure

This chapter contains the following topics:

- About procedures
- Declaring an argument
- Calling a procedure
- Overloading a procedure
- Using a control structure

About procedures

A procedure is a set of commands that perform a specific set of operations. Actuate Basic supports two types of procedures, Sub and Function. A Sub procedure does not return a value. A Function procedure returns a value.

A procedure can simplify programming by breaking a program into smaller logical components. You use these components as building blocks that enhance and extend Actuate Basic.

A procedure is useful for condensing a repeated or shared task, such as a calculation, text and control formatting, and database operations.

Using procedures has two major benefits:

- When you break a program into discrete logical units, you can debug these units more easily than an entire program without procedures.
- You can reuse a procedure in multiple reports, typically without modification.

About scope in procedures

The procedures you create can have either class or global scope. The scope of the procedure determines which parts of a program can access that procedure. A procedure you declare in a class has class scope. This means that it is accessible only to objects of that class. A procedure with class scope is a method of the class.

A procedure you declare in an Actuate Basic source (.bas) file has global scope. This means that it is accessible from any part of the report. The following sections describe methods and global procedures in more detail.

About methods

A method is a procedure you declare within a class declaration. A report typically includes multiple objects of a class. A method performs an action on an object in a class. The following example shows a method that checks the values of a parameter:

```
Sub Start( )  
    If IsNull( StartDate )  
+ Or (DateDiff("d", StartDate, DateSerial(2006,1,1) > 0)) Then  
        StartDate = DateSerial(2006, 1, 1)  
    End If  
    Super::Start( )  
End Sub
```

For more information about methods, see *Programming with Actuate Foundation Classes*.

Usually, your code does not need to specify which object is currently executing. Sometimes, however, a method or property refers explicitly to a particular object. The `Me` keyword supports referring to the object in which the code is running. Use `Me` as if it were the `Name` property of the object, as shown in the following example:

```
Sub PrintTotal( )  
    Me.Print  
End Sub
```

About global procedures

You can create a global procedure by creating a new Actuate Basic source (.bas) file or by using an existing BAS.

The following example shows an outline of a BAS that uses global procedure declarations:

```
Sub ProcA( )  
    ...  
End Sub  
Function FuncAr( ) As Integer  
    ...  
    FuncA = <expression>  
End Function
```

After you include a module containing procedure declarations, you call your procedures the same way as you call Actuate's predefined functions.

Declaring a Sub procedure

The syntax for a Sub procedure is:

```
Sub <procedure name>( [<arguments>] )  
    <statements>  
End Sub
```

where

- `<arguments>` is an optional list of argument names separated by commas. Each argument looks like a variable declaration and acts like a variable in the procedure. For more information about arguments, see "Declaring an argument," later in this chapter.
- `<statements>` are executed each time the procedure is called. You can place a Sub procedure in a global module, where it is accessible throughout the report, or in a class, where it becomes a method that operates on or is accessible only to an instance of that class.

Declaring a Function procedure

Actuate Basic includes built-in functions that return a value with an appropriate data type. For example, Now returns a date value containing the current date and time.

You can write your own procedures using the Function statement. The following example shows the syntax:

```
Function <procedure name>( <arguments> ) [As <type>]  
    <statements>  
    <procedure name> = <expression>  
End Function
```

A Function procedure is similar to a Sub procedure in that it can take arguments, execute a series of statements, and change the value of its arguments. The arguments for a Function procedure work the same way as arguments for a Sub procedure, with the following differences:

- Typically, you call a function by including the Function procedure name and arguments on the right side of a larger statement or expression. The variable on the left of the equal sign stores the value the Function returns.
- A Function procedure has a data type, just as a variable does, that determines the type of the return value. If you omit the As clause, the function type is Variant.
- You return a value by assigning it to the procedure name within the procedure. When the function returns, this value can become part of the larger expression from which you called the function.

The following example shows how to write a function that calculates and returns the area of a rectangle, given the length and width:

```
Function RectArea (Width As Single, Length As Single) As Single  
    RectArea = Width * Length  
End Function
```

Creating a global procedure

To create a global procedure using a new source file, perform the following steps.

- 1 Create an Actuate Basic source (.bas) file.
 - 1 Choose Tools→Library Organizer→New.
 - 2 In New Library, type a name for the file. In Save as type, choose Source File (*.bas).
 - 3 Navigate to the directory in which to save the file. Choose Save.
 - 4 In Library Organizer, choose OK.

A window for creating the source file appears.

- 2 In the source file, write the procedure using the Sub or Function statement. Include parentheses after the procedure name, even if the parentheses are empty.

- 3 Save the source file.

The report includes the source file.

Declaring an argument

An argument passes a value to the procedure. You declare an argument as a variable in a procedure declaration. For example, a procedure that performs a calculation usually requires a value for processing, as shown in the following examples. You pass this value to the procedure when you call it. The arguments are the names the procedure uses for the values you supply. The first value you supply gets the first parameter name in the list, the second value gets the second parameter name, and so on.

```
Function Sum2 (Num1 As Integer, Num2 As Integer) As Integer
    Sum = Num1 + Num2
End Function
```

```
Function ExtendedCost (Cost As Currency, Quantity As Integer)
+   As Currency
    ExtendedCost = Cost * Quantity
End Function
```

About argument data types

The default data type of a procedure argument is Variant. You can declare another data type for a procedure argument variable. For example, the following function accepts a string and an integer:

```
Function ExtractLeftString( S As String, N As Integer)
    <statements>
End Function
```

Passing an argument by reference

Actuate Basic passes a variable to a procedure by reference. Passing a variable by reference gives the procedure access to the variable's location in memory. Using this information, the procedure can change the value of the variable.

If you declare a data type for an argument passed by reference, you must pass a value of that data type when you call the procedure. You can convert the data type if necessary.

Passing an argument by value

The ByVal keyword passes a variable by value. When calling an internal procedure, Actuate Basic passes a copy of the value to the procedure. In this case, if the procedure changes the value, only the copy changes, not the original. When the procedure finishes, the copy of the variable goes out of scope.

When calling an external procedure, Actuate Basic passes the address of the string data. In this case, if the procedure changes the value, the original value also changes.

Calling a procedure

The techniques for calling a procedure depend on the type of procedure, its scope, and the way your report uses it. The following sections describe how to call Sub and Function procedures.

Calling a Sub procedure

A call to a Sub procedure is a stand-alone statement. Because a Sub procedure does not return a value, you cannot call it by using its name within an expression. A Sub procedure can modify values of any variables it receives as arguments.

You call a Sub procedure in one of two ways, as shown in the following examples:

```
Call MyProc( Argument1, Argument2)
MyProc (Argument1, Argument2)
```

Calling a Function procedure

Because a Function procedure returns a value, you typically call it by using its name as part of a larger expression. You call a custom function the same way you call a built-in function. All the following examples call a function named UpdateTotal:

```
Print UpdateTotal
NewTotal = UpdateTotal( )
If UpdateTotal < 0 Then
    ShowFactoryStatus( "Error: Total is negative." )
End If
```

Overloading a procedure

To overload a procedure is to define multiple versions of it. The versions use the same procedure name but different argument lists. The lists can differ in the

number of arguments, the order of arguments, or the data types of the arguments. Overloading produces a group of closely-related procedures that can call one another as necessary.

For example, you can write a square root function that operates on integers and another square root function for doubles. In Actuate Basic, you can give both procedures the same name, `square_root`. By overloading `square_root`, you give it more than one possible meaning.

Actuate Basic distinguishes between versions of the function by the type and number of arguments. The following examples show an overloaded procedure:

```
Function square_root( intInput As Integer) As Integer
Function square_root( doubleInput As Double) As Double
```

Using a control structure

Use a control structure to control the flow of report generation. Most reports contain decision points that support using structures and loops to change statement order. Table 3-1 describes the control structures that Actuate Basic supports.

Table 3-1 Supported control structures		
Statement	Description	Syntax
Do...Loop	Executes a block of statements while a specified condition is True or until it becomes True. You can use several variations of the Do...Loop statement but each evaluates a numeric conditional as a Boolean to determine whether to continue executing. The first syntax in this table tests the condition statement. If False, the loop code is skipped. If true, the statements execute and the loop repeats until the condition evaluates to False. The second syntax guarantees that the loop will execute at least once.	Do While <condition>
		<statements>
		Loop
		Do
		<statements>
		Loop While <condition>

(continues)

Table 3-1 Supported control structures (continued)

Statement	Description	Syntax
If...Then... Else	Executes one block of specified statements based on a conditional expression. You can include only a single Else clause regardless of whether you have ElseIf clauses.	If <condition1> Then [<statement block 1>] ElseIf <condition2> Then [<statement block 2>] Else [<statement block 3>] End If
For...Next	Repeats a block of instructions a specified number of times.	For <counter> = <start> To <end> [Step <step size>] <statements> Next <counter>

Using a nested control structure

You can place a control structure inside another control structure, such as a For...Next loop within an If...Then block. A control structure inside another control structure is called a nested structure.

Actuate Basic supports nesting a control structure to as many levels as you need.

Exiting a control structure

To exit a loop without performing any further iterations or statements within the loop, use the Exit For and Exit Do statements.

Exiting a Sub or Function procedure

To exit a procedure without processing any remaining statements in it, use the Exit Sub and Exit Function statements. These statements terminate the Sub or Function procedure and transfer control to the line following the procedure's End statement.

4

Calling an external function

This chapter contains the following topics:

- Understanding external C functions
- Declaring a C function
- Calling a C function
- Working with a Java object
- Converting a Java data type
- About Java exception and error handling
- Debugging a Java object

Understanding external C functions

This chapter describes how to call a C function in an Actuate Basic report. It does not describe how to program a C function or publish it in a library. Refer to C documentation for that information.

Actuate Basic provides a rich set of statements and functions you can use in your report. Sometimes, however, your program can accomplish more or execute more efficiently using C functions. Many companies and third-party developers supply libraries of C functions. By taking advantage of these C libraries, you can extend the functionality of Actuate Basic.

Actuate Basic supports calling an external C function if the function is accessible to a report. In the Windows environment, an Actuate Basic report can call a C function stored in a dynamic link library (DLL). On a UNIX system, a report can call a C function stored in a shared library.

Using a C function with Actuate Basic

Because C functions reside in external files, you must provide information to Actuate Basic so that it can find and execute the appropriate C function. Using a C function involves two basic steps:

- Declare the C function in Actuate Basic using the Declare statement. This step supplies the information Actuate Basic requires to convert and execute the C function.
- Call the C function the same way you call an Actuate statement or function. Actuate software loads the library then executes the C function.

You declare the C function only once but you can call it any number of times.

To make a C function accessible to all parts of your Actuate application, write the Declare statements in an Actuate Basic source (.bas) file, using a text or code editor. Then, include the BAS in your report by choosing Tools→Library Organizer.

Unloading an external library

As part of a library's memory management, the library must de-allocate memory used by a variable that an external call returns. For a variable you use with Actuate, you can create a memory cleanup function, `AcCleanup(char *aPointer)`. If you implement an `AcCleanup` function in your external library, Actuate calls `AcCleanup` after it finishes using the variable. If you do not implement `AcCleanup`, Actuate does not call `AcCleanup`.

Declaring a C function

The first step in using an external C function is to declare it. You must provide the following information in the Declare statement:

- The name of the C function
- The name of the DLL or shared library that contains the C function
- Arguments that the C function takes
- A return data type value, if any

You can also provide a name with which to call the C function by using the Alias keyword. For more information about using Alias, see “Aliasing a non-standard C function name,” later in this chapter.

For more information about the Declare statement, see Chapter 6, “Statements and functions.”

Declaring the C function as a Sub procedure

If the C function does not return a value, declare it as a Sub procedure, using the following syntax:

```
Declare Sub <function name> Lib <"library name">
    [Alias <"alias name">] [( <argument list> )]
```

The following example declares a Sub procedure:

```
Declare Sub LogError Lib "Kernel32" (ByVal uErr As Integer,
+ lpvInfo As Any)
```

Declaring the C function as a Function procedure

If the C function returns a value, declare it as a Function procedure, using the following syntax:

```
Declare Function <function name> Lib <"library name">
    [Alias <"alias name">] [( <argument list> )] [As <type>]
```

The following example declares a Function procedure:

```
Declare Function GetSystemMetrics Lib "USER32" (i As Integer)
+ As Integer
```

Understanding C function declaration issues

To declare and call a C function, ensure you have documentation for those procedures. A C function declaration can become complex for the following reasons:

- C often passes arguments by value, whereas Actuate Basic's default behavior is to pass arguments by reference.
- C type declarations differ from Actuate Basic type declarations.
- A C function can have a name that is not a valid identifier in Actuate Basic.

The following sections explain the syntax of the Declare statement in more detail so that you can create the correct declaration for the C function.

Specifying the library of a C function

On a Windows system, you specify the name of a DLL in the Lib<"library name"> clause. On a UNIX system, you specify the name of a shared library.

<"library name"> can be a file specification that includes a path. For example:

```
Declare Function GetSystemMetrics  
+ Lib "C:\WINNT\SYSTEM32\USER32" (i As Integer) As Integer
```

If you omit the path, Actuate searches for the library in the following order:

- The directory in which Actuate is installed
- The current directory
- The Windows system directory
- The Windows directory
- On a Windows system, the directories listed in the PATH environment variable
- On a UNIX system, the directories listed in the LD_LIBRARY_PATH, LIBPATH, or SHLIB_PATH environment variables

If you omit the file extension, Actuate assumes a .dll extension.

Passing an argument by value or reference

By default, Actuate Basic passes all arguments by reference. However, many C functions expect you to pass arguments by value. If you pass an argument by reference to a procedure that expects a value, the procedure cannot interpret the data.

To pass an argument by value, use the ByVal keyword before the argument declaration in the Declare statement. Each time you call the procedure, Actuate Basic passes the argument by value, as shown in the following example:

```
Declare Function GetFreeSystemResources Lib "User32"  
+ (ByVal fuSysResource As Integer) As Integer
```

The arguments you pass by reference to C functions are strings and arrays.

About flexible argument types

Some C functions can accept more than one type of data for the same argument. To pass more than one type of data, declare the argument using the As Any keyword to remove type restrictions, as shown in the following example:

```
Declare Function SendMessage Lib "User32"  
+ (ByVal hWnd As Integer, ByVal msg As Integer,  
+ ByVal wp As Integer, ByVal lp As Any) As Long
```

When you call the function, you can pass either a string or a long integer as its last argument.

```
FindItem = SendMessage(aList.hWnd, LB_FINDSTRING, -1, target)
```

Aliasing a non-standard C function name

Occasionally, a C function has a name that is an invalid Actuate Basic identifier. A C function name is invalid if it starts with an underscore, contains a hyphen, or has the same name as an Actuate Basic reserved word. When the C function name is an invalid Basic identifier, use the Alias keyword, as shown in the following example:

```
Declare Function LOpen Lib "Kernel32" Alias "_lopen"  
+ (ByVal fn As String, ByVal f As Integer) As Integer
```

The preceding example calls LOpen in the Basic code. _lopen is the name of the C function in the DLL or shared library.

You can also use Alias when you want to use a name different than the actual C function name. For example, to substitute a shorter name for a long C function name.

Determining an Actuate Basic argument type

To call a C function from Actuate Basic, you must translate it into a valid Declare statement. Table 4-1 lists the Actuate Basic argument types to declare in the Declare statement, based on the C argument types of the functions you call.

Table 4-1 Relationships of C argument types to Actuate Basic types

C type	Actuate Basic type
int *x, int &x	x As Integer

(continues)

Table 4-1 Relationships of C argument types to Actuate Basic types (continued)

C type	Actuate Basic type
int x	ByVal x As Integer
long *x, long &x	x As Long
long x	ByVal x As Long
double *x, double &x	x As Double, x As Single, x As Date
double x	ByVal As Single, ByVal As Double, ByVal As Date
AcCurrency *x ¹	x As Currency
AcCurrency x	ByVal x As Currency
char *x, LPCSTR x (null terminated string)	ByVal x As String
wchar_t *x, LPCTSTR x (null terminated Unicode string)	ByVal x() As String
union { int, long, double, AcCurrency, RWCString } *x	x As Variant, x As Any
actual data (int, long, double, AcCurrency, char*)	ByVal x As Variant, ByVal x As Any
void **x (pointer to any C/C++ pointer)	x As CPointer
void *x	ByVal x As CPointer
int *x, int x[]	x() As Integer, ByVal x() As Integer
long *x, long x[]	x() As Long, ByVal x() As Long
double *x, double x[]	x() As Single, ByVal x() As Single, x() As Double, ByVal x() As Double, x() As Date, ByVal x() As Date
AcCurrency *x, AcCurrency x[]	x() As Currency, ByVal x() As Currency
RWCString **x, RWCString &x[]	x() As String
char **x, char *x[]	ByVal x() As String
void **x, void *x[]	x() As CPointer, ByVal x() As CPointer
wchar_t **x, wchar_t *x[]	ByVal x() As String

1. AcCurrency is a C structure with a size of 12 bytes.

```
struct AcCurrency
{
    unsigned long low;
    unsigned long mid;
    long high;
};
```

The currency value is stored in fixed point format.

```
<96-bit integer value in AcCurrency structure> = <currency
value> * 109
```

Calling a C function

Call a C function as you do an Actuate Basic statement or function, ensuring that you pass the correct arguments. Actuate Basic cannot verify the arguments you pass.

Calling a C function with a specific data type

Actuate Basic provides a range of data types, including some that C functions do not support, such as variable-length strings, AnyClass, and Object. The following sections discuss data-type issues to consider when passing an argument in a function call.

Passing a string to a C function

Procedures in most DLLs expect standard C strings, which end in a null character (binary zero). If a C function expects a null-terminated string as an argument, declare the argument as a string with the ByVal keyword. In a string declaration, the ByVal keyword is misleading. ByVal tells Actuate Basic to convert the string to a null-terminated string, not that the string is passed by value. In fact, strings are always passed to C functions by reference.

Passing an array to a C function

You pass individual elements of an array in the same way you pass any variable of the same type as the base type of the array. You can also pass an entire array of any type except user-defined types. Actuate copies data in the Actuate Basic array into a C array before passing it to the C function.

If you pass a multidimensional array, the C function reverses the dimensions. For example, if you declare an Actuate Basic array using the following declaration:

```
Dim x (3, 4, 5) As Integer
```

C converts it to:

```
Int x [5] [4] [3]
```

Passing an array by value is faster than passing it by reference. Use the `ByVal` keyword to pass an array by value when possible.

Passing a null pointer to a C function

In Actuate Basic, any of the fundamental data types can be null. Therefore, to pass a null pointer to a C function, use the `Null` keyword, as shown in the following examples:

```
Declare Sub Func1 Lib "LIBABC" (ByVal p As CPointer)
    Dim ptr As CPointer
    Func1(ptr)      ' pass CPointer ptr to the C function
    Func1(Null)     ' pass null pointer to the C function

Declare Sub Func2 Lib "LIBXYZ" (ByVal s As String)
    Dim s As String
    s = "text"
    Func2(s)        ' pass null-terminated string to the C function
    Func2(Null)     ' pass null pointer to the C function
```

Passing a user-defined data type to a C function

You cannot pass a user-defined data type to a C function.

Passing an object reference variable to a C function

You cannot pass an object reference variable to a C function. An object reference variable is a complex data structure that a C function cannot interpret.

About return values from C functions

Table 4-2 shows how C return values convert to Actuate Basic data types.

Table 4-2 Relationships of C return values to Actuate Basic data types

C type	Actuate Basic type
int	Integer
long	Long
double	Single, Double, Date
char* (null terminated)	String
(char*) NULL	String (empty)
any pointer (void*, etc.)	CPointer

Working with a Java object

Actuate supports access to Java objects using the Java Native Interface (JNI). To perform the following tasks, access a Java object using Actuate Basic:

- Create a Java object.
- Invoke an instance method on the instances.
- Invoke a static method on the class of the object.
- Access an instance variable on the instances.
- Access a static variable on the class of the object.

About Java requirements

To access a Java object using Actuate Basic, you must use Java Runtime Environment (JRE) or Java Development Kit (JDK) Version 1.2 or higher. You must verify the installation of the JRE or JDK. If a required DLL is missing, JRE can close an Actuate report when creating a Java Virtual Machine.

Add the class definitions of the Java classes to the CLASSPATH variable.

Creating a Java object

Before creating a Java object, you must declare a variable to refer to the object. For example:

```
Dim theObject As Object
```

You then use the `CreateJavaObject` function to create the Java object using the following syntax:

```
Set theObject = CreateJavaObject("<class identifier>")
```

Invoking a method and accessing a field on a Java object

To perform actions on the object, you invoke the methods of a Java object using the `object.method` syntax. If the method does not exist for the object, Actuate displays a user error message.

To access a field on the object, name the field following the handle to the object. For example:

```
someint = theObject.internalValue
```

To set a field to a specific value, use the following syntax:

```
theObject.internalValue = 10
```

Use the same syntax to access static fields and methods.

Actuate makes no distinction between code that accesses a field and code that invokes a method without parameters. For example, the following lines of code are considered the same:

```
someint = theObject.InternalValue()  
someint = theObject.InternalValue
```

Similarly, if an instance method and a static method have the same name and the same or similar signatures, Actuate makes no distinction between them.

Specifically, Actuate makes no distinction between integral data types such as long, short, and int, and float data types such as single and double. For example, there is no distinction between the following methods:

```
Myfunction(short, short, long)  
Myfunction(int, int, int)
```

Invoking a static method and accessing a static field

You can invoke a static method and access a static field without instantiating an object of the class. In the following example, TheStaticMethod is the name of the method to call and theStaticField is the name of the field to access:

```
Dim theClassObject As Object  
Set theClassObject = CreateJavaClassHandle( <classname> )  
theClassObject.TheStaticMethod( <parameters> )  
theClassName.theStaticField = 10
```

Converting a Java data type

Table 4-3 shows how Java data types convert to Actuate Basic data types.

Table 4-3 Relationships of Java to Actuate Basic data types

Java data type	Actuate Basic type
boolean	Boolean
byte	Integer
char	Integer
double	Double
float	Single
int	Integer
long	Integer
Object	Object

Table 4-3 Relationships of Java to Actuate Basic data types

Java data type	Actuate Basic type
short	Integer
void	No type

Converting a Java String

Actuate e.Report Designer Professional supports conversions between a Java String and an Actuate Basic string. Actuate converts only the entire string. Other Actuate string operations do not work on a Java String. e.Report Designer Professional supports the following operations:

- Converting an Actuate Basic string to a Java String object.
- Passing an Actuate Basic string to a method that expects a Java String object.
- Converting a Java String object to an Actuate Basic string. A Java String object does not convert automatically. Use methods on the Java object to copy a string from a Java String object.

Converting a Java null

You cannot assign a Java null to an Actuate data type. In C and C++, Null is a constant with a value similar to 0, 0L, or ((void*)0), depending on the compiler and memory model options.

In Java, null is a keyword denoting a special value for a reference. Null does not necessarily have a value of 0. You cannot convert it to a primitive data type such as Integer or Boolean.

As a workaround to this issue, return an appropriate value instead of null from a method in the Java class file.

Converting an array

Actuate supports automatic conversion of single-dimension arrays of primitive types to and from Actuate Basic. The assignment operator (=) copies a Java array where each element is a primitive type, such as an int, into an Actuate Basic array. In an assignment operation, you can copy an entire Actuate Basic array of primitive types into a Java array. The operation copies each element in the source array to the destination array until the end of either the source or the destination array. The following example shows how to copy an array of 10 elements:

```
Dim basicIntArr( 10 ) As Integer
Dim javaIntArr As Object
Set javaIntArr = <something returning a Java array>
' Convert a Java integer array to a Basic array
basicIntArr = javaIntArr
```

You access elements in an array using the methods on the array object.

About Java exception and error handling

The Actuate Basic Err function returns an integer value corresponding to each user error. You can use either the number or the constant for error handling. Table 4-4 lists the error names and their meanings.

Table 4-4 Errors

Error name	Meaning
E_JVMCLASSPATHNOTFOUND	Could not get environment variable CLASSPATH
E_JVMCREATEJVMFAILED	Failed to create Java Virtual Machine
E_JVMCLASSNOTFOUND	Could not find the Java class
E_JVMCREATEOBJECTFAILED	Failed to create Java object
E_JVMINVALIDJAVAHANDLE	Invalid Java object or class handle
E_JVMMETHODFIELDACCESS FAILED	Failed to access a method or a field
E_JVMTYPECONVERSIONFAILED	Type conversion failed
E_JAVAEXCEPTIONOCCURRED	Java exception occurred

Actuate captures and keeps the last exception object. You can test for the E_JAVAEXCEPTIONOCCURRED user error and access the exception object using the GetJavaException function. For example:

```
Dim javaObj As Object
On Error Goto HandleError
Set javaObj = CreateJavaObject( "JavaClassName" )
javaObj.TryToDoSomething() ' This call can cause Java Exception
' Write code to handle normal behavior without exception
' then exit the method

HandleError:

Dim errorCode As Integer
errorCode = Err

If errorCode = E_JAVAEXCEPTIONOCCURRED Then
    Dim exceptionObj As Object
    Set exceptionObj = GetJavaException()
```

```
    If exceptionObj.toString() = "SomeJavaExceptionType" Then  
        ' Do something or resume execution  
    End If  
End If
```

Debugging a Java object

The Actuate debugger recognizes all external objects. When you declare the object, the debugger indicates that the object type is unknown. When you create the object, the debugger shows the object type. A numeric identifier indicates the object. Handles to the same object show the same identifier.

For a Java String, the debugger indicates that the object is a Java Object and shows the beginning of the string value.

For a Java array, the debugger indicates that the object is a Java array object and shows the object type.

Part Two

Actuate Basic Language Reference

Language summary

This chapter provides grouped lists of functions and statements that are frequently used together to perform specific programming tasks:

- Arrays
- Classes and instances
- Program flow
- Conversion
- Date and time
- Environment
- Error trapping
- File input and output
- Finances
- Graphics and printing
- Math
- Operators
- Procedures
- Strings
- Variables and constants

Arrays

Table 5-1 Working with arrays

Programming task	Function/Statement
Change default lower limit	Option Base
Declare and initialize	Dim, Global, ReDim, Static
Test the limits	LBound, UBound
Reinitialize	Erase, ReDim

Classes and instances

Table 5-2 Working with classes and instances

Programming task	Function/Statement
Declare a class	Class
Create an instance of a class	NewInstance, NewPersistentInstance, IsPersistent, CreateJavaObject, CreateJavaClassHandle
Access class variables	GetClassID, GetClassName, GetValue, GetValueType, GetVariableCount, GetVariableName, IsKindOf, SetBinding
Copy class variable values	CopyInstance

Program flow

Table 5-3 Controlling program flow

Programming task	Function/Statement
Branch	FollowHyperlink, GoTo, On Error
Exit or pause the program	End, Stop
Loop	Do...Loop, For...Next, While...Wend
Make decisions	If...Then...Else, If, Select Case

Conversion

Table 5-4 Performing conversions

Programming task	Function/Statement
ANSI value to string	Chr[\$]
Binary image file to string	ConvertBFileToString
Color to SVG attribute	SVGColorAttr
Date to serial number	DateSerial, DateValue
Decimal number to others	Hex[\$], Oct[\$]
Font to SVG style	SVGFontStyle
Lists of values into an array	ListToArray
Number to string	Format[\$], Str[\$]
Number to SVG attribute	SVGAttr
Number to SVG string	SVGDbI
One data type to another data type	CCur, CDate, CDbI, CInt, CLng, CSng, CStr, CVar, CVDatE, Fix, Int
Serial number to date	Day, Month, Weekday, Year
Serial number to time	Hour, Minute, Second
String to ANSI value	Asc
String to binary image file	ConvertStringToBFile
String to number	Val
String to SVG attribute	SVGAttr
String to SVG string	SVGStr
String to SVG style	SVGStyle
Time to serial number	TimeSerial, TimeValue

Date and time

Table 5-5 Working with dates and times

Programming task	Function/Statement
Control how dates are converted	ParseDate

(continues)

Table 5-5 Working with dates and times (continued)

Programming task	Function/Statement
Convert date to serial number	DateSerial, DateValue
Convert serial number to date	CVDate, Day, Month, Weekday, Year
Convert serial number to time	Hour, Minute, Second
Convert time to serial number	TimeSerial, TimeValue
Convert to date data type	CDate, CVDate
Determine whether an argument can be converted to a date	IsDate
Get current date or time	Date[\$], Now, Time[\$], IsDate
Manipulate date or time	DateAdd, DateDiff, DatePart
Process time	Timer

Environment

Table 5-6 Manipulating the environment

Programming task	Function/Statement
Clear Clipboard	ClearClipboard
Display comments in the status line of the factory dialog	ShowFactoryStatus
Find environment variables	Environ[\$]
Get Clipboard text	GetClipboardText
Get command-line arguments	Command[\$]
Get user's login name	GetServerUserName
Get user's machine name	GetServerName
Get name of Actuate application which is currently running	GetAppContext
Get user's operating system login name	GetOSUserName
Get scaling factor	GetReportScalingFactor

Table 5-6 Manipulating the environment

Programming task	Function/Statement
Get stage of a report's lifecycle	GetReportContext
Get the name of the Encyclopedia volume on which the file is stored	GetVolumeName
Get user agent string	GetUserAgentString
Get version number of the AFC library	GetAFCROXVersion
Get version number of the factory that the report object executable (.rox) file is using	GetFactoryVersion
Get version number of ROX file	GetROXVersion
Run other programs	Shell
Temporarily suspend report execution	Sleep
Set Clipboard text	SetClipboardText
Sound beep	Beep

Error trapping

Table 5-7 Trapping errors

Programming task	Function/Statement
Get error messages	Error, Error\$, GetJavaException
Get error status	Err, Erl
Insert explanatory remarks	Rem
Prevent division-by-zero error	SafeDivide
Prevent logic error by predetermining whether a condition is true	Assert
Set Err function to a given value	Err

(continues)

Table 5-7 Trapping errors (continued)

Programming task	Function/Statement
Simulate run-time errors	Error
Trap errors while program is running	Assert, On Error, Resume

File input and output

Table 5-8 Working with files

Programming task	Function/Statement
Access or create a file	Open
Add directories to search for included images	ExtendSearchPath
Close a file	Close, Reset
Control output appearance	Space, Tab, Width
Copy one file to another	FileCopy
Determine which open report object instance (.roi) file is the default used when New Persistent() is called to instantiate an object	SetDefaultPOSMFile
Determine which formats are supported in a DHTML environment for displaying report pages and results of a search operation	GetSearchPageFormats, GetViewPageFormats, IsSearchFormatSupported, IsViewPageFormatSupported
Get information about a file	EOF, FileAttr, FileDateTime, FileExists, FileLen, FileTimeStamp, FreeFile, Loc, LOF, Seek, Seek2
Manage disk drives and directories	ChDir, ChDrive, CurDir[\$], Mkdir, Rmdir
Manage files	Kill, Lock...Unlock, Name
Read from a file	Get, Input, Input[\$], InputB[\$], Line Input
Retrieve strings from resource files	StrLoad[\$]
Search for a file through the existing search path	FindFile

Table 5-8 Working with files

Programming task	Function/Statement
Set object aging rules on a report object web (.row) file	SetStructuredFileExpiration
Set or get file attributes	GetAttr, SetAttr
Set read-write position in a file	Seek
Write to a file	Print, Put, Write

Finances

Table 5-9 Working with finances

Programming task	Function/Statement
Depreciation of assets	DDB, SLN, SYD
Get annuity information	FV, IPmt, NPer, Pmt, PPmt, PV, Rate
Get net present value and rate of return	IRR, NPV, MIRR

Graphics and printing

Table 5-10 Working with graphics and printing

Programming task	Function/Statement
Decode string into binary image file	ConvertStringToBFile
Encode binary image file into string	ConvertBFileToString
Dynamically adjust the height of a container to accommodate a large amount of text	GetDisplayHeight (Windows only)
Print text	Print, Write
Work with colors	QBColor, RGB

Math

Table 5-11 Working with mathematical expressions

Programming task	Function/Statement
General calculation	Exp, Log, Sqr
Generate random numbers	Randomize, Rnd
Get absolute value	Abs
Get the sign of expressions	Sgn
Numeric conversions	Fix, Int
Trigonometry	Atn, Cos, Sin, Tan

Operators

Table 5-12 Working with mathematical operators

Programming task	Function/Statement
Arithmetic	*, +, -, \, /, ^, Mod
Comparison	<, =<, >, >=, =, <>, &, Is
Concatenation	&
Logical expressions	And, BAnd, Eqv, Imp, Not, BNot, Or, BOr, Xor
Pattern matching	Like

Procedures

Table 5-13 Working with procedures

Programming task	Function/Statement
Call Sub procedure	Call
Declare a reference to an external procedures	Declare
Define a procedure	Function...End Function, Sub...End Sub
Exit from a procedure	Exit, Function...End Function, Sub...End Sub

Strings

Table 5-14 Working with strings

Programming task	Function/Statement
Assign value	Let
Compare two strings	StrComp
Convert to lowercase or uppercase letters	LCase[\$], UCase[\$]
Copy to and from Clipboard	SetClipboardText, GetClipboardText
Create strings of repeating characters	Space[\$], String[\$], StringW[\$]
Find the length of an expression in bytes	LenB
Find the length of a string	Len
Format strings	Format[\$]
Justify strings	LSet, RSet
Manipulate strings	InStr, Left[\$], LTrim[\$], Mid[\$], RevInStr, Right[\$], RTrim[\$], Trim[\$]
Manipulate bytes	InStrB, LeftB[\$], RightB[\$], MidB[\$]
Replace part of a string with a different substring	StrSubst
Set string comparison rules	Option Compare
Translate from one language to another	Open[\$]
Work with UCS-2 encoding values	AscW, ChrW[\$]
Work with ASCII and ANSI values	Asc, Chr[\$]

Variables and constants

Table 5-15 Working with variables and constants

Programming task	Function/Statement
Add search indexes on variables of components	AddValueIndex
Assign object references to variables	Set
Declare aliases for existing object types	Type...As
Declare user-defined variables or record structures	Type...End Type
Declare variables and constants	Const, Dim, Global, Static
Get information about Variant variables	IsDate, IsEmpty, IsNull, IsNumeric, VarType

Statements and functions

This chapter provides an alphabetical list of all Actuate Basic functions and statements. Each entry includes a general description of the function or statement, its syntax, and a description of its parameters and return values.

For conceptual information about working with Actuate Basic, see Part 1, “Working with Actuate Basic.”

Using the code examples

The examples in this chapter illustrate how to use individual statements and functions. They are not necessarily real-world examples of how to create a report. The easiest way to use the Actuate Basic code examples is to copy the code from the code example window in online help and paste it in Method Editor in e.Report Designer Professional.

Not all examples have a Declaration section. If the example you are using does not include a Declare...End Declare statement, you do not have to paste anything into a Basic source (.bas) file.

To examine the effect the sample programs have, it is best to step through them using the e.Report Designer Professional debugger. For information about the debugger, see *Accessing Data using e.Report Designer Professional*.

How to open an example in online help

- 1 Choose Help→Contents.
- 2 In the Table of Contents, navigate to Programming with Actuate Basic→Statements and functions→Using the code examples.
- 3 Under the topic title, choose Example. The code example displays.

How to use a code example in a report design

- 1 Create a new report or open an existing report. This procedure opens Forecast.rod in eRDPro\Examples\DesignAndLayout\Forecast as an example.
- 2 If the code example has a Declaration section, perform the following steps:
 - 1 Create a Basic source (.bas) file by choosing Tools→Library Organizer. Library Organizer appears.
 - 2 Choose New. New Library appears.
 - 3 In File name, type the name for the new file. In Save as type, choose Source file (.bas). Choose Save. The source file appears under Libraries included in your report.
 - 4 Perform the following steps in Library Organizer:
 - 1 Choose OK.
 - 2 In the code example window of the online help, select the code.
 - 3 Copy and paste the Declare section into your BAS.
 - 4 Save the .bas file.
- 3 In the e.Report Designer Professional application:



- 1 In Report Structure, double-click the ForecastApp report section object. The Properties page appears within the Properties window.
- 2 Choose Methods. Methods page appears.
- 3 Choose Most Commonly Used Methods and double-click Sub Start(). The ForecastApp::Start editing pane appears.
- 4 In the editor, paste in the remaining code from the example under:

```
Super::Start( )
```

- 4 Compile and run your report:
 - 1 Choose Report→Build and Run. The function runs and displays any prompts.
 - 2 Respond to the prompts that appear. The function displays the final result and your report appears.

Example The following example demonstrates the FV function. The example shows where to paste the different parts of a code example. To use this example, perform the following steps in this order:

- Paste the following code into your Actuate Basic source code (.bas) file:

```
Declare
    Global Const ENDPERIOD = 0
    Global Const BEGINPERIOD = 1
End Declare
```

- Paste the following code into the Start subroutine of your AcReport object under Super::Start():

```
Dim EachPmt As Double, APR As Double
Dim TotalPmts As Double, PayWhen As Integer
Dim PresentVal As Double, FutureVal As Double
Dim Msg as String, Fmt As String

' Specify money format
Fmt = "$#,##0.00"
EachPmt = 2000 ' Amount to save each month
APR = 0.0325 ' The annual percentage rate for the interest
TotalPmts = 60 ' The number of months to save

' Assume payment at month end
PayWhen = ENDPERIOD
PresentVal = 12000 ' Amount in the savings account now
' Now do the real work
FutureVal = FV(APR / 12, TotalPmts, -EachPmt, -PresentVal,
+ PayWhen)
' Format the resulting information for the user
```

```
Msg = "Starting with " & Format(PresentVal, Fmt)
+     & " and saving " & Format(EachPmt, Fmt)
+     & " every month at an interest rate of "
+     & Format(APR, "##.00%") & " for a period of "
+     & TotalPmts & " months will give you "
+     & Format(FutureVal, Fmt) & "."
ShowFactoryStatus( Msg )
```

- Build and run the report.
- Respond to the prompt.
- The result appears, followed by the report.

Abs function

Returns the absolute value for a number or expression.

Syntax Abs(<number expression>)

Parameters <number expression>

Number, numeric expression, or Variant of VarType 8 (String) that specifies the number for which you want to find the absolute value. If <number expression> is a String, it is parsed according to the formatting rules of the current run-time locale. For example, the following statement returns 123.456 on a French run-time locale and 123456.00 on an English run-time locale:

```
Abs ("123,456")
```

Returns Number, numeric expression, or Variant of VarType 8 (String). If <number> evaluates to Null, Abs returns Null.

Example The following example demonstrates the return value of Abs:

```
Sub Start( )
    Dim Msg as String
    Super::Start( )
    ' Returns 25
    Msg = "The result of Abs( 25 ) is " & Abs( 25 )
    ShowFactoryStatus( Msg )
    ' Also returns 25
    Msg = "The result of Abs( -25 ) is " & Abs( -25 )
    ShowFactoryStatus( Msg )
    ' Returns 0
    Msg = "The result of Abs( ABC ) is " & Abs( "ABC" )
    ShowFactoryStatus( Msg )
    ' Returns 123
    Msg = "The result of Abs( 123four ) is " & Abs( "123four" )
    ShowFactoryStatus( Msg )
End Sub
```


For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Sgn function

Acos function

Returns the arc cosine of an angle.

Syntax Acos(<cosval>)

Parameters <cosval>

A number, numeric expression, or Variant of VarType 8 (String) that specifies the value for which you want to find the arc cosine. The value of <cosval> should be in the range of -1 to 1. If <cosval> is a String, it is parsed according to the formatting rules of the current run-time locale.

To convert between radians and degrees, use: radians = degrees * Pi/180.

Returns Double, in the range of 0 to Pi radians.

If <cosval> evaluates to Null, Acos returns Null.

Example The following example generates the cosine of an angle expressed in radians, then returns the arc cosine of the cosine:

```
Sub Start( )
    Dim Pi As Double
    Dim CosVal as Double
    Dim Msg As String
    Super::Start( )
    Pi = 3.14159265358979
    ' Use Pi/4, or 45 degree, angle
    CosVal = Cos( Pi / 4 )
    Msg = "The arccosine of " & CosVal & " is: " & Acos( CosVal )
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Asin function
Atn function
Cos function
Sin function
Tan function

AddBurstReportPrivileges function

Adds one privilege setting to a role or user.

Syntax AddBurstReportPrivileges(<id>, <userOrRole>, <privileges>)

Description This function sets privileges on a burst report for a single user or role. You can call this method several times to set privileges of multiple roles or users. The setting affects the current burst report only. You call this method from SetBurstReportPrivileges() in the AcReport class. If AddBurstReportPrivileges() is not called during a burst report generation, the burst report will have the same privileges as its primary report.

Parameters **<id>**
String expression specifying the role or user id like role name, for example, "Admin", or a user name, such as "Jon".

<userOrRole>
String expression specifying either "Role" or "User".

<privileges>
String expression containing list of privileges separated by commas. For example, "READ, WRITE."

All parameters are case insensitive.

Example The following example overrides the subreport's SetBurstReportPrivileges() method to add read and write rights for the user bob, and secure read rights to the role sales:

```
Sub SetBurstReportPrivileges( row As AcDataRow )
    AddBurstReportPrivileges( "bob", "User", "READ,WRITE" )
    AddBurstReportPrivileges( "Sales", "Role", "SECURE READ" )
End Sub
```

For information about using the code examples, see "Using the code examples," earlier in this chapter.

AddValueIndex function

Adds a search index on a variable of a component.

Syntax AddValueIndex(<intFileID>, <strClassName>, <strAttrName>)

Description Use AddValueIndex to add a search index to an ROI. A search index speeds the retrieval of information when searching a report, although at the cost of a somewhat larger ROI and somewhat longer Factory run. AddValueIndex() must be called in the Factory during report generation. You cannot add an index to an ROI once it is created.

Each index speeds access to one variable in one class. The easiest way to create an index is to set the Searchable property of a class to True. This adds an index on the DataValue variable of that class. Use AddValueIndex() to search on any other variable and add an index on that variable. You must create a separate index for each variable you want indexed. For each, you must specify the ROI in which to create the index, the class name, and the variable name within the class.

A typical circumstance in which you specify a different variable is when a hyperlink specifies a value that is related to the data stored in the DataValue variable. For example, a data control displays a customer's name, while an associated hyperlink uses the customer's ID. When indexing this hyperlink, specify an additional variable, perhaps called LinkTag, that contains the customer's ID.

Parameters **<intFileID>**

Integer expression. The file ID of the report object instance (.roi) (POSM file) to which you want to add the new index. The value returned from creating or opening an ROI.

This is in most cases the ROI opened in the Factory. An easy way to get this ID is from any persistent object in your ROI. To do so, use code like the following:

```
Dim roiFile As Integer
roiFile = GetPosmFile( thePersistentObject )
AddValueIndex( roiFile, "yourClass", "yourVar" )
```

You must designate a valid ROI that is open in the Factory.

<strClassName>

String expression. The fully qualified name of the class of the component with the variable you want to index.

You must specify an existing class by its fully qualified name, and the class must have persistent instances.

To determine the fully qualified class name, use one of the following techniques:

- Consult the Class tab of the Property Sheet for the component to find its name and scope. Specify <strClassName> according to the form: "scope1::scope2::name".
- If you have an instance of the class, call GetClassName on the object.

<strAttrName>

String expression. The name of a variable in the class to be indexed. The attribute name:

- Must be a variable in the class specified by <strClassName>.
- Must be a variable, not a property. The variable can have the same name as a property.

AddValueIndex function

- Cannot be a structure such as Size or Rectangle.
- Must be of a simple scalar data type such as Integer, Date, Currency, String, or Double. Can also be a type alias for a scalar type such as Boolean or Twips.

Returns Boolean

- True if all arguments are correct.
- False if any of the arguments are invalid.

- Tips**
- A convenient place to insert calls to AddValue is in the Finish() method for your subclass of AcReport, the top component in the Structure View.
 - Hyperlinks use the search engine. Therefore, to improve your report's performance when executing hyperlinks, use AddValueIndex to index hyperlinks.
 - Do not confuse properties and variables of an object. They often have the same names, especially when a property specifies the default value for a variable. To avoid confusion, use the Component Editor's Variables page to see what variables are available.
 - To facilitate debugging, use Verify to ensure that, if any argument to AddValueIndex is invalid, the Factory will halt. For example, use code like the following:

```
Verify(AddValueIndex( 0, "AFrame::ItemCode", "DataValue" ))
```

Example The following example assumes you have a report that displays a list of customers by name. Each customer is identified by a customer number variable, but you do not want to display this number, so you created a CustomerNumber variable on the CustomerName control in the CustomerFrame. The root AcReport component is CustomerListing.

Add an index on the CustomerNumber variable using the following code in the Finish method of CustomerListing:

```
Sub Finish( )
    Dim theROIFile As Integer
    Super::Finish( )
    ' Get the ROI file handle for the ROI that contains this
    ' component
    theROIFile = GetPOSFile( me )
    ' Add a custom index for the CustomerNumber variable in the
    ' CustomerListing::CustomerFrame::CustomerName control.
    ' Quit the Factory if something goes wrong
    Verify( AddValueIndex( theROIFile,
+       "CustomerListing::CustomerFrame::CustomerNumber",
+       "CustomerNumber" ) )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

Asc function

Returns the ANSI code that corresponds to the given character.

Syntax Asc(<string expression>)

Parameters **<string expression>**
String expression that represents a character to translate to a corresponding code in the ANSI character set.

Returns Integer between 0 and 65535.

The return value is the character code value produced by converting <string expression> from Unicode to Multibyte character set (MBCS) using the current run-time encoding. The following rules apply to the conversion:

- If <string expression> is longer than one character, Asc translates only the first character.
- If <string expression> evaluates to Null, Asc returns Null.
- If the string in <string expression> does not match the run-time encoding, Asc might return an incorrect value. For example, if the report runs on a system that uses English (ASCII) encoding, passing a Japanese string produces incorrect results because Japanese characters cannot be converted to ASCII.

- Tips**
- To translate an ANSI code number to its corresponding character, use Chr\$.
 - If the run-time encoding is UCS-2, Asc behaves in the same way as AscW.

Examples The following Asc() statements are equivalent. Each returns the numeric value 90.

```
Sub Start( )
    Super::Start( )
    ShowFactoryStatus( Str(Asc("Z")) )
    ShowFactoryStatus( Str(Asc(Mid$("XYZ",3,1))) )
    ShowFactoryStatus( Str(Asc(UCASE$("zebra"))) )
End Sub
```

The following example creates a name and displays the ANSI value of each letter in that name:

```
Sub Start( )
    Dim I As Integer
    Dim Msg As String, AName As String
    Super::Start( )
    AName = "Pallavi Sharma"
```

AscW function

```
For I = 1 To Len( AName )
    Msg = Msg & Mid$( AName, I, 1 ) & " ---> "
+     & Asc( Mid$( AName, I, 1 ) )
Next I
ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also AscW function
Chr, Chr\$ functions
ChrW, ChrW\$ functions

AscW function

Returns the code point of the given character in UCS-2 encoding.

Syntax AscW(<string expression>)

Parameters **<string expression>**
String expression that represents a character to translate to a corresponding code point in UCS-2 encoding. If <string expression> is longer than one character, AscW translates only the first character.

Returns Integer between 0 and 65535. If <string expression> evaluates to Null, AscW returns Null.

Example The following example creates a name and displays the ANSI value of each letter in that name:

```
Sub Start( )
    Dim I As Integer
    Dim Msg As String, AName As String
    Super::Start( )
    AName = "Vishál Tayal"
    For I = 1 To Len( AName )
        Msg = Msg & Mid$( AName, I, 1 ) & " ---> "
+         & AscW( Mid$( AName, I, 1 ) )
    Next I
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also ChrW, ChrW\$ functions

Asin function

Gives the arc sine of an angle.

Syntax `Asin(<sinval>)`

Parameters **<sinval>**

A number, numeric expression, or Variant of type 8 (String) that specifies, in the value for which you want to find the arc sine. The value of <sinval> should be in the range of -1 to 1. If <sinval> is a String, it is parsed according to the formatting rules of the current run-time locale.

To convert between radians and degrees, use: $\text{radians} = \text{degrees} * \text{Pi} / 180$.

Returns Double, in the range of $-\text{Pi}/2$ to $\text{Pi}/2$ radians.

If <sinval> evaluates to Null, Asin returns Null.

Example The following example generates the sine of an angle expressed in radians and returns the arcsine of the sine:

```
Sub Start( )
    Dim Pi As Double
    Dim SinVal as Double
    Dim Msg As String
    Super::Start( )
    Pi = 3.14159265358979
    ' Use Pi/4, or 45 degree, angle
    SinVal = Sin( Pi / 4 )
    Msg = "The arcsine of " & SinVal & " is: " & Asin( SinVal )
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Acos function
 Atn function
 Cos function
 Sin function
 Tan function

Assert statement

Halts the program and displays an error message when a given condition is False.

Syntax `Assert(<condition>)`

Atn function

Description	When <condition> is True, Assert does nothing. When False, Assert halts the program and displays an error message. Use Assert to trap errors.
Parameters	<condition> Any numeric or string expression that can be evaluated. When <condition> evaluates to zero or Null, the condition is False, otherwise <condition> is True.
Example	<p>The following example uses Assert to halt a program before a function attempts to divide a number by zero. This prevents the program from attempting to perform an illegal operation.</p> <pre>Function PercentOf(num As Integer, denom As Integer) As Integer Assert (denom <> 0) PercentOf = num * 100 / denom End Function</pre> <p>For information about using the code examples, see “Using the code examples,” earlier in this chapter.</p>
See also	Erl function Err function Error statement Error, Error\$ functions On Error statement

Atn function

Gives the arctangent of a number.

Syntax Atn(<tanval>)

Parameters **<tanval>**
Number, numeric expression, or Variant of VarType 8 (String) that specifies the tangent value for which you want to find the arctangent. If <number> is a String, it is parsed according to the formatting rules of the current run-time locale.

For example, the following statement returns 0.89 on a French run-time locale and 1.57 on an English run-time locale:

```
Atn ("1,234")
```

To convert to radians from degrees, use radians = degrees * Pi/180.

Returns The arctangent, in radians, as a double.

If <number> evaluates to Null, Atn returns Null.

Example The following example generates the tangent of an angle in radians and returns the value of the arctangent given that tangent value:


```

Sub Start( )
    Dim tanVal As Double, dblDegree As Double, Pi As Double
    Dim Msg As String
    Super::Start( )
    Pi = 3.14159265358979
    ' Use Pi / 4, or 45 degree, angle
    tanVal = tan( pi / 4 )
    Msg = "The arctangent of " & tanVal & " is " & Atn(tanVal)
    ShowFactoryStatus( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Acos function
 Asin function
 Cos function
 Sin function
 Tan function

Beep statement

Sounds a short tone through the computer’s speaker.

Syntax Beep

Description To use Beep, sound must be turned on in the sounds section of the Windows Control Panel. You cannot control the tone or the duration of the sound using Beep. Beep is not supported when a report runs on iServer.

Example The following example prompts the user for a number. If the number falls outside a certain range recognized as valid, the computer beeps and displays a message.

```

Sub Start( )
    Dim Number As Integer, Msg As String
    Super::Start( )
    Number = Rnd * 10
    ' Validate range
    If Number >= 1 And Number <= 5 Then
        Msg = "The number " & Number & " is between 1 and 5."
    Else
        ' Beep if not in range
        Beep
        Msg = "The number " & Number & " is not between 1 and 5."
    End If
    ShowFactoryStatus( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

Call statement

Transfers program control to an Actuate Basic Sub procedure or to a Windows dynamic-link library (DLL) procedure.

Syntax [Call] <procedure name> [(<argument list>)]

Description You are never required to use the Call keyword when you call a procedure. If you use the Call keyword to call a procedure that requires arguments, <argument list> must be enclosed in parentheses.

You pass variable arguments to <procedure name> in two ways, by reference or by value. When you pass variables by reference, Actuate Basic assigns their contents (values) actual addresses. The called procedure can alter the variables. When you pass variables by value, Actuate Basic assigns their contents (values) temporary addresses. The called procedure cannot alter the contents of the variables.

Parameters **Call**
Optional keyword that indicates that Actuate Basic is to transfer program control to another procedure.

<procedure name>

Specifies the name of the procedure to which the program is to transfer control.

<argument list>

List of variables, arrays, or expressions to pass to the procedure as arguments.

By default, arguments in list are passed by reference. To pass an entire array, use its name followed by empty parentheses.

For example, the following statement transfers control to a Sub procedure called ManyBeeps and passes the value 15 to it as an argument:

```
Call ManyBeeps(15)
```

The following statement transfers control to a Sub procedure called ManyBeeps and passes the value 15 to it as an argument, but without using the Call keyword:

```
ManyBeeps(15)
```

The following statement transfers control to a Sub procedure called MySortArray, and passes the integer array NewColors% to it:

```
Call MySortArray(NewColors%())
```

Tip If you are having trouble passing arguments to DLL procedures, use the ByVal keyword to pass them by value. In many cases, external DLL routines might not

support all Actuate Basic data types, and using ByVal to call such a DLL routine allows the routine to convert the arguments so that it can accept them.

Example The following example shows two ways of calling the MessageBeep procedure in User.exe, a Microsoft Windows DLL. First, you must declare the procedure MessageBeep from the Windows dynamic link library at or near the beginning of your Actuate Basic source code (.bas) file.

```
Declare Sub MessageBeep Lib "User32" (ByVal N As Integer)
```

Then, paste the following example in the method editor:

```
Sub Start( )
    Dim I As Integer
    Super::Start( )
    ' Call Windows procedure
    Call MessageBeep(0)
    ' Insert delay between calls
    Sleep(2)
    ' Call again without Call keyword
    MessageBeep(0)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Declare statement

CCur function

Converts a numeric expression to the Currency data type.

Syntax CCur(<numeric expression>)

Description CCur is one of nine Actuate Basic data type conversion functions. If <numeric expression> lies outside the acceptable range for Currency, an overflow error occurs.

Parameters **<numeric expression>**
Numeric expression to convert from the Date, Integer, Long, Single, Double, String, or Variant data type to the Currency data type. The following conditions apply to <numeric expression>:

- If <numeric expression> is Null, CCur returns Null.
- If <numeric expression> is a String or Variant, it must be interpretable as a number.
- If <numeric expression> is a String, it is parsed according to the formatting rules of the current run-time locale.

For example, each of the following statements returns 123. In the second statement, the string 123 enclosed in quotation marks is considered a numeric expression because it can be interpreted as a number.

In the third statement, four cannot be interpreted as a number.

```
CCur(123)
CCur("123")
CCur("123four")
```

The following statement first converts the string 123four using Val to convert the number 123. Val ignores the string component (four).

```
CCur(Val("123four"))
```

The following statement returns 123.456 on a French run-time locale and 123456.00 on an English run-time locale:

```
CCur("123,456")
```

Returns Currency. If <numeric expression> cannot be interpreted as a number, zero is returned.

- Tips**
- To convert an expression to currency without explicitly using CCur, assign the expression to a variable that is the Currency data type.
 - To declare the data type of a variable, use Dim with the As clause.
 - To round a number to precisely the number of decimal places you want and discard anything residual, use Format\$.
 - To ensure that you pass the correct data type to a Sub procedure or a Windows Dynamic Link Library (.dll), use data type conversion functions.

Example The following example generates a random number, converts that number using each of the conversion functions in turn, then displays the result:

```
Sub Start( )
    Dim Orig As String, Msg As String
    Super::Start( )
    ' Get a random number between 1 and 256
    Orig = 255 * Rnd + 1
    ' Convert to various formats
    Msg = "Your number is: " & Orig
    ShowFactoryStatus ( Msg )
    Msg = "CCur( Orig ) yields ----> " & CCur( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CDate( Orig ) yields ----> " & CDate( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CDBl( Orig ) yields ----> " & CDBl( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CInt( Orig ) yields ----> " & CInt( Orig )
    ShowFactoryStatus ( Msg )
End Sub
```

```

Msg = "CLng( Orig ) yields ----> " & CLng( Orig )
ShowFactoryStatus ( Msg )
Msg = "CSng( Orig ) yields ----> " & CSng( Orig )
ShowFactoryStatus ( Msg )
Msg = "CStr( Orig ) yields ----> " & CStr( Orig )
ShowFactoryStatus ( Msg )
Msg = "CVar( Orig ) yields ----> " & CVar( Orig )
ShowFactoryStatus ( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also CDate function
 CDBl function
 CInt function
 CLng function
 CSng function
 CStr function
 CVar function
 CVDate function
 Dim statement
 Format, Format\$ functions

CDate function

Converts an expression to a Date.

Syntax CDate(<date expression>)

Description CDate is one of nine Actuate Basic data type conversion functions. Do not use CDate to convert a long date format that also contains a day-of-the-week string, like Friday, Nov. 12, 1982. The function does not recognize such strings as dates.

Avoid supplying CDate with a date in a format other than the format the locale map specifies.

Parameters <date expression>

Date expression, or any numeric or string expression that can be interpreted as a date, a time, or both a date and a time:

- Can be a string such as November 12, 1982 8:30 P.M., 12 Nov., 1982 08:30 PM, 11/12/82, 08:30pm, or any other string that can be interpreted as a date, a time, or both a date and a time in the valid range.
- Can be a date serial number such as 30267.854, which corresponds to November 12, 1982 at 8:30 P.M., or any other number that can be mapped to a date, time, or both a date and a time in the valid range.

- For date serial numbers, the integer component represents the date itself while the decimal component represents the time of day on that date, where January 1, 1900 at precisely noon has the date serial number 2.5, and negative numbers represent dates prior to December 30, 1899 (0).

Default date if none specified: 0 (Dec. 30, 1899)

Default time if none specified: 00:00:00 (midnight)

The following conditions apply to <date expression>:

- <date expression> must not be empty or zero-length.
- <date expression> cannot contain a day of week.
- <date expression> must specify a date within the range January 1, 100 through December 31, 9999, inclusive.
- <date expression> is parsed according to the formatting rules of the current run-time locale.
- If <date expression> includes a time of day, it must be a valid time, even if CDate is not being used to return anything having to do with a time of day. A valid time is one that is in the range 0:00:00 (12:00:00 A.M.) through 23:59:59 (11:59:59 P.M.). Either the 12- or 24-hour clock can be used. The time must be in one of the following formats:

hh:mm:ss

hh:mm

hh

- <date expression> cannot include a day of week.
- If <date expression> is a numeric expression, it must be in the range -657434 to +2958465, inclusive.

The following assumes that the AC_CENTURY_BREAK property is set to the default value of 30. For information about using AC_CENTURY_BREAK, see *Accessing Data using e.Report Designer Professional*.

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000. For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).
- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

Note that a date can contain an abridged month, such as Nov. 12, 1982 as opposed to November 12, 1982.

Examples The following statements are equivalent. Each assigns 11/12/82 8:30:00 P.M., with its underlying serial number to the variable BDate.

```
BDate = CDate("11/12/82 8:30 pm")
BDate = CDate("12 Nov 1982 20:30")
BDate = CDate("November 12, 1982 8:30PM")
BDate = CDate(30267.854167)
```

Returns Date

- If <date expression> is Null, CDate returns Null.
- If <date expression> contains a day of week, CDate returns Null.
- If <date string> contains only numbers separated by valid date separators, CDate recognizes the order for month, day, and year according to the settings of the current run-time locale.
- If <date expression> cannot be evaluated to a date, CDate returns Null.
- If <date expression> fails to include all date components, such as day, month, and year, CDate returns Null.
- If <date expression> contains only the time and the time is valid, CDate returns December 30, 1899 with the time.

- Tips**
- To determine if either a numeric or string expression that looks like a date can be converted to a date, use IsDate. However, IsDate cannot determine whether or not a string that looks like a number can be converted to a date, even if the number is in the correct range for date serial numbers.
 - If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all dates.

Example The following example generates a number. For any valid value, the example displays both a date and a date serial number.

```
Sub Start( )
    Dim Msg As String, DateMeme As String, ConvDateMeme As Date
    Super::Start( )
    DateMeme = CStr(Rnd * 125 * 365)
    ConvDateMeme = CDate( DateMeme )
    Msg = "The date is: " & ConvDateMeme
    ShowFactoryStatus( Msg )
    Msg = "The serial number for that date is: "
    + & CDb1( ConvDateMeme )
    ShowFactoryStatus ( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also CCur function
CDBl function
CInt function
CLng function
CSng function
CStr function
CVar function
CDate function
Dim statement
Format, Format\$ functions
IsDate function

CDBl function

Converts a numeric expression to the Double data type.

Syntax CDBl(<numeric expression>)

Description CDBl is one of nine Actuate Basic data type conversion functions. If <numeric expression> lies outside the acceptable range for a Double data type, an overflow error occurs. If <numeric expression> is Null, CDBl returns Null.

Parameters **<numeric expression>**
Numeric expression to be converted from the Currency, Date, Integer, Long, Single, String or Variant data type to the Double data type. The following conditions apply to <numeric expression>:

- If <numeric expression> is a String or Variant, it must be interpretable as a number.
- If <numeric expression> is a String, it is parsed according to the formatting rules of the current run-time locale.

For example, each of the following statements returns the value 123. In the second statement, the string 123 enclosed in double quotation marks is considered a numeric expression because it can be interpreted as a number. In the third statement, four cannot be interpreted as a number.

```
CDBl (123)
CDBl ("123")
CDBl ("123four")
```

The following statement uses Val to convert the string 123four to the number 123. Val ignores the string component (four).

```
CDBl (Val ("123four"))
```

The following statement returns 123.456 on a French run-time locale and 123456.00 on an English run-time locale:

`CDBl("123,456")` returns

Returns Double. If <numeric expression> cannot be interpreted as a number, zero is returned.

- Tips**
- To convert an expression to double without explicitly using `CDBl`, assign the expression to a variable that is the Double data type.
 - To declare the data type of a variable, use `Dim` with the `As` clause.
 - To round a number to precisely the number of decimal places you want and discard anything residual, use `Format$`.
 - To be sure you pass the correct data type to a subprocedure or to a Windows Dynamic Link Library (DLL), use data type conversion functions.

Example The following example generates a random number, converts that number using each of the conversion functions in turn, then displays the result:

```
Sub Start( )
    Dim Orig As String, Msg As String
    Super::Start( )
    ' Get a random number between 1 and 256
    Orig = 255 * Rnd + 1
    ' Convert to various formats
    Msg = "Your number is: " & Orig
    ShowFactoryStatus ( Msg )
    Msg = "CCur( Orig ) yields ----> " & CCur( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CDate( Orig ) yields ----> " & CDate( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CDBl( Orig ) yields ----> " & CDBl( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CInt( Orig ) yields ----> " & CInt( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CLng( Orig ) yields ----> " & CLng( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CSng( Orig ) yields ----> " & CSng( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CStr( Orig ) yields ----> " & CStr( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CVar( Orig ) yields ----> " & CVar( Orig )
    ShowFactoryStatus ( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also `CCur` function
`CDate` function
`CInt` function

CLng function
CSng function
CStr function
CVar function
CDate function
Dim statement
Format, Format\$ functions
Int function

ChDir statement

Changes the current working directory on the specified or current drive.

Syntax ChDir <path name>

Parameters <path name>

String expression that specifies the name of the target directory.

<path name> has the following syntax:

[<drive:>] [N] [<directory>\<directory>]... (Windows)

[/] [<directory>/<directory>]... (UNIX)

<path name> must contain fewer than 259 characters and must be a valid directory.

<drive:>

(Windows only.) Character, followed by a colon, that specifies the drive. If you do not specify <drive:>, ChDir uses the current drive. If you specify a drive other than the current one, Actuate Basic only changes the current directory on that drive; it does not change the current drive to <drive:>.

<directory>

String expression of the name of the directory or subdirectory to make the current directory.

For example, the following statement changes the current working directory on drive D: to Mydocs, even if the current drive is C:, but does not change the current drive to D:

```
ChDir "D:\Mydocs"
```

Together, the following two statements change the current directory on the current drive to \Myfiles\Mailbox:

```
DirName$ = "\Myfiles\Mailbox"  
ChDir DirName$
```

- Tips**
- To make sure you have set the correct working directory before you issue commands that do not specify full path names, use ChDir.
 - To change the current drive, use ChDrive.
 - ChDir affects the operation of file-related commands like Open and Kill, which use the current working, or default, drive and directory unless you specify a full path name.

Example The following example changes the current directory as the root, then resets the current directory to the original one:

```
Sub Start( )
    Dim Msg As String, UsersPath As String
    Super::Start( )
    ' Save the current path
    UsersPath = CurDir
    ' Reset to a new path
    ChDir "\"
    Msg = "The current directory has been changed to "
+     & CurDir
    ShowFactoryStatus( Msg )
    Msg = "Changing back to the previous current "
+     & "directory in five seconds."
    ShowFactoryStatus( Msg )
    Sleep(5)
    ' Change back to user default directory
    Msg = "Now changing back."
    ChDir UsersPath
    Msg = "The current directory has been reset to "
+     & UsersPath & "."
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also ChDrive statement
 CurDir, CurDir\$ functions
 MkDir statement
 Rmdir statement

ChDrive statement

Changes the current default drive.

Syntax ChDrive <drive letter>

Parameters **<drive letter>**

String expression, consisting of a single letter that specifies the drive that is to become the default drive (Windows only). <drive letter> must correspond to the letter of a valid drive, and <drive letter> must be in the range A to <lastdrive>, where <lastdrive> is the maximum drive letter in your computer.

For example, the following statement changes the current working (default) drive to A:

```
ChDrive "A"
```

Together, the following two statements change the current drive to C:

```
DriveSpec$ = "C"  
ChDrive DriveSpec$
```

- Tips**
- To ensure that you have set the correct working directory before you issue commands that do not specify full path names, use ChDir.
 - To change the current directory, use ChDir.
 - To determine the current drive and directory, use CurDir.
 - ChDir and ChDrive affect the operation of file-related commands like Open and Kill, which use the current working, or default, drive and directory unless you specify a full path name.
 - ChDrive is ignored when the Actuate Basic program is running on UNIX.

Example The following example changes the default directory to a second drive. If it cannot change the directory, it responds with an error message.

```
Sub Start( )  
  On Error Resume Next  
  Dim CurrPath As String, Drive As String  
  Dim HasColon As Integer, Msg As String  
  Dim NewDrive As String  
  Super::Start( )  
  ' Get current path  
  CurrPath = CurDir  
  ' If current drive is invalid Reset error to 0  
  If Err = 68 Then  
    Drive = "Invalid"  
    Err = 0  
  Else  
    ' Get drive letter  
    Drive = Left(CurrPath, 2)  
  End If  
  Msg = "Your current drive is "& Drive & ". "  
  ShowFactoryStatus( Msg )
```

```

' Set drive to D:
NewDrive= "D:"
' Change drive
ChDrive NewDrive
Select Case Err
    ' Device unavailable error
    Case 44
        Msg = "That drive is not available. "
+        & "No drive change was made."
    ' Disk not ready error
    Case 71
        Msg = "Close the door on your drive and try again"
    ' Illegal function call
    Case 10
        Msg = "Error changing to " & NewDrive
    Case Else
        Msg = "Drive changed to " & UCase$(NewDrive)
    End Select
    ShowFactoryStatus( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples” earlier in this chapter.

See also ChDir statement
 CurDir, CurDir\$ functions
 Mkdir statement
 Rmdir statement

Chr, Chr\$ functions

Returns the character that corresponds to the specified character code in the current run-time encoding.

Syntax Chr(<character code>)
 Chr\$(<character code>)

Parameters **<character code>**
 A numeric expression that represents the character code you want Chr[\$] to translate to a character. The following conditions apply to <character code>:

- If <character code> is not an Integer, Chr[\$] rounds it to the nearest Integer before returning the character. In the United States, <character code> usually refers to ANSI codes.
- <character code> must be between 0 and 65535 or a run-time error occurs.
- <character code> is interpreted according to the current run-time encoding.

Chr, Chr\$ functions

For example:

```
Chr$(65) returns A
Chr$(228) returns g on a Greek locale
Chr$(228) returns ä on an English locale
Chr$(Sqr(4) * 45) returns Z
Chr$(90.11) returns Z
```

The following statement prints or displays the copyright symbol (©):

```
Chr$(169)
```

Returns Chr: Variant
Chr\$: String

- Chr[\$] returns nonprintable and printable characters.
- Character codes from 0 to 31, inclusive, are the same as the standard nonprintable ASCII codes.
- Character codes 8, 9, 10, and 13 convert, respectively, to backspace, tab, linefeed, and carriage return characters. You cannot see them graphically. Depending on the application, they can affect the visual display of text.

- Tips**
- To force a message either to start or to continue to print on a new line, use Chr\$(10), which inserts the linefeed character.
 - To insert quotation marks (") inside a message, use Chr\$(34).
 - To send special control codes to your printer or to another device, use Chr\$ with a print statement directed to that device.
 - To translate from a character to its character code number, use Asc.
 - If the run-time encoding is UCS-2, Chr behaves in the same way as ChrW.

Example The following example returns the character corresponding to a generated number. The example displays the character, if it can be displayed, as well.

```
Sub Start( )
    Dim AnsiNum As Integer, Msg As String
    Super::Start( )
    AnsiNum = Rnd * 255
    Msg = "The character that corresponds to " & AnsiNum & " is:"
    + & " " & Chr$( AnsiNum )
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Asc function
AscW function
ChrW, ChrW\$ functions

ChrW, ChrW\$ functions

Translates a UCS-2 code value into a character.

Syntax ChrW(<character code>)

ChrW\$(<character code>)

Parameters <character code>

A numeric expression that represents the character code in UCS-2 you want ChrW[\$] to translate to a character. The following conditions apply to <character code>:

- <character code> must be a valid UCS-2 code.
- If <character code> is not an Integer, ChrW[\$] rounds it to the nearest Integer before returning the character. In the United States, <character code> usually refers to ANSI codes.
- <character code> must be between 0 and 65535 or a run-time error occurs.

For example, the following statement returns A:

```
ChrW$(65)
```

The following statement returns γ:

```
ChrW(947)
```

Returns ChrW: Variant
ChrW\$: String

Example The following example returns the character corresponding to a number that is randomly generated. The example also displays the user-selected character, if it can be displayed.

```
Sub Start( )
    Dim AnsiNum As Integer, Msg As String
    Super::Start( )
    AnsiNum = Rnd * 65535
    Msg = "The character that corresponds to " & AnsiNum & " is:"
    +      & " " & ChrW$( AnsiNum )
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also AscW function

CInt function

Converts a numeric expression to the Integer data type.

Syntax CInt(<numeric expression>)

Description CInt is one of nine Actuate Basic data type conversion functions. CInt rounds the fractional part of <numeric expression>, while Fix and Int truncate it. If <numeric expression> lies outside the acceptable range for an Integer, an overflow error occurs. If <numeric expression> is negative, CInt rounds to the next lowest negative number. For example:

```
CInt (1.5) = 2
CInt (1.4) = 1
CInt (-1.4) = -1
CInt (-1.5) = -2
```

Parameters **<numeric expression>**

Numeric expression to convert from the Currency, Date, Double, Long, Single, String, or Variant data type to the Integer data type. The following conditions apply to <numeric expression>:

- If <numeric expression> is Null, CInt returns Null.
- If <numeric expression> is a String or Variant, it must be interpretable as a number.
- If <numeric expression> is a String, it is parsed according to the formatting rules of the current run-time locale.

For example, each of the following statements returns 123. In the second statement, the string 123 enclosed in double quotation marks is considered a numeric expression because it can be interpreted as a number. In the third statement, four cannot be interpreted as a number.

```
CInt (123)
CInt ("123")
CInt ("123four")
```

The following statement first converts the string 123four using Val to convert the number 123. Val ignores the string component (four).

```
CInt (Val ("123four"))
```

The following statement returns 123.456 on a French run-time locale and 123456.00 on an English run-time locale:

```
CInt ("123,456")
```

Returns Integer. If <numeric expression> cannot be interpreted as a number, zero is returned.

- Tips**
- To convert an expression to an Integer without using CInt, assign the expression to a variable that is the Integer data type.
 - To declare the data type of a variable, use Dim with the As clause.
 - To round a number to precisely the number of decimal places you want and discard anything residual, use Format\$.
 - To be sure you pass the correct data type to a sub procedure or to a Windows Dynamic Link Library (.dll), use data type conversion functions.

Example The following example generates a random number, converts that number using each of the conversion functions in turn, then displays the result:

```
Sub Start( )
    Dim Orig As String, Msg As String
    Super::Start( )
    ' Get a random number between 1 and 256
    Orig = 255 * Rnd + 1
    ' Convert to various formats
    Msg = "Your number is: " & Orig
    ShowFactoryStatus ( Msg )
    Msg = "CCur( Orig ) yields ----> " & CCur( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CDate( Orig ) yields ----> " & CDate( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CDBl( Orig ) yields ----> " & CDBl( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CInt( Orig ) yields ----> " & CInt( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CLng( Orig ) yields ----> " & CLng( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CSng( Orig ) yields ----> " & CSng( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CStr( Orig ) yields ----> " & CStr( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CVar( Orig ) yields ----> " & CVar( Orig )
    ShowFactoryStatus ( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also CCur function
CDate function
CDBl function
CLng function
CSng function
CStr function
CVar function

CVDate function
Dim statement
Format, Format\$ functions
Int function

Class statement

Declares and defines a class in Actuate Basic.

Syntax Class <name of class> [Subclass Of <name of superclass>]...[,<name of superclass>...]]
 [{Dim|Static}] <variable> [([<subscripts>)]) [As <data type>]
 [, [{Dim|Static}] <variable> [([<subscripts>)]) [As <data type>]]
 <nested class(es)>
 <method(s)>

 End Class

Parameters **<name of class>**
 The name you assign to the class. You must supply a class name.

<Subclass Of <name of superclass>>
 Specifies a superclass from which this class can be derived. Multiple inheritance is supported by specifying more than one superclass.

[{Dim|Static}]
 These optional keywords define the scope of the variable.

Dim—Defines an instance variable. Each instance of the class has a copy of each instance variable.

Static—Defines a static variable. All instances of this class and all instances of derived classes share a single copy of the variable.

<variable>
 Name of the variable belonging to the class. A class can contain any number of variables.

<subscripts>
 Describes array dimensions according to the following syntax:

 [<lower> **To**] <upper>[, [<lower> **To**] <upper>]...

 If you do not supply subscript values between parentheses, Actuate Basic declares a dynamic array. Range from <lower> to <upper> can be from -2147483648 to 2147483647, inclusive.

As <data type>

Clause that declares the data type of <variable>. <data type> can specify any valid Actuate Basic data type, user-defined data type, or class name, for example:

```
Dim SalesTax Customer As String, Amount As Currency
```

<nested class(es)>

Any number of other class definitions. Actuate automatically creates nested classes for controls within frames, and for sections and frames within the report object.

<method(s)>

Procedure that performs actions on the objects of the class. Your class can contain any number of methods. Each method is defined using the Sub or Function statements.

Tip Class statements can be recursive. Actuate Basic sets a run-time stack limit of 200. A report using recursion with a large number of iterations might exceed this limit.

Example The following example creates the class PerDay that stores a counter and date in each class instance. PerDay also has an overall counter that sums the counts of all instances of the class. As the counts are updated, the local, or instance, counters are independent, while the global, or static, counter increases every time an instance counter is incremented.

To use this example, paste the class definition at or near the beginning of your Actuate Basic source code (.bas) file.

```
Class PerDay
    ' PerDay stores a count for a corresponding date
    Dim DateOfDay As Date, CountOfDay As Integer
    ' CountTotal sums CountOfDay for all instances of PerDay
    Static CountTotal As Integer

    ' Initialize sets the starting date and count for the class
    ' instance and updates the total count.
    Sub Initialize( NewDate As Date, NewCount As Integer )
        DateOfDay = NewDate
        CountOfDay = NewCount
        CountTotal = CountTotal + NewCount
    End Sub

    ' IncrCount increments the local and global counts by one.
    Sub IncrCount( )
        CountOfDay = CountOfDay + 1
        CountTotal = CountTotal + 1
    End Sub

    ' Display shows the values of this instance of PerDay plus
    ' the global total
```

ClearClipboard function

```
Sub Display( )
    Dim Msg As String
    Msg = "The count is " & CountOfDay
    ShowFactoryStatus( Msg )
    Msg = "The date is " & DateOfDay
    ShowFactoryStatus( Msg )
    Msg = "The total for all instances of this class "
+     & "is " & CountTotal
    ShowFactoryStatus( Msg )
End Sub
End Class
```

Then, paste the following example code in the method editor:

```
Sub Start( )
    Dim FirstPerDay As PerDay, SecondPerDay As PerDay
    Dim NewDate As Date
    Super::Start( )
    ' Instantiate two instances of class PerDay.
    Set FirstPerDay = New PerDay
    Set SecondPerDay = New PerDay
    ' Get today's date for the first PerDay instance.
    NewDate = Date
    FirstPerDay.Initialize( NewDate, 1 )
    ' Both the instance and global counts are 1.
    FirstPerDay.Display( )
    ' Use last week's date for the second PerDay instance.
    NewDate = NewDate - 7
    SecondPerDay.Initialize( NewDate, 1 )
    SecondPerDay.IncrCount( )
    ' The second instance count is 2. The global count is 3.
    SecondPerDay.Display( )
    ' The first instance count is still 1. The global count is 3.
    FirstPerDay.Display( )
End Sub
```

See also Dim statement
Function...End Function statement
Option Base statement
Static statement
Sub...End Sub statement

ClearClipboard function

Clears the contents of the operating environment Clipboard.

Syntax ClearClipboard

Returns Integer

- Returns 1 (True) if the Clipboard was successfully cleared.
- Returns 0 (False) if the Clipboard could not be cleared.

Example The following example places the current date on the Clipboard, then displays the contents of the Clipboard:

```
Sub Start( )
    Dim Msg As String
    Super::Start( )
    On Error Resume Next
    Msg = "The Clipboard contains: " & GetClipboardText
    ShowFactoryStatus( Msg )
    Msg = "Placing today's date on the clipboard."
    ShowFactoryStatus( Msg )
    ClearClipboard
    SetClipboardText(Format$(Date, "dddd, mm/dd/yyyy"))
    Msg = GetClipboardText
    ShowFactoryStatus( "The Clipboard now contains: " & Msg )
End Function
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetClipboardText function
SetClipboardText function

CLng function

Converts a numeric expression to the Long data type.

Syntax CLng(<numeric expression>)

Description CLng is one of nine Actuate Basic data type conversion functions. If <numeric expression> lies outside the acceptable range for a Long data type, an overflow error occurs. If <numeric expression> is Null, CLng returns Null.

Parameters **<numeric expression>**
Numeric expression to convert from the Currency, Date, Double, Integer, Single, String, or Variant data type to the Long (Long integer) data type. The following conditions apply to <numeric expression>:

- If String or Variant, <numeric expression> must be interpretable as a number.
- If <number expression> is a String, it is parsed according to the formatting rules of the current run-time locale.

CLng function

For example, each of the following statements returns the value 123. In the second statement, the string 123 enclosed in double quotation marks is considered a numeric expression because it can be interpreted as a number.

```
CLng(123)
CLng("123")
```

The following statement generates an error. The string 123four is not considered a numeric expression because four cannot be interpreted as a number.

```
CLng("123four")
```

The following statement first converts the string 123four using Val to convert the number 123. Val ignores the string component (four).

```
CLng(Val("123four"))
```

The following statement returns 123.456 on a French run-time locale and 123456.00 on an English run-time locale:

```
CLng("123,456")
```

Returns Long. If <numeric expression> cannot be interpreted as a number, zero is returned.

- Tips**
- To convert an expression to long without using CLng, assign the expression to a variable that is the Long data type.
 - To declare the data type of a variable, use Dim with the As clause.
 - To round a number to precisely the number of decimal places you want and discard anything residual, use Format\$.
 - To be sure you pass the correct data type to a sub procedure or to a Windows Dynamic Link Library (.dll), use data type conversion functions.

Example The following example generates a random number, converts that number using each of the conversion functions in turn, then displays the result:

```
Sub Start( )
    Dim Orig As String, Msg As String
    Super::Start( )
    ' Get a random number between 1 and 256
    Orig = 255 * Rnd + 1
    ' Convert to various formats
    Msg = "Your number is: " & Orig
    ShowFactoryStatus ( Msg )
    Msg = "CCur( Orig ) yields ----> " & CCur( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CDate( Orig ) yields ----> " & CDate( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CDBl( Orig ) yields ----> " & CDBl( Orig )
    ShowFactoryStatus ( Msg )
End Sub
```

```

Msg = "CInt( Orig ) yields ----> " & CInt( Orig )
ShowFactoryStatus ( Msg )
Msg = "CLng( Orig ) yields ----> " & CLng( Orig )
ShowFactoryStatus ( Msg )
Msg = "CSng( Orig ) yields ----> " & CSng( Orig )
ShowFactoryStatus ( Msg )
Msg = "CStr( Orig ) yields ----> " & CStr( Orig )
ShowFactoryStatus ( Msg )
Msg = "CVar( Orig ) yields ----> " & CVar( Orig )
ShowFactoryStatus ( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also CCur function
 CDate function
 CDbf function
 CInt function
 CSng function
 CStr function
 CVar function
 CVDate function
 Dim statement
 Format, Format\$ functions

Close statement

Concludes input/output to a file.

Syntax Close [[#] <open file number>] ... [, [#] <open file number>] ...

Description

- If you use Close for a file that was opened for Output or Append, Actuate Basic flushes the buffers associated with the file and writes any remaining data in them to disk.
- The association of a file with <open file number> ends when Close is executed. You can then reopen the file using the same or a different file number, or you can reuse the file number to open a different file.
- Once a file has been closed, the file number cannot be referenced by any other file-related statements (such as Get or Put) until you issue another Open with that file number.
- If <open file number> does not refer to a currently open file, Actuate Basic ignores the Close statement and continues with the next command.

Close statement

- Close with no arguments closes all open files.
- Actuate Basic automatically closes all open files at program termination, whether or not you use Close.

Parameters <open file number>

Numeric expression for the number you used in a previously issued Open statement that opened the target file to be closed.

Default: All open files are closed.

For example, the following statement closes the file previously opened as #1:

```
Close #1
```

The following statement closes the files opened as 1, 5, and 7:

```
Close 1, 5, 7
```

The following statement closes all open files:

```
Close
```

Tip You should close each open file before ending your program.

Example The following example generates three test files by opening the test files, writing to the test files, and closing the test files. The example overrides Start to call a subroutine that generates the three test files. It then deletes the files. To use this example, paste the procedure Make3Files after the End Sub of the Start procedure or save it in your Actuate Basic source code (.bas) file.

```
Sub Start( )
    Dim Msg As String
    Super::Start( )
    ' Create test files
    Make3Files
    Msg = "Three test files have been created on your disk at "
+    & CurDir$ & ". They will now be deleted."
    ShowFactoryStatus( Msg )
    ' Remove files from disk.
    Kill "TESTFIL?"
End Function

' The following procedure creates the sample data files.
Sub Make3Files()
    Dim I As Integer, FreeNum As Integer, TestFileName As String
    ShowFactoryStatus( "We are now in the Make3Files sub." )
    For I = 1 to 3
        ' Get next free file handle
        FreeNum = FreeFile
        TestFileName = "TESTFIL" & FreeNum
        ' Opening the file automatically creates it
        Open TestFileName For Output As FreeNum
```



```

    ' Print one line of text in the file
    Print #FreeNum, "This is a test file."
Next I
    ' Close all files
    Close
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Open statement
 Reset statement
 Stop statement

Command, Command\$ functions

Returns the argument component of the command line of erdpro.exe.

Syntax Command

 Command\$

Description In the following example, commandargs represents what Command returns if you launched Actuate Basic with the following command:

```
erdpro.exe /CMD commandargs
```

The function returns commandargs Secondcomm 32, the launch argument—assuming you launched the application with the following command:

```
erdpro commandargs Secondcomm 32
```

Actuate Basic Compiler does not generate an EXE. Instead, it generates a report object executable (.rox) file, which runs either in the ROX compiler, which is built into e.Report Designer Professional, or through iServer.

Returns Command: Variant
 Command\$: String

Example The following example displays the command-line arguments of erdpro.exe that you are currently using:

```

Sub Start( )
    Dim Msg As String
    Super::Start( )
    If Command = "" Then
        Msg = "Sorry, no command-line arguments were "
+           & "used to launch this program."
    Else

```

Const statement

```
Msg = "The command-line string you passed to this "  
+     & "program when you launched it is " & Command  
End If  
ShowFactoryStatus( Msg )  
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

Const statement

Declares symbolic constants to be used in place of literal values.

Syntax [Global] Const<const name>=<expression> [,<const name>=<expression>]...

Description The following conditions apply when using symbolic constants:

- Const must be in a Declare section.
- Any <const name> you use must be defined by Const before you can refer to it.
- A constant cannot be a Variant, and its data type cannot change.
- Unlike a variable, a constant cannot be changed while your program is running.
- You can use a constant anywhere you might use an expression.
- The data type of <const name> is based on <expression> if there is no type declaration postfix specified. A string <expression> always yields a String <const name>, but a numeric <expression> yields the simplest data type that can represent it once it has been evaluated.
- A constant declared in a sub or function procedure is local to that procedure.

Parameters [Global]

Keyword indicating that the <const name>s can be accessed by all procedures in the program.

<const name>

Name of the constant to which the value of <expression> is assigned. The name must follow standard variable naming conventions.

<expression>

Expression assigned to <const name>. <expression> can consist of literals, other constants, or any arithmetic or logical operators. The expression cannot contain or use any of the following:

- Variables
- User-defined functions

- Intrinsic Actuate Basic functions such as Chr[\$]
- Tips**
- To simplify maintenance and debugging, put Global Const definitions in a single module.
 - To make constants easier to recognize when debugging, use all uppercase letters for your constant names.
 - To declare the data type of a constant, use a type declaration postfix character like %, &, !, #, @, or \$.

Example The following example defines the constant PI, generates the value of a radius, then uses PI to compute the circumference and area of a circle. To use this example, paste the following code at or near the beginning of your Actuate Basic source code (.bas) file:

```
Declare
    ' Define constantGlobal Const PI = 3.141592654
End Declare
```

Then, paste the following function into the method editor:

```
Sub Start( )
    Dim Area As Double, Circum As Double
    Dim Msg As String, Radius As Integer
    Super::Start( )
    ' The radius of a circle in centimeters
    Radius = Rnd * 10
    ' Compute circumference
    Circum = 2 * PI * Radius
    ' Compute area
    Area = PI * (Radius ^ 2)
    Msg = "If the radius of a circle is " & Radius & " cm"
    ShowFactoryStatus( Msg )
    Msg = "the circumference of the circle is " & Circum & " cm."
    ShowFactoryStatus( Msg )
    Msg = "Its area is " & Area & " sq cm."
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Dim statement
Global statement
Let statement
Static statement

ConvertBFileToString function

Encodes a binary data file into a string.

Syntax ConvertBFileToString(<filename>)

Description Use ConvertStringToBFile to conditionally embed different images in your report instances—based upon different data or run-time parameters.

Use ConvertBFileToString, and the complementary function ConvertStringToBFile, to send the same report design to two different customers, A and B, and include binary data A in the report to A, and binary data B in the report to B. Instead of embedding either set of binary data in a given report, or creating two slightly different reports, you write conditional code in a single report. The instances of your report display different data at run time as required.

ConvertBFileToString should be used only in conjunction with its complementary function, ConvertStringToBFile.

Parameters **<filename>**
String expression that specifies the binary file to convert. Can include optional drive and path information. The default path is the current default drive and directory. <filename> cannot include wildcard characters and must refer to an existing file.

Returns String. If <filename> is not found or the file cannot be read, a run-time error occurs.

See also ConvertStringToBFile function

ConvertStringToBFile function

Decodes a string from Actuate's internal representation back into a binary file.

Syntax ConvertStringToBFile(<stringval>)

Description Use ConvertStringToBFile to conditionally embed different sets of binary data in your report instances—based upon different data or run-time parameters.

Use ConvertStringToBFile, and the complementary function ConvertBFileToString, to send the same report design to two different customers, A and B, and include binary data A in the report to A, and binary data B in the report to B. Instead of embedding either set of binary data in a given report, or creating two slightly different reports, you write conditional code in a single report. The instances of your report display different sets of binary data at run time as required.

- ConvertStringToBFile should be used only in conjunction with its complementary function, ConvertBFileToString.

- The parameter you pass in (<stringval>) must be the return from the complementary function ConvertBFileToString.
- The returned file name is the name of the temporary file. Remove the temporary file when it is no longer needed.

Parameters <stringval>

String expression that specifies the string to convert into a binary file.

Returns String

Tip ConvertStringToBFile creates a temporary file. Be sure to include code that will clean up the temporary file after it is no longer needed.

See also ConvertBFileToString function

ConvertToXML function

Returns a string with escaped characters for those characters that have special meaning to XML.

Syntax ConvertToXML(<convert>, <XMLcharset>)

Parameters <convert>

String expression. Contains the string you wish to modify. Certain characters have special meaning to XML. ConvertToXML puts escape characters in the string in place of the special character so that the string itself is properly formatted for use in XML. For example, the & character has special meaning to XML syntax, and including it in a string to be used in XML can cause unpredictable results. Calling ConvertToXML replaces the ampersand (&) character with the string &. The string that contained A & B is now returned as A & B.

<XMLcharset>

String expression. Contains the encoding value to use in conversion. If set to "", no encoding is used.

Returns String

Example The following example demonstrates the return value of ConvertToXML:

```
Sub Start( )
    Dim data as String
    Dim Msg as String
    Super::Start( )
    data = "A & B"
    Msg = "The result of ConvertToXML(data) is " &
        ConvertToXML(data)
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

CopyInstance statement

Copies the values of the variables from one instance to another instance, even when the classes of the two instances are unrelated.

Syntax CopyInstance(<source>, <destination>, <excludeProperty>)

Both the names and data types of the variables in <source> must match the names and data types of the corresponding variables in <destination>.

Parameters **<source>**

Any instance (object). The instance that contains the variables from which you want to copy values.

<destination>

Any instance (object). The instance that contains the variables to which you want to copy the values from <source>.

The classes of the two instances do not need to be related.

CopyInstance matches variables on name and data type.

For example, in the case of a variable in <source> named Amount with type Currency, CopyInstance copies the variable’s value from <source> to <destination> only if <destination> has a variable with the same name and type.

CopyInstance ignores or skips variables that do not match on both name and data type.

<excludeProperty>

String that specifies the properties to be excluded when copying an instance.

Tip CopyInstance is useful when you work with multi-input filters. CopyInstance simplifies writing complex data streams, for example, when creating a union.

Example The following example creates the classes Size and Quantity. Both classes contain a variable named Title of type String, but no other similar variables.

To use this example, paste the class definitions at or near the beginning of your Actuate Basic source code (.bas) file.

```
Class Size
    Dim Height As Single, Title As String
    Dim Msg As String
    Sub Initialize(NewHeight As Single, NewTitle As String)
        Height = NewHeight
        Title = NewTitle
    End Sub
```

```

Sub Display( )
    Msg = "Title is " & Title & " and Height is " & Height
    ShowFactoryStatus( Msg )
End Sub
End Class
Class Quantity
    Dim Quantity As Integer, Title As String
    Dim Msg As String
    Sub Initialize(NewQuantity As Integer, NewTitle As String)
        Quantity = NewQuantity
        Title = NewTitle
    End Sub

    Sub Display( )
        Msg = "Title is " & Title & ". Quantity is " & Quantity
        ShowFactoryStatus( Msg )
    End Sub
End Class

```

Then, paste the following example code into the method editor:

```

Sub Start( )
    Dim SizeObj As Size, QuanObj As Quantity
    Super::Start( )
    Set SizeObj = New Size
    Set QuanObj = New Quantity
    SizeObj.Initialize(5.67, "A size")
    SizeObj.Display
    QuanObj.Display
    CopyInstance(SizeObj, QuanObj, "")
    QuanObj.Display
End Sub

```

Only SizeObj is initialized. After CopyInstance is called, only the Title variable in QuanObj has a value. The remaining QuanObj variable, Quantity, is not set because it has no match in SizeObj.

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also SetBinding function

Cos function

Returns the cosine of an angle.

Syntax Cos(<angle>)

CreateJavaClassHandle function

Parameters <angle>

Number, numeric expression, or Variant of VarType 8 (String) that specifies, in radians, the angle for which you want to find the cosine.

If <angle> is a String, it is parsed according to the formatting rules of the current run-time locale. If <angle> evaluates to Null, Cos returns Null.

Returns Double

Tip To convert between radians and degrees, use: radians = degrees * Pi/180.

Example The following example prompts the user for an angle expressed in radians, then returns the cosine of the angle:

```
Sub Start( )
    Dim Angle As Double, Pi As Double
    Dim Msg As String
    Super::Start( )
    Pi = 3.14159265358979
    ' A random angle in radians
    Angle = Pi * Rnd
    Msg = "The cosine of " & Angle & " is: " & Cos( Angle )
    ShowFactoryStatus ( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Acos function
Asin function
Atn function
Sin function
Tan function

CreateJavaClassHandle function

Creates a handle to a Java class.

Syntax CreateJavaClassHandle("<class identifier>")

Description Use CreateJavaClassHandle to access static class fields and static class methods. You can also use CreateJavaClassHandle to create an instance of the class by invoking a class constructor method via the class handle.

CreateJavaClassHandle throws a user error for the following problems:

- CLASSPATH environment variable not found
- Java Virtual Machine not found or cannot be created
- Class not found

- Method or field not found

- Parameters** **<class identifier>**
 java.lang.String expression that specifies the name of the Java class. The Java class must be located in a path defined in the CLASSPATH environment variable. If the class identifier contains a package name and a class name, only the class name is used in invoking the class constructor.
- Returns** A Basic object which is a handle to the Java class object if the method succeeded, and an undefined handle if the call failed.
- Example** On the first line of the following example, the variable theClassHandle is declared as a type Object. On the second line, CreateJavaClassHandle is used to create the handle to the Java class java.lang.String and assign it to theClassHandle.

```
Dim theClassHandle As Object
Set theClassHandle = CreateJavaClassHandle("java.lang.String")
```

The following example shows how to create a Java class handle and how to use that handle to invoke a constructor to create an instance of the class:

```
Dim theClassHandle As Object
Set theClassHandle = CreateJavaClassHandle("java.lang.String")
Dim theInstanceHandle As Object
Set theInstanceHandle = theClassHandle.String( "Hello")
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

CreateJavaObject function

Creates an instance of a class without invoking a constructor.

Syntax CreateJavaObject("<class identifier>")

Description CreateJavaObject allocates an object of the given ClassIdentifier. The call does not invoke any constructor, including default constructor, of the class. Instance fields of the class are not initialized in the allocated object. To initialize the instance, either call an initialization method on the instance or invoke the constructor through a handle to the class.

CreateJavaObject throws a user error for the following problems:

- CLASSPATH environment variable not found
- Java Virtual Machine not found or cannot be created
- Class not found
- Object creation failed

CreateJavaObject cannot receive a Null instance.

Parameters	<p><class identifier> String expression that specifies the name of the Java class. The Java class must be located in a path defined in the CLASSPATH environment variable. The class identifier must be either the class name or the class name and package name. The class identifier cannot contain a partial path.</p>
Returns	A Basic object which is a handle to the instance if the method succeeded, and an undefined handle if the call failed.
Example	<p>On the first line of the following example, the variable theObject is dimensioned as a type Object. On the second line, CreateJavaObject is used to create the Java object, readfile, and assign it to theObject.</p> <pre>Dim theObject As Object Set theObject = CreateJavaObject("readfile")</pre> <p>For information about using the code examples, see “Using the code examples,” earlier in this chapter.</p>

CSng function

Converts a numeric expression to the Single data type.

Syntax	CSng(<numeric expression>)
Description	CSng is one of nine Actuate Basic data type conversion functions. If <numeric expression> lies outside the acceptable range for a Single data type, an overflow error occurs. If <numeric expression> is Null, CSng returns Null.
Parameters	<p><numeric expression> Numeric expression to convert from the Currency, Date, Double, Integer, Long, String, or Variant data type to the Single (or single precision floating point) data type. The following conditions apply to <numeric expression>:</p> <ul style="list-style-type: none"> ■ If <numeric expression> is a String or Variant, it must be interpretable as a number. ■ If <numeric expression> is a String, it is parsed according to the formatting rules of the current run-time locale. <p>For example, each of the following statements returns 123. In the second statement, the string 123 enclosed in double quotation marks is considered a numeric expression because it can be interpreted as a number.</p> <pre>CSng(123) CSng("123")</pre> <p>The following statement generates an error. The string 123four is not considered a numeric expression because four cannot be interpreted as a number.</p> <pre>CSng("123four")</pre>

The following statement first converts the string 123four using Val to convert the number 123. Val ignores the string component, four.

```
CSng(Val("123four"))
```

The following statement returns 123.456 on a French run-time locale and 123456.00 on an English run-time locale:

```
CSng("123,456")
```

Returns Single. If <numeric expression> cannot be interpreted as a number, zero is returned.

- Tips**
- To convert an expression to single without using CSng, assign the expression to a variable that is the Single data type.
 - To declare the data type of a variable, use Dim with the As clause.
 - To round a number to precisely the number of decimal places you want and discard anything residual, use Format[\$].
 - To be sure you pass the correct data type to a sub procedure or to a Windows Dynamic Link Library (.dll), use data type conversion functions.

Example The following example generates a random number, converts that number using each of the conversion functions in turn, then displays the result:

```
Sub Start( )
    Dim Orig As String, Msg As String
    Super::Start( )
    ' Get a random number between 1 and 256
    Orig = 255 * Rnd + 1
    ' Convert to various formats
    Msg = "Your number is: " & Orig
    ShowFactoryStatus ( Msg )
    Msg = "CCur( Orig ) yields ----> " & CCur( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CDate( Orig ) yields ----> " & CDate( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CDBl( Orig ) yields ----> " & CDBl( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CInt( Orig ) yields ----> " & CInt( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CLng( Orig ) yields ----> " & CLng( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CSng( Orig ) yields ----> " & CSng( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CStr( Orig ) yields ----> " & CStr( Orig )
    ShowFactoryStatus ( Msg )
    Msg = "CVar( Orig ) yields ----> " & CVar( Orig )
    ShowFactoryStatus ( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also CCur function
CDate function
CDBl function
CInt function
CLng function
CStr function
CVar function
CVDate function
Dim statement
Format, Format\$ functions

CStr function

Converts an expression to the String data type.

Syntax CStr(<valid expression>)

Description CStr is one of nine Actuate Basic data type conversion functions.

Parameters **<valid expression>**
Expression to convert from the Currency, Date, Double, Integer, Long, Single, or Variant data type to the String data type. <valid expression> is parsed according to the formatting rules of the current run-time locale.

For example, the following statement returns the string 123four:

```
CStr(123) & "four"
```

The following statement generates an error, because it mixes string and numeric data types:

```
CStr(123) + 5
```

Returns String

If <valid expression> is Null, CStr returns Null.

- Tips**
- To declare the data type of a variable, use Dim with the As clause.
 - To ensure that you pass the correct data type to a sub procedure or a Windows Dynamic Link Library (.dll), use data type conversion functions.

Example The following example generates a random number, converts that number using each of the conversion functions in turn, then displays the result:

```
Sub Start( )  
    Dim Orig As String, Msg As String
```

```

Super::Start( )
' Get a random number between 1 and 256
Orig = 255 * Rnd + 1
' Convert to various formats
Msg = "Your number is: " & Orig
ShowFactoryStatus ( Msg )
Msg = "CCur( Orig ) yields ----> " & CCur( Orig )
ShowFactoryStatus ( Msg )
Msg = "CDate( Orig ) yields ----> " & CDate( Orig )
ShowFactoryStatus ( Msg )
Msg = "CDBl( Orig ) yields ----> " & CDBl( Orig )
ShowFactoryStatus ( Msg )
Msg = "CInt( Orig ) yields ----> " & CInt( Orig )
ShowFactoryStatus ( Msg )
Msg = "CLng( Orig ) yields ----> " & CLng( Orig )
ShowFactoryStatus ( Msg )
Msg = "CSng( Orig ) yields ----> " & CSng( Orig )
ShowFactoryStatus ( Msg )
Msg = "CStr( Orig ) yields ----> " & CStr( Orig )
ShowFactoryStatus ( Msg )
Msg = "CVar( Orig ) yields ----> " & CVar( Orig )
ShowFactoryStatus ( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also CCur function
 CDate function
 CDBl function
 CInt function
 CLng function
 CSng function
 CVar function
 CVDate function
 Dim statement
 Format, Format\$ functions

CurDir, CurDir\$ functions

Returns the current default directory for the specified drive, or for the current drive.

Syntax CurDir[(<drive:>)]
 CurDir\$[(<drive:>)]

Description While DOS always maintains a distinct current directory for each drive in the system, UNIX keeps only the current directory under the current drive. The current directory is the one the system searches first for a file name whenever you start such a search without specifying a path name.

Parameters **<drive:>**
String expression, consisting of a single character followed by a colon that specifies the drive for which you want to determine the current directory. The default is the current drive. The following conditions apply to <drive:>:

- First character of <drive:> must correspond to the letter of a valid DOS drive.
- First character of <drive:> must be in the range A to <lastdrive>, where <lastdrive> is the maximum drive letter you set in your Config.sys file.

For example, the following statement assigns to the variable DefaultVar a string containing the current directory path on the default drive:

```
DefaultVar = CurDir
```

The following statement assigns to the variable B\$ a string containing the current directory path on drive A:

```
B$ = CurDir("A")
```

The following statement assigns to the variable PlaceMark a string containing the current directory path on drive C:

```
PlaceMark = CurDir$("C:")
```

Returns CurDir: Variant
CurDir\$: String

- Tips**
- Since the path CurDir[\$] returns includes the drive letter, it also determines which drive is currently the current drive.
 - To be sure you have set the correct working directory before you issue commands that do not specify full path names, use CurDir[\$], ChDrive, and ChDir.
 - <drive> is ignored when the Basic program is running on a UNIX server.

Example The following example displays a message box indicating the current directory on the current drive:

```
Sub Start( )  
    Dim Msg As String  
    Super::Start( )  
    Msg = "The current directory is: "  
    ' Get current directory  
    Msg = Msg & CurDir  
    ShowFactoryStatus( Msg )  
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also ChDir statement
ChDrive statement
MkDir statement
Rmdir statement

CVar function

Converts a numeric expression to the Variant data type.

Syntax CVar(<valid expression>)

Description CVar is one of nine data type conversion functions. If <any valid expression> lies outside the acceptable range for a Variant data type, an overflow error occurs.

Parameters **<valid expression>**
Expression to convert to the Variant data type from the Currency, Date, Double, Integer, Long, Single, or String data type.

For example, the following statements return True, nonzero:

```
CVar(123) & "four" = "123four"
CVar(123) + 5 = 128
CVar(123) + 5 & "append" = "128append"
```

Returns Variant

If <valid expression> is Null, CVar returns Null.

- Tips**
- To convert an expression to variant without explicitly using CVar, assign the expression to a variable that is the Variant data type.
 - To declare the data type of a variable, use Dim with the As clause.
 - To be sure you pass the correct data type to a Sub procedure or to a Windows Dynamic Link Library (.dll), use data type conversion functions.

Example The following example generates a random number, converts that number using each of the conversion functions in turn, then displays the result:

```
Sub Start( )
    Dim Orig As String, Msg As String
    Super::Start( )
    ' Get a random number between 1 and 256
    Orig = 255 * Rnd + 1
    ' Convert to various formats
    Msg = "Your number is: " & Orig
    ShowFactoryStatus ( Msg )
    Msg = "CCur( Orig ) yields ----> " & CCur( Orig )
```

```

ShowFactoryStatus ( Msg )
Msg = "CDate( Orig ) yields ----> " & CDate( Orig )
ShowFactoryStatus ( Msg )
Msg = "CDBl( Orig ) yields ----> " & CDBl( Orig )
ShowFactoryStatus ( Msg )
Msg = "CInt( Orig ) yields ----> " & CInt( Orig )
ShowFactoryStatus ( Msg )
Msg = "CLng( Orig ) yields ----> " & CLng( Orig )
ShowFactoryStatus ( Msg )
Msg = "CSng( Orig ) yields ----> " & CSng( Orig )
ShowFactoryStatus ( Msg )
Msg = "CStr( Orig ) yields ----> " & CStr( Orig )
ShowFactoryStatus ( Msg )
Msg = "CVar( Orig ) yields ----> " & CVar( Orig )
ShowFactoryStatus ( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also CCur function
 CDate function
 CDBl function
 CInt function
 CLng function
 CSng function
 CStr function
 CVDate function
 Dim statement
 Format, Format\$ functions

CVDate function

Converts an expression to a Variant of VarType 7 (Date).

Syntax CVDate(<date expression>)

Parameters <date expression>

Date expression, or any numeric or string expression that can be interpreted as a date, a time, or both a date and a time. The default date if none is specified is 0 (Dec. 30, 1899) and the default time if none is specified is 00:00:00 (midnight).

The following conditions apply to <date expression>:

- Can be a String such as November 12, 1982 8:30 P.M., 12 Nov., 1982 08:30 P.M., 11/12/82, 08:30 P.M., or any other String that can be interpreted as a date, a time, or both a date and a time in the valid range.

- Can be a date serial number such as 30267.854, which corresponds to November 12, 1982 at 8:30 P.M., or any other number that can be mapped to a date, a time, or both a date and a time in the valid range.
- For date serial numbers, the Integer component represents the date itself while the decimal component represents the time of day on that date, where January 1, 1900 at precisely noon has the date serial number 2.5, and negative numbers represent dates prior to December 30, 1899 (0).
- If <date expression> includes a time of day, it must be a valid time, even if CVDate is not being used to return anything having to do with a time of day. A valid time is one that is in the range 0:00:00 (12:00:00 A.M.) through 23:59:59 (11:59:59 P.M.). Either the 12- or 24-hour clock can be used.
- If <date expression> is a numeric expression, the numeric expression must be in the range -657434 to +2958465, inclusive.
- <date expression> cannot contain a day of week.
- <date expression> must not be empty or zero-length.
- <date expression> must specify a date within the range January 1, 100 through December 31, 9999, inclusive.
- <date expression> is parsed according to the formatting rules of the current run-time locale.

The following assumes that the AC_CENTURY_BREAK property is set to the default value of 30. For information about using AC_CENTURY_BREAK, see *Accessing Data using e.Report Designer Professional*.

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000. For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).
- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

Note that a date can contain an abridged month, such as Nov. 12, 1982 as opposed to November 12, 1982.

For example, the following statements are equivalent. Each assigns 11/12/82 8:30:00 P.M., with its underlying serial number, to the variable BDate:

```
BDate = CVDate("11/12/82 8:30 pm")
BDate = CVDate("12 Nov 1982 20:30")
BDate = CVDate("November 12, 1982 8:30PM")
BDate = CVDate(30267.854167)
```

Returns Date

- If <date expression> is Null, CVDate returns Null.
- If <date expression> cannot be evaluated to a date, CVDate returns Null.
- If <date expression> contains a day of week, CVDate returns Null.
- If <date expression> fails to include all date components, such as day, month, and year, CVDate returns Null.
- If <date string> contains only numbers separated by valid date separators, CVDate recognizes the order for month, day, and year according to the settings of the current run-time locale.

- Tips**
- Do not use CVDate to convert a long date format that also contains the day-of-the-week string, like Friday, Nov. 12, 1982. The function does not recognize such strings as dates.
 - Avoid supplying CVDate with a date in a format other than formats specified in the locale map.
 - To determine if either a numeric or string expression that looks like a date can be converted to a date, use IsDate. However, IsDate cannot determine whether a string that looks like a number can be converted to a date, even if the number is in the correct range for date serial numbers.
 - If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

Example The following example generates a date. For any valid entry, it displays both a date and a date serial number.

```
Sub Start( )
    Dim DateMeme As String, ConvDateMeme As Date
    Dim Msg As String
    Super::Start( )
    DateMeme = CStr( Rnd * 125 * 365 )
    ConvDateMeme = CVDate( DateMeme )
    Msg = "The date is: " & ConvDateMeme
    ShowFactoryStatus( Msg )
    Msg = "The serial number for that date is: "
    + & Cdbl( ConvDateMeme )
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also CCur function
CDate function

CDBl function
 CInt function
 CLng function
 CSng function
 CStr function
 CVar function
 Dim statement
 Format, Format\$ functions
 IsDate function
 ParseDate function

Date, Date\$ functions

Returns the current system date.

Syntax Date

 Date\$

For example, the following statement assigns the current system date to a variable:

```
CurrDate = Date
```

Returns Date: Variant
 Date\$: String

- Date returns a Variant of VarType 7 (Date) that contains a date stored internally as a Double.
- Date\$ returns a date within the range January 1, 1980 through December 31, 2036, inclusive.
- Date\$ returns a 10-character string in the form mm-dd-yyyy, where mm represents the current month (01-12), dd the day (01-31), and yyyy the year (1980-2036). The locale for the report determines the order in which year, month, and day appear. The separator is always a hyphen, '-'. For example, for the Japanese locale, Date\$ returns a string like 2005-10-24, even though the separator character for a Japanese date is '/'.

Example The following example examines the system date and determines how many business days remain in the current week, not counting today:

```
Sub Start( )
    Dim CurrentDay As Integer, BusDaysLeft As Integer
    Dim Verb As String, DayNoun As String, Msg As String
    Super::Start( )
    ' Weekday returns an Integer
    CurrentDay = Weekday(Date)
```

DateAdd function

```
BusDaysLeft = 6 - CurrentDay
If BusDaysLeft < 0 or BusDaysLeft > 5 Then BusDaysLeft = 0
If BusDaysLeft = 1 Then
    Verb = "is "
    DayNoun = "day "
Else
    Verb = "are "
    DayNoun = "days "
End If
Msg = "Today is " & Format$(Date, "dddd") & "."
ShowFactoryStatus( Msg )
Msg = "There " & Verb & BusDaysLeft & " business " & DayNoun
ShowFactoryStatus( Msg )
Msg = "left in the current week, not counting today."
ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also CVDate function
Format, Format\$ functions
Now function
Time, Time\$ functions

DateAdd function

Returns a date to which a specified time interval has been added.

Syntax DateAdd(<interval code>, <number of intervals>, <date expression>)

Parameters **<interval code>**
String expression that specifies the interval of time, such as quarter, month, or second to add. You can use only one <interval code> at a time.

Table 6-1 lists each valid time period and the <interval code> that corresponds to it.

Table 6-1 Time periods and the corresponding interval codes

<interval code>	Time period	Description
yyyy	Year	Adds a year.
qq	Half a year	Adds half a year.
q	Quarter	Adds a quarter of a year.
m	Month	Adds a month.
y	Day of the year	Adds the day of the year.

Table 6-1 Time periods and the corresponding interval codes

<interval code>	Time period	Description
d	Day of the month	Adds the day of the month.
w	Day of the week	Adds the day of the week.
ww	Week of the year	Adds the week of the year. The week begins on a Sunday.
www	Custom week of the year.	Adds the week of the year. The date you specify determines the day on which the week begins.
h	Hour	Adds the hour.
n	Minute	Adds a minute.
s	Second	Adds a second.

<number of intervals>

Numeric expression that specifies the number of intervals to add. Use a positive number to get future dates and a negative number to get past dates.

<date expression>

String expression that specifies the date to add to, or a variant expression that contains a valid date. The following conditions apply to <date expression>:

- <date expression> must specify a date within the range January 1, 100 through December 31, 9999, inclusive.
- <date expression> cannot contain a day of week.
- <date expression> is parsed according to the formatting rules of the current run-time locale.

Returns Variant

- If you subtract more years than are in <date expression>, an error occurs.
- If <date expression> cannot be evaluated to a date, DateAdd returns Null.
- If <date expression> fails to include all date components, such as day, month, and year, DateAdd returns Null.
- If <date expression> contains a day of week, DateAdd returns Null.
- If <number of intervals> is not a Long value, DateAdd follows the rules for Fix function and rounds <number of intervals> to the nearest whole number.

The following assumes that the AC_CENTURY_BREAK property is set to the default value of 30. For information about using AC_CENTURY_BREAK, see *Accessing Data using e.Report Designer Professional*.

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000.

DateDiff function

For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).

- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

Note that a date can contain an abridged month, such as Nov. 12, 1982 as opposed to November 12, 1982.

- Tips**
- Use DateAdd to add a specified time interval to a date. For example, you can use DateAdd to calculate a date 30 days from a transaction date to display a Send Late Payment Notice field.
 - To calculate the difference between two dates, use DateDiff.
 - If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

Example The following example generates a date, adds 30 days to that date, then displays the result:

```
Sub Start( )
    Dim TransactionDate, Msg
    Super::Start( )
    TransactionDate = CDate(CInt(Rnd * 125 * 365))
    Msg = DateAdd("d", 30, TransactionDate)
+   & " is 30 days after the date " & TransactionDate
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also DateDiff function

DateDiff function

Calculates and returns the time difference between two specified dates.

Syntax DateDiff(<interval>, <date to subtract>, <date to subtract from>)

Parameters **<interval>**
String expression that specifies the interval of time, such as quarter, month, or second, to use in calculating the difference between two specified dates. You can use only one <interval> at a time.

Table 6-2 lists valid values for <interval> and describes how DateDiff uses each in calculations.

Table 6-2 Time periods and the corresponding interval expressions

<interval>	Time period	Description
yyyy	Year	DateDiff uses the year portion in calculation.
qq	Half of the year	DateDiff calculates the difference by determining the half of the year into which each date falls, then subtracting the halves.
q	Quarter	DateDiff uses the following quarters: January - March, April - June, July - September, and October - December. DateDiff calculates the difference by determining the quarter into which each date falls, then subtracting the quarters.
m	Month	DateDiff uses the month portion of dates in calculation.
y	Day of the year	DateDiff counts the number of days in the specified years.
d	Day of the month	DateDiff counts the number of days in the specified months.
w	Day of the week	DateDiff counts the number of Mondays.
ww	Week of the year	DateDiff counts the number of Sundays.
www	Custom week of the year	DateDiff counts the number of weeks. The date you specify determines the day on which the week begins.
h	Hour	DateDiff counts the number of hours.
n	Minute	DateDiff counts the number of minutes.
s	Second	DateDiff counts the number of seconds.

<date to subtract>

String expression that specifies the date to subtract, or the name of a variant expression containing the valid date. The following conditions apply to <date to subtract>:

- <date to subtract> must specify a date within the range January 1, 100 through December 31, 9999, inclusive.
- <date to subtract> cannot contain a day of week.
- <date to subtract> is parsed according to the formatting rules of the current run-time locale.

<date to subtract from>

String expression that specifies the date to subtract from, or the name of a variant expression containing the valid date. The following conditions apply to <date to subtract from>:

- <date to subtract from> must specify a date within the range January 1, 100 through December 31, 9999, inclusive.
- <date to subtract from> cannot contain a day of week.
- <date to subtract from> is parsed according to the formatting rules of the current run-time locale.

The following assumes that the AC_CENTURY_BREAK property is set to the default value of 30. For information about using AC_CENTURY_BREAK, see *Accessing Data using e.Report Designer Professional*.

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000. For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).
- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

Note that a date can contain an abridged month, such as Nov. 12, 1982 as opposed to November 12, 1982.

Returns Variant

- If <date to subtract> refers to a later point in time than <date to subtract from>, DateDiff returns a negative number.
- If <date to subtract> cannot be evaluated to a date, DateDiff returns Null.
- If <date to subtract from> cannot be evaluated to a date, DateDiff returns Null.
- If <date to subtract> fails to include all date components (day, month, and year), DateDiff returns Null.
- If <date to subtract from> fails to include all date components (day, month, and year), DateDiff returns Null.
- If <date to subtract> contains a day of week, DateDiff returns Null.
- If <date to subtract from> contains a day of week, DateDiff returns Null.
- If <interval> is w (weekday), DateDiff returns the number of weeks by counting the number of Mondays between the two dates. If <date to subtract from> falls on a Monday, DateDiff does not include that Monday in the

calculation. In the following example, both specified dates fall on a Monday. The result DateDiff returns is 2.

```
DateDiff("w", "6/26/95", "7/10/95")
```

- If <interval> is ww (week), DateDiff returns the number of weeks by counting the number of Sundays between the two dates. If <date to subtract from> falls on a Sunday, DateDiff does not include that Sunday in the calculation. In the following example, both specified dates fall on a Sunday. The result DateDiff returns is 2.

```
DateDiff("ww", "6/25/95", "7/9/95")
```

- DateDiff uses the year portion of dates in calculation. For this reason, the following example returns 1, although the dates are one day apart:

```
DateDiff("yyyy", "12/31/95", "1/1/96")
```

- DateDiff uses the month portion of dates in calculation. For this reason, the following example returns 1, although the dates are one day apart:

```
DateDiff("m", "12/31/95", "1/1/96")
```

- DateDiff calculates the difference by checking which quarters the specified dates fall in. For this reason, the following example returns 1, although the dates are one day apart:

```
DateDiff("q", "12/31/95", "1/1/96")
```

- The actual display format of date and time is set using the Windows Control Panel.

- Tips**
- Use DateDiff to calculate the difference between two dates to display in a calculated field. For example, you can use DateDiff to calculate the number of days between a pre-sales date and a transaction date to display in a Sales Response field.
 - If you are calculating the number of weeks between two dates, you can use either weekday (w) or week (ww) as the interval. Because each starts the calculations from a different day, the results can be different.
 - To add a specified time interval to a date, use DateAdd.
 - If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

Example The following example uses two valid date expressions, PreSalesDate and TransactionDate. DateDiff finds the difference, in days, between PreSalesDate and TransactionDate, then displays the result.

```
Sub Start( )
    Dim PreSalesDate As Date, TransDate As Date
    Dim DDiff As Integer, Msg As String
```

DatePart function

```
Super::Start( )
PreSalesDate = CDate( CInt( Rnd * 125 * 365 ) )
TransDate = DateAdd( "d", CInt( Rnd * 90 ), PreSalesDate )
DDiff = DateDiff( "d", PreSalesDate, TransDate )
Msg = "The pre-sales date, " & PreSalesDate & ", is "
ShowFactoryStatus( Msg )
Msg = DDiff & " days before the transaction date, "
ShowFactoryStatus( Msg )
Msg = TransDate & "."
ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also DateAdd function
 DateSerial function

DatePart function

Returns a specified component of a given date.

Syntax DatePart(<interval code>, <date exprs>)

Parameters **<interval code>**
String expression that specifies the interval of time such as quarter, month, or second you want to determine. You can use only one <interval code> at a time.

Table 6-3 lists valid time periods for <interval code>.

Table 6-3 Time periods for dates and the corresponding interval codes

<interval code>	Time period	Range of return values
yyyy	Year	100 - 9999
qq	Half of the year	1 - 2
q	Quarter	1 - 4
m	Month	1 - 12
y	Day of the year	1 - 366
d	Day of the month	1 - 31
w	Day of the week	1 - 7
ww	Week of the year	1 - 53
www	Custom week of the year. The date you specify determines the day on which the week begins.	1 - 53

Table 6-3 Time periods for dates and the corresponding interval codes

<interval code>	Time period	Range of return values
h	Hour	0 - 23
n	Minute	0 - 59
s	Second	0 - 59

<date exprs>

Date expression, or any numeric or string expression that can be interpreted as a date, a time, or both a date and a time:

- Can be a string expression such as November 12, 1982 8:30 P.M., Nov. 12, 1982 08:30 PM, 11/12/82 8:30pm, 20:30, or any other string that can be interpreted as a date, a time, or both a date and a time in the valid range.
- Can be a date serial number such as 30267.854, which corresponds to November 12, 1982 at 8:30 P.M., or any other number that can be mapped to a date, a time, or both a date and a time in the valid range.
- For date serial numbers, the integer component represents the date itself while the decimal component represents the time of day on that date, where January 1, 1900 at precisely noon has the date serial number 2.5, and negative numbers represent dates prior to December 30, 1899 (0).

Default time of day if none specified: 00:00:00 (midnight)

Default date if none specified: December 30, 1899

The following conditions apply to <date exprs>:

- <date exprs> must be in the range January 1, 100 through December 31, 9999, inclusive.
- If <date exprs> is a numeric expression, it must be in the range -657434 to +2958465, inclusive.
- If <date exprs> is a variable containing a date serial number, the variable must be explicitly declared as one of the numeric types.
- If <date exprs> includes a time of day, it must be a valid time, even when you are not using DatePart to return anything having to do with time of day. A valid time is one that is in the range 00:00:00 (12:00:00 A.M.) through 23:59:59 (11:59:59 P.M.). Either the 12- or 24-hour clock format may be used.
- <date exprs> cannot contain a day of week.
- <date exprs> is parsed according to the formatting rules of the current run-time locale.

DatePart function

The following assumes that the AC_CENTURY_BREAK property is set to the default value of 30. For information about using AC_CENTURY_BREAK, see *Accessing Data using e.Report Designer Professional*.

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000. For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).
- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

Note that a date can contain an abridged month, such as Nov. 12, 1982 as opposed to November 12, 1982.

Each of the following examples returns True:

```
Print 11 = DatePart("m", "11/12/82 8:30:01 pm")
Print 12 = DatePart("d", "11/12/82 8:30:01 pm")
Print 316 = DatePart("y", "11/12/82 8:30:01 pm")
```

Returns Integer

- If <date exprs> is Null, DatePart returns Null.
- If <date exprs> cannot be evaluated to a date, DatePart returns Null.
- If <date exprs> fails to include all date components, such as day, month, and year, DatePart returns Null.
- If <date exprs> contains a day of week, DatePart returns Null.
- If DatePart("w", <date exprs>) returns 1, the day of the week for <date exprs> is Sunday. If DatePart returns 2, the day of the week is Monday, and so on.

- Tips**
- To return more than one interval at a time and to exercise more control over output, use Format instead of DatePart.
 - If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

Example The following example generates a date and time, then displays all ten values DatePart can return:

```
Sub Start( )
    Dim UserDate As String, Msg As String
    Dim Ans As Integer
    Super::Start( )
    ' Get a date
```

```

UserDate = CDate( Rnd * 125 * 365 )
Msg = "The date is: " & UserDate
ShowFactoryStatus( Msg )
Msg = "The year is: " & DatePart( "yyyy", UserDate )
ShowFactoryStatus( Msg )
Msg = "The quarter is: " & DatePart( "q", UserDate )
ShowFactoryStatus( Msg )
Msg = "The month is: " & DatePart( "m", UserDate )
ShowFactoryStatus( Msg )
Msg = "The day of the year is: " & DatePart( "y", UserDate )
ShowFactoryStatus( Msg )
Msg = "The day of the month is: " & DatePart( "d", UserDate )
ShowFactoryStatus( Msg )
Msg = "The day of the week is: " & DatePart( "w", UserDate )
ShowFactoryStatus( Msg )
Msg = "The week of the year is: " & DatePart( "ww", UserDate )
ShowFactoryStatus( Msg )
Msg = "The hour is: " & DatePart( "h", UserDate )
ShowFactoryStatus( Msg )
Msg = "The minute is: " & DatePart( "n", UserDate )
ShowFactoryStatus( Msg )
Msg = "The second is: " & DatePart( "s", UserDate )
ShowFactoryStatus( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also DateAdd function
 DateDiff function
 Day function
 Format, Format\$ functions
 Now function
 Weekday function
 Year function

DateSerial function

Returns a date variant based on the specified year, month, day, hour, minute, and second.

Syntax DateSerial(<year>, <month>, <day>)
 DateSerial(<year>, <month>, <day>, <hour>, <minute>, <second>)

DateSerial function

Parameters	<year> Numeric expression that specifies the year of a date. Must be an integer greater than zero.
	<month> Numeric expression that specifies the month of a date. Must be in the range 1 through 12, inclusive.
	<day> Numeric expression that specifies the day of a date. Must be in the range 1 through 31, inclusive.
	<hour> Numeric expression that specifies the hour of a day. Must be in the range 0 through 23, inclusive.
	<minute> Numeric expression that specifies the minute of a hour. Must be in the range 0 through 59, inclusive.
	<second> Numeric expression that specifies the second of a minute. Must be in the range 0 through 59, inclusive.

Returns Date

- The value DateSerial returns usually looks like a date but is stored internally as a double-precision number known as a date serial number, which is a number that represents a date and/or time from midnight January 1, 1 through December 31, 9999, inclusive.
- The integer component of any date serial number represents the date, such as day, month, and year itself while the decimal or fractional component represents the time of day on that date as a proportion of a whole day—where January 1, 1900 at precisely noon has the date serial number 2.5, and where negative numbers represent dates prior to December 30, 1899.
- The actual display format of date and time is set using the Windows Control Panel.

Tips ■ DateSerial can return a new date based on calculations done on a given date. In the following example, DateSerial returns a date that is thirty days before November 12, 1982—that is, 10/13/1982—and assigns it to the variable DateNew:

```
DateNew = DateSerial(1982, 11, 12) - 30
```

- If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

Examples Each of the following statements stores the underlying date serial number for November 12, 1982 (which is 30267) into the double-precision variable DateVar#:

```
DateVar# = CDb1(DateSerial(82, 11, 12))
DateVar# = DateSerial(1982, 11, 12) * 1
```

The following example generates a date and displays the day of the week for that date:

```
Sub Start( )
    Dim Msg As String, UserDate As Date, Verb As String
    Dim ValidFlag As Boolean
    Dim DD As Integer, MM As Integer, YY As Integer
    Dim DayOfWeek As String
    Super::Start( )

    Do
        ' Generate day, month, and year values
        DD = Rnd * 31
        MM = Rnd * 12
        YY = Rnd * 125 + 1899
        ' Assume the worst
        ValidFlag = False
        If MM >= 1 And MM <= 12 Then
            If DD >= 1 And DD <= 31 Then
                If YY >= 1753 And YY <= 2078 Then
                    ValidFlag = True
                End If
            End If
        End If
        ' Repeat until input is valid
    Loop While ValidFlag = False

    ' Determine date serial
    UserDate = DateSerial( YY, MM, DD )
    ' Find correct verb
    Select Case UserDate
        ' Now is the date serial for the current moment. We need
        ' only its integer component to compare with what the
        ' generated date to determine if the date was before
        ' today, today, or in the future
        Case Is < Int( Now ): Verb = " was a "
        Case Is > Int( Now ): Verb = " will be a "
        Case Else: Verb = " is a "
    End Select

    ' Returns a day of week
    DayOfWeek = Format( UserDate, "dddd" )
```

```
Msg = UserDate & Verb & DayOfWeek & ". "  
ShowFactoryStatus( Msg )  
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also DateValue function
Day function
Month function
Now function
TimeSerial function
TimeValue function
Weekday function
Year function

DateValue function

Returns a date variant that represents the date of the specified string.

Syntax DateValue(<date string>)

Parameters <date string>

String expression that specifies a date. Can be any string that can be interpreted as a date. The following conditions apply to <date string>:

- <date string> must be in the range January 1, 100 through December 31, 9999, inclusive.
- If a time is appended to the date it must be a valid time, even though DateValue does not return a time.
- <date string> is parsed according to the formatting rules of the current run-time locale.

The following assumes that the AC_CENTURY_BREAK property is set to the default value of 30. For information about using AC_CENTURY_BREAK, see *Accessing Data using e.Report Designer Professional*.

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000. For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).
- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

Note that a date can contain an abridged month, such as Nov. 12, 1982 as opposed to November 12, 1982.

Returns Date

- If <date string> contains only numbers separated by valid date separators, DateValue recognizes the order for month, day, and year according to the Short Date setting of the current run-time locale.
- If <date string> cannot be evaluated to a date, DateValue returns Null.
- If <date string> fails to include all date components, such as day, month, and year, DateValue returns Null.
- If a day of week is specified, DateValue returns Null.
- The value DateValue returns usually looks like a date but is stored internally as a double-precision number known as a date serial number—that is, a number that represents a date and/or time from midnight January 1, 100 through December 31, 9999, inclusive.
- The integer component of any date serial number represents the date (day, month, and year) itself while the decimal or fractional component represents the time of day on that date as a proportion of a whole day, where January 1, 1900, at precisely noon has the date serial number 2.5, and negative numbers represent dates prior to December 30, 1899.

Tip If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

Examples The following statements are equivalent. If the default Short Date format for the current run-time locale is mm/dd/yy, each stores 11/12/10 into the variable DateVar.

```
DateVar = DateValue("November 12, 10")
DateVar = DateValue("November 12, 2010")
DateVar = DateValue("Nov 12, 2010")
DateVar = DateValue("Nov 7, 2010") + 5
DateVar = DateValue("11/12/10")
DateVar = DateValue("11-12-2010")
```

Each of the following statements stores the underlying date serial number for November 12, 1982 (which is 30267) into the double-precision variable DateVar#:

```
DateVar# = DateValue("Nov 12, 1982")
DateVar# = DateValue("Nov 12, 1982") * 1
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also DateSerial function

Day function
Month function
Now function
TimeSerial function
TimeValue function
Weekday function
Year function

Day function

Returns an integer between 1 and 31, inclusive, that represents the day of the month for a specified date argument.

Syntax Day(<date exprs>)

Parameters <date exprs>

Date expression, or any numeric or string expression that can evaluate to a date. Specifies a date and/or time:

- Can be a string such as November 12, 1982, Nov. 12, 1982, 11/12/82, 11-12-82, or any other string that can be interpreted as a date in the valid range.
- Can be a date serial number such as 30267.854, which corresponds to November 12, 1982 at 8:30 P.M., or any other number that can be mapped to a date in the valid range.
- For date serial numbers, the integer component represents the date itself while the decimal component represents the time of day on that date, where January 1, 1900 at precisely noon has the date serial number 2.5, and negative numbers represent dates prior to December 30, 1899 (0).

The following conditions apply to <date exprs>:

- If <date exprs> is a string expression, it must specify a date in the range January 1, 100 through December 31, 9999, inclusive.
- <date exprs> is parsed according to the formatting rules of the current run-time locale.
- If <date exprs> is a numeric expression, it must be in the range -657434 to +2958465, inclusive.
- If <date exprs> is a variable containing a date serial number, the variable must be explicitly declared as one of the numeric types.

Returns Integer

- If <date exprs> cannot be evaluated to a date, Day returns Null. For example:
`Day ("This is not a date.")` returns Null.

- If <date exprs> fails to include all date components, such as day, month, and year, Day returns Null, as shown by the following examples:

```
Day ("Nov 12, 1982") returns 12, but
Day ("Nov 1982") returns Null
```

- If <date exprs> is Null, Day returns Null.

The following assumes that the AC_CENTURY_BREAK property is set to the default value of 30. For information about using AC_CENTURY_BREAK, see *Accessing Data using e.Report Designer Professional*.

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000. For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).
- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

Note that a date can contain an abridged month, such as Nov. 12, 1982 as opposed to November 12, 1982.

Tip If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

Examples The following statements are equivalent. Each assigns 7 to the variable UserDay.

```
UserDay = Day("6/7/64")
UserDay = Day("June 7, 1964 2:35 PM")
UserDay = Day("Jun 7, 1964")
UserDay = Day(23535)
UserDay = Day(4707*5)
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Date, Date\$ functions
 Hour function
 Minute function
 Month function
 Now function
 Second function
 Weekday function
 Year function

DDB function

Returns the depreciation of an asset for a given, single period using the double-declining balance method.

Syntax DDB(<initial cost>, <salvage value>, <asset lifespan>, <single period>)

Parameters All parameters must be positive numbers.

<initial cost>

Numeric expression that specifies the initial cost of the asset.

<salvage value>

Numeric expression that specifies the value of the asset at the end of its useful life.

<asset lifespan>

Numeric expression that specifies the length of the useful life of the asset.

Rule for <asset lifespan>: Must be given in the same units of measure as <single period>. For example, if <single period> represents a month, then <asset lifespan> must be expressed in months.

<single period>

Numeric expression that specifies the period for which you want DDB to calculate the depreciation.

Rule for <single period>: Must be given in the same units of measure as <asset lifespan>. For example, if <asset lifespan> is expressed in months, then <single period> must represent a period of one month.

The following example calculates the depreciation for the first year under the double-declining balance method for a new machine purchased at \$1400, with a salvage value of \$200, and a useful life estimated at 10 years. The result (\$280) is assigned to the variable Year1Deprec.

```
Year1Deprec = DDB(1400, 200, 10, 1)
```

Returns Double

Double-declining balance depreciation is an accelerated method of depreciation that results in higher depreciation charges and greater tax savings in the earlier years of the useful life of a fixed asset than are given by the straight-line depreciation method (SLN), where charges are uniform throughout.

The method uses the following formula:

Depreciation over <single period> = ((<initial cost> - total depreciation from prior periods) * 2) / <asset lifespan>.

Example The following example initializes various particulars about an asset, then returns the asset's double-declining balance depreciation for a single period:

```

Sub Start( )
    Dim Fmt As String, InitCost As Double, SalvageVal As Double
    Dim MonthLife As Double, LifeSpan As Double
    Dim DepYear As Double
    Dim PeriodDepr As Double, Msg As String, YearMonths
    Super::Start( )
    YearMonths = 12
    ' Define money format
    Fmt = "#,##0.00"
    ' Set Initial cost to $100,000
    InitCost = 100000
    ' Set salvage value to $10,000
    SalvageVal = 10000
    ' Set useful life to 10 years
    LifeSpan = 10
    ' Set year for depreciation to 5
    DepYear = 5

    PeriodDepr = DDB( InitCost, SalvageVal, LifeSpan, DepYear )
    Msg = "InitCost: " & InitCost
+   & " SalvageVal: " & SalvageVal
+   & " LifeSpan: " & LifeSpan
+   & " The depreciation for year " & DepYear & " is "
+   & Format( PeriodDepr, Fmt ) & "."
    ShowFactoryStatus( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples” earlier in this chapter.

See also SLN function
SYD function

Declare statement

Informs Actuate Basic that you are using, and how you are using, an external procedure in a dynamic link library (.dll). A procedure that returns a value is declared as a Function. A procedure that does not return a value is declared as a Sub.

Syntax Declare Sub <proc> Lib <lib name> [Alias <alias name>] [[[<arg list>]]]

Declare Function <proc> Lib <lib name> [Alias <alias name>] [[[<arg list>]]] [As <function data type>]

Description Use Declare to declare external procedures—procedures contained in a DLL. Declare needs to appear at or near the beginning of your Actuate Basic source

Declare statement

code (.bas) file. DLL procedures declared in any module are available to all procedures in all modules.

Empty parentheses indicate that the sub or function procedure has no arguments and that arguments should be checked to ensure that none are passed. In the following example, the sub First takes no arguments:

```
Declare Sub First Lib "MyLIB"()
```

If you use arguments in a call to First, an error occurs. The following example code would return an error for a sub First that takes no arguments:

```
Declare Sub First Lib "MyLIB" (arg%)
```

When an argument list appears, the number and type of arguments are checked each time the procedure is called. In the following example, the sub procedure Second takes one Long argument:

```
Declare Sub Second Lib "MyLIB" (X&)
```

If the name of the procedure in the DLL does not conform to Actuate Basic naming conventions, you must use an Alias clause to specify it as it appears in the DLL. From that point on, Actuate Basic uses <alias name>.

Parameters

Sub

Keyword indicating that the procedure does not return a value.

Function

Keyword indicating that the procedure returns a value and therefore can be used in an expression.

<proc>

The name of the sub or function you are declaring. Must be the same as its name in the DLL where it is defined. For function procedures, the data type of the procedure determines the data type it returns. Unless you use an As clause, <proc> can include a type-declaration character indicating the data type returned by the procedure.

The following conditions apply to <proc>:

- Must follow standard variable naming conventions.
- Cannot be the name of any other procedure.
- Cannot include a type-declaration character if you use the As clause.

Lib

Keyword before the name of the DLL, <lib name>, that contains the procedure being declared.

<lib name>

String literal of the DOS filename of the DLL that contains <proc> or <alias name>. If not in the current directory on the current drive, <lib name> must specify the full path name.

Alias

Keyword indicating the sub or function as it is named in the DLL. The following conditions apply to Alias:

- Must be used when the DLL procedure name is the same as an Actuate Basic reserved word.
- Must be used when a DLL procedure has the same name as a global variable, constant, or any other procedure in the same scope.
- Must be used if any characters in the DLL procedure name are not allowed in Actuate Basic names.

<alias name>

String literal for the alternative name of <proc> as it appears within <lib name>.

<arg list>

List of variables representing arguments that are passed to the sub or function procedure when it is called. <arg list> has the following syntax:

[**ByVal**] <arg variable> [**As** <arg data type>] [, [**ByVal**] <arg variable>
[**As** <arg data type>]] . . .

Arguments may be passed by value (using the keyword ByVal) or by reference.

ByVal

Keyword indicating that the argument is passed by value rather than by reference. Table 6-4 summarizes the behavior of ByVal.

Table 6-4 ByVal behavior

<arg variable>	Behavior of ByVal
Numeric expression	Converts <arg variable> to the data type indicated by its type-declaration character, if any, or else by its associated As clause. Passes the converted value to the DLL procedure.
Null-terminated string	Passes the address of the string data to the DLL procedure.

Default: String descriptor is sent to the called DLL procedure.

ByVal cannot be used with an array, user-defined type, or class variable.

<arg variable>

Any valid Actuate Basic variable name. <arg variable> must conform to standard variable naming conventions. If <arg variable> includes a type-declaration character, you cannot use the **As** <arg data type> clause.

Declare...End Declare statement

As <arg data type>

Clause that declares the data type of <arg variable> as Any, CPointer, Currency, Date, Double, Integer, Long, Single, String, Variant, a user-defined type, or any class. The following conditions apply to As <arg data type>:

- If you use this clause, do not use a type-declaration character as part of <arg variable>.
- Use the Any data type in an As clause only to override type checking for that argument.

The default type is Variant.

As <function data type>

Clause that declares the data type of the value returned by a function procedure, and not valid with declarations of sub procedures. The argument <function data type> can be Integer, Long, Single, Double, Currency, String (variable-length only), or Variant.

Example The following example shows a Declare statement that substitutes a shorter name, WinDir, for the full name of a Windows function that retrieves the Windows directory, GetWindowsDirectory. The function takes two arguments that are declared here by value and returns an integer.

```
Declare Function WinDir Lib "Kernel"  
+ Alias "GetWindowsDirectory" (  
+ ByVal lpBuffer As String, ByVal nSize As Integer) As Integer
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Call statement

Declare...End Declare statement

Declares global constants, global variables, and user-defined variable types.

Syntax Declare

<declaration statements>

End Declare

Parameters <declaration statements>

Any number of valid Actuate Basic global variable, global constant, or user-defined data type declaration statements.

- Tips**
- To declare global constants, global variables, and user-defined variable types in Actuate Basic, you must bookend your declarations with Declare and End Declare, as shown in the example.

- Do not confuse this multi-line Declare... End Declare statement with the single-line Declare statement that supports accessing functions in external dynamic link library files (DLLs).
- You can use as few or as many Declare... End Declare blocks as you need. It is good programming practice, however, to position all such statements in one group at or near the beginning of your code.

Example The following code in a user Basic file contains several different types of declarations within a single Declare... End Declare block:

```
Declare
    ' Global dynamic array:
    Global CarModelsCount()

    ' Global fixed array with 366 elements:
    Global Birthdays(366)

    ' Global Integer variable:
    Global PrintFlag as Integer
    ' Global constant:
    Global Const PI = 3.14159265359

    ' User-defined (non-intrinsic) variable type:
    Type FullName
        FirstName As String
        MiddleName As String
        Lastname As String
        ExactAge As Double
    End Type

    ' A declaration based on the new non-intrinsic type above.
    ' Like an alias:
    Type PenName As FullName

    ' Two similar user-defined variable types, but based on
    ' intrinsic types this time:
    Type CustomerCount As Integer
    Type LiquidMeasure As Double

    ' An enum declaration
    Enum DatabaseType
        ODBC
        Oracle
        DB2
    End Enum
End Declare
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Const statement

Declare statement
 Enum...End Enum statement
 Global statement
 Type...As statement
 Type...End Type statement

Dim statement

Declares variables and allocates memory. Dim is an abbreviation for the Basic term dimension.

Syntax Dim <varname> [[[<subscripts>]]] [As [{Volatile|Transient|Persistent}] <type>] [, <varname> [[[<subscripts>]]] [As [{Volatile|Transient|Persistent}] <type>]]...

Description When you dimension variables with Dim, they are initialized as shown in Table 6-5.

Table 6-5 Initialization of variables with Dim

Type	Initialized as...
Numeric	0
Variant	Empty
Variable-length strings	Zero-length strings
CPointer	Null
User-defined	Separate variables
Object reference	Nothing (before Set)

To declare variables that are available to all procedures within the module, use Global. To declare variables that are available only in the procedure, use Dim at the procedure level. You cannot redimension an array variable with ReDim if you explicitly specified its size using Dim.

Parameters **<varname>**
A name you create for the new variable.

<subscripts>
Describes array dimensions according to the following syntax:

[<lower> **To** <upper>[, [<lower> **To** <upper>]]...

Range from <lower> to <upper> can be from -2147483648 to 2147483647, inclusive. If you do not supply subscript values between parentheses, Actuate Basic declares a dynamic array.

The following statements are equivalent if you do not use Option Base:

```
Dim P(7,5)
Dim P(0 TO 7, 0 TO 5)
Dim P(7, 0 TO 5)
```

The following example declares a dynamic array:

```
Dim TestArray()
```

[{Volatile|Transient|Persistent}]

These keywords are optional. When omitted, the variable is Persistent by default.

You probably do not want to use these keywords in your own code, and Actuate does not support their use in the Variables dialog box. They are documented here to help you understand AFC source code more thoroughly.

Persistent—The variable is to be written to the report object instance (.roi) file subject to standard ROI compression.

Transient—The variable is used only in the Factory and is not written to the ROI. When the object is read from the ROI, Transient variables are set to their default values. Marking variables as Transient results in a smaller ROI and improves object locality.

Volatile—Like a Persistent variable, the variable is written to the ROI. However, unlike Persistent, Volatile variables are not subject to ROI compression. Marking variables as Volatile improves object locality for objects with variables that change frequently during a report run, at the cost of taking additional space in the ROI.

As <type>

Specifies a data type or class for the variable. If you specify a class, <varname> can hold a reference to an instance of that class or descendant classes. Otherwise, if you do not specify As <type>, <varname> is of type Variant.

- Tips**
- To avoid assigning incorrect variable types, use the As clause to declare variable types.
 - Use the Option Strict statement to enforce variable typing.
 - To declare dynamic arrays, use Dim with empty parentheses after the variable name. Later, to define the number of dimensions and elements in the array, use ReDim.

```
Dim TestArray()
```

- To declare the data type of a variable without using As <type>, append the data type declaration character to the variable's name. For example, if you want the variable Income to contain only Currency data, declare it as:

```
Dim Income@
```

If you want the variable to contain only Double data, declare it as:

```
Dim Income#
```

Do...Loop statement

For more information about data type declaration characters, see “Using a type-declaration character” in Chapter 2, “Understanding variables and data types.”

- To set the value of an instance handle to an instance of a class, use Set.

Example The following code manipulates objects created using various Dim statements:

```
Sub Start( )
    Dim i As Integer
    Dim myControl As AcControl
    Dim Obj1 As AcLabelControl
    Dim Obj2 As AcLabelControl, Msg As String

    Super::Start( )
    ' Assignment

    Set myControl = me
    i = 103

    ' Standard instantiation
    Set Obj1 = New AcLabelControl
    ' Dynamic instantiation
    Set Obj2 = NewInstance ( "AcLabelControl" )

    Obj2.BackgroundColor = Red
    Msg = "The numeric value for the background color "
+      & "of Obj2 is: " & Obj2.BackgroundColor
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Option Strict statement
ReDim statement
Set statement

Do...Loop statement

Repeats a block of instructions while a specified condition is True or until a specified condition becomes True.

Syntax Syntax 1

```
Do [{ While | Until } <expression to reevaluate>]
    <statements>
[Exit Do]
```

```
<statements>
```

```
Loop
```

```
Syntax 2
```

```
Do
```

```
<statements>
```

```
[Exit Do]
```

```
<statements>
```

```
Loop [{ While | Until } <expression to reevaluate>]
```

Description If the condition to evaluate is placed at the bottom of the loop (after Loop), the loop executes at least once. If the condition to evaluate is placed after Do, the loop does not execute at all if the condition is initially False.

Parameters **While**
Keyword indicating that every time Actuate Basic begins or repeats the instructions between Do and Loop, Actuate Basic must determine whether <expression to reevaluate> is True or False. The following conditions apply to <expression to reevaluate>:

- If <expression to reevaluate> is True, the program executes the loop.
- If <expression to reevaluate> is False, or has become False during the last trip through the loop, Actuate Basic skips the intervening statements and passes control to the statement following Loop.

Until

Keyword indicating that every time Actuate Basic begins or repeats the instructions between Do and Loop, Actuate Basic must determine whether <expression to reevaluate> is True or False. The following conditions apply to <expression to reevaluate>:

- If <expression to reevaluate> is False, the program executes the loop.
- If <expression to reevaluate> is True, or has become True during the last trip through the loop, Actuate Basic skips the intervening statements and passes control to the statement following Loop.

The following example assumes Counter starts at 1 and increments by 1 each time through the loop, the following statement fragments are equivalent. In either case, the associated loop is executed nine times.

```
Do While Counter < 10
Loop Until Counter = 10
```

If Counter is instead incremented by 2 each time, the first associated loop is executed five (1, 3, 5, 7, 9) times. The second loop, however, never stops executing because Counter increments from 9 to 11 and so never exactly equals 10. A minor

Do...Loop statement

correction can address this issue. In the following example, Counter is incremented by 2 each time and the loop executes only five times:

```
Do Until Counter >= 10
```

Exit Do

A keyword indicating that the program must immediately interrupt the loop at the point at which the keyword occurs, and pass control to the statement following Loop.

<expression to reevaluate>

Any valid numeric or string expression that evaluates to True or False.

<statements>

Zero or more valid Actuate Basic statements.

- Tips**
- To stop a loop from continuing based upon whether a given expression is True or False, use Exit Do within a conditional structure like If Then.
 - Exit Do does not automatically exit all nested loops. When Do...Loop statements are nested, an Exit Do in a loop transfers control to the loop that is logically nested one level above the current one. For example, if you want to provide users with a way to back out of a complicated structure, map out a logical backtracking path in the form of several Exit Do statements, one at each level to which they are backtracking.
 - Evaluate Boolean variables using the keywords True or False.

Example The following example asks the user whether to display Demo 1 or Demo 2 first. In Demo 1, the program prompts the user for a number within a certain range. If that number falls outside the range, the Demo repeats the prompt. In Demo 2, the program prints the numbers from 1 to 11.

```
Sub Start( )
    Dim DemoNum As Integer, Counter As Integer
    Dim FirstShown As Integer
    Dim SecondShown As Integer, BothShown As Integer
    Dim Msg As String
    Super::Start( )
    ' Initialize flags and counters before the top of the loop
    ' Initially set Counter to 1
    Counter = 1
    ' Assume Demo 1 has not been shown
    FirstShown = False
    ' Assume Demo 2 has not been shown
    SecondShown = False
    ' Assume neither have been shown
    BothShown = False
    ' Start with Demo 1
    DemoNum = 1
```

```

' The outer loop will execute until the exit condition
' BothShown is true
Do Until BothShown
    ' First inner loop is executed if the user typed 1
    Do While DemoNum = 1
        ' This is the first demo
        Msg = "Random number is " + CStr(Int(10 * Rnd + 1))
        ShowFactoryStatus( Msg )
        ' Remember Demo 1 has been shown
        DemoNum = 2
        ' User is ready for Demo 2
        FirstShown = True
        ' Exit first inner loop
    Exit Do
Loop
' The second inner loop is executed when the user types 2
' but only if user hasn't seen the second demo. In other
' words, SecondShown is false.
Do While DemoNum = 2 And Not SecondShown
    ' This nested loop will execute 11 times and return to
    ' 2nd inner loop
    Do Until Counter = 12
        ShowFactoryStatus( CStr( Counter ) )
        Counter = Counter + 1
    Loop
    DemoNum = 1
    ' Exit condition for second inner loop
    SecondShown = True
Loop
' Set up final exit condition from outer loop
If FirstShown and SecondShown then BothShown = True
Loop
ShowFactoryStatus( "Both demos have been shown. Goodbye!" )
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Exit statement
 If...Then...Else statement
 While...Wend statement

End statement

Signals the completion of a multiline If...Then...Else statement, a Select Case statement, a block of Function or Sub statements, a Declare section, a Type or Class definition, or terminates the entire program.

Syntax End [{ Class | Declare | Function | If | Select | Sub | Type }]

Parameters **End**
Keyword that terminates the entire program.

End Class

Keyword that signifies the completion of a Class statement. End Class must terminate every Class statement.

End Declare

Keyword that completes a multiple-line Declare statement. End Declare must terminate a Declare statement that is in a multiline or block format.

End Function

Keyword that completes a Function definition. End Function must terminate every Function statement. Actuate Basic automatically supplies End Function when you type a Function statement.

End If

Keyword that completes a multiple-line If...Then...Else statement. End If must terminate every If...Then...Else statement that is in multiline or block format.

End Select

Keyword that completes a Select Case statement. End Select must terminate every Select Case statement.

End Sub

Keyword that completes a Sub procedure. End Sub must terminate every Sub statement. Actuate Basic automatically supplies End Sub when you type a Sub statement.

End Type

Keyword that completes a Type statement. End Type must terminate every Type statement.

Example The following example uses a Select Case block to return the name of the day of the week for the current day. To use this example, remove the End statement and run the example. The example generates an error message, Select Case without End Select.

```
Sub Start( )  
    Dim DayNumber As Integer, DayName As String
```



```

Super::Start( )
DayNumber = Weekday( Date )
Select Case DayNumber
    Case 1
        DayName = "Sunday"
    Case 2
        DayName = "Monday"
    Case 3
        DayName = "Tuesday"
    Case 4
        DayName = "Wednesday"
    Case 5
        DayName = "Thursday"
    Case 6
        DayName = "Friday"
    Case 7
        DayName = "Saturday"
End Select
ShowFactoryStatus( DayName )
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Class statement
 Declare statement
 Function...End Function statement
 If...Then...Else statement
 Select Case statement
 Stop statement
 Sub...End Sub statement
 Type...End Type statement

Enum...End Enum statement

Declares an enumerated type. The Enum...End Enum statement must be placed within a Declare...End Declare block.

Syntax Enum <user-defined enumeration type>

```

    <name 1> [= value 1]
    <name 2> [= value 2]
    ...
    <name N> [= value N]

```

Enum...End Enum statement

End Enum

Parameters **<user-defined enumeration type>**

The name of the type. This name is used to declare enum variables.

<name 1>...<name N>

The names of the values an enum variable of the declared type can take.

<value 1>...<value N>

Optional explicit values for the names. If not set, the first value of the name list is set to zero, and the value of each following name is increased by one.

Example The following code creates and uses an enumerated data type to determine branches in a section of code.

To create an enum, you place the enum statement in a Declare statement block, and save it as an Actuate Basic source (.bas) library file.

```
Declare
    Enum DatabaseType
        ODBC
        Oracle
        DB2
    End Enum
End Declare
```

The enum is then used as any other global type, as shown in the following code:

```
Sub Start()
    Dim DataSource as DatabaseType
    ' Place code to determine database type here
    ' Assign value to enumeration variable, for example:
    DataSource = DB2
    ' Use the enum variable to branch
    Select Case DataSource
        Case ODBC
            ' Code specific to ODBC database
        Case Oracle
            ' Code specific to Oracle database
        Case DB2
            ' Code specific to DB2 database
    End Select
    Super::Start()
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Declare...End Declare statement

Environ, Environ\$ functions

Returns the setting of a specified environment variable.

Syntax Environ\$(<environment variable name>)
 Environ[\$](<environment variable name>)
 or
 Environ\$(<table entry number>)
 Environ[\$](<table entry number>)

Parameters **<environment variable name>**
 String expression that specifies the name of an environment variable about which you want to know the settings. An environment variable is an internal variable an operating system uses to hold information about the computer system in which your program is running. These variables contain information about the current drive and path, and special information needed by various programs. Although each computer system has a different set of environment variables with different values, few common ones exist, such as PATH.

<environment variable name> must not contain a space.

<table entry number>

Numeric expression that specifies the variable's entry number. This number corresponds to its position in the environment table, where the first line in the table is line 1. The number must be greater than zero. The following example returns the contents of the CLASSPATH environment variable:

```
PathToJavaClasses = Environ("CLASSPATH")
```

Returns Environ: Variant
 Environ\$: String

- If <table entry number> is greater than the number of lines in the table, Environ[\$] returns a Empty string.
- If you call Environ[\$] using <environment variable name>, the function returns only the content of the variable, not its name.
- If you call Environ[\$] using <table entry number>, the function returns both the content of the variable in that position and its name.

Example The following Windows-based code looks for the PATH environment variable in the user's system. If it finds the variable, it displays its entry number and the length of the string it contains.

```
Sub Start( )
    Dim EnvString As String, LineNumber As Integer
    Dim Msg As String, Pathlen As Integer
```

EOF function

```
Super::Start( )
' Initialize line index to 1
LineNumber = 1
Do
  ' Get environment variable
  EnvString = Environ( LineNumber )
  ' Is it the PATH entry?
  If UCase$( Left( EnvString, 5 ) ) = "PATH=" Then
    ' If so, get its length
    Pathlen = Len( Environ( "PATH" ) )
    Msg = "The PATH entry occurs at position " & LineNumber
+      & ". Its length is " & Pathlen & "."
    Exit Do
  Else
    ' Not the PATH entry, so increment line counter
    LineNumber = LineNumber + 1
  End If
Loop Until EnvString = ""
If Pathlen > 0 Then
  ShowFactoryStatus( Msg )
Else
  ShowFactoryStatus( "No PATH environment variable." )
End If
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Command, Command\$ functions

EOF function

Returns a value that indicates whether the end of a file being input has been reached.

Syntax EOF(<open file number>)

Parameters <open file number>

Numeric expression that is the file descriptor used in the previously issued Open statement to open the target file. <open file number> must be the number of a currently open file, and must also refer to a disk file.

For example, the following code opens an existing disk file and then uses EOF repeatedly to test whether or not the end of the file has yet been reached:

```
Open "c:\Vb\Tests\test.fil" For Input As #1
Do While Not EOF(1) 'Test for end of file.
    Input #1, FileData 'Read line of data.
Loop
```

Returns Integer (0 for False or 1 for True)

EOF behaves differently depending upon the mode of access you use for the file:

- For sequential files, EOF returns True if the end of the file has been reached. Otherwise, EOF returns False.
- For random or binary files, EOF returns True if the last executed Get statement was unable to read an entire record. Otherwise, EOF returns False.

Tip Use EOF when you handle sequential files to avoid an error generated when you try to access a file's contents past the end of a file.

Example The following example creates a test file on disk that contains random numbers. The procedure opens the test file, reports the last value in the test file, then deletes the sample file from the disk. This example overrides Start to generate the test file, report the value, and prompt the user to delete the test file. To use this example, paste the procedure, MakeDataFile, after the End Function of the Start() procedure or save it in an Actuate code module (.bas) file.

```
Sub Start( )
    Dim TempVar As Integer, Msg As String
    Super::Start( )
    ' Generate sample file
    MakeDataFile
    ' Open sample for input
    Open "Test.fil" For Input As #1
    ' Check for end of file
    Do While Not EOF( 1 )
        ' Read data
        Input #1, TempVar
    Loop
    ' Close test file
    Close #1
    Msg = "The last value in the test file was "
+    & TempVar & "."
    ShowFactoryStatus ( Msg )
    Msg = "Now deleting test file."
    ShowFactoryStatus( Msg )
    ' Delete test file
    Kill "Test.fil"
End Sub
'Here is the procedure that generates the test file
Sub MakeDataFile()
    Dim I As Integer
```

Erase statement

```
' Open file for output
Open "Test.fil" For Output As #1
' Generate random values
For I = 0 To 250
    Print #1, Int(711 * Rnd)
Next I
' Close test file
Close #1
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Loc function
LOF function
Open statement

Erase statement

De-allocates memory reserved for dynamic arrays, or reinitializes the elements in a fixed array.

Syntax Erase <array name>... [, <array name>]

Description Erase behaves differently depending upon whether <array name> refers to a fixed or to a dynamic array:

- When Erase refers to a fixed array, Erase reinitializes the contents of the array but does not free up memory.
- When Erase refers to a dynamic array, Erase recovers the memory previously allocated to the array.

Erase reinitializes fixed arrays as shown in Table 6-6.

Table 6-6 How Erase initializes arrays

Type of fixed array	Array element set to...
Numeric	0 (Zero)
String (variable-length)	Empty
Variant	Empty
User-Defined	The value as shown here for each component type, taken separately
Object	Nothing
CPointer	Null

Parameters <array name>

Any valid array name. Can be a variable name or expression. An expression cannot contain parentheses. For example, the following statements are valid:

```
Erase BigArray
Erase my.Array
```

The following statement is invalid:

```
Erase my.Array(1)
```

- Tips**
- If you erase a dynamic array, you can use Dim or ReDim to create a new dynamic array with the same name as the old one.
 - You do not need to erase a dynamic array before you redimension it with ReDim.

Example The following example creates an array, fills it with values, then erases it:

```
Sub Start( )
    ' Declare variables
    Dim I As Integer, J As Integer, Total As Long, Msg
    ' Create 2-D integer array
    Dim Matrix(50, 50) As Integer
    Super::Start( )

    For I = 1 To 50
        For J = 1 To 50
            ' Put some values into array
            Matrix(I, J) = J
        Next J
    Next I

    ' Erase array
    Erase Matrix
    ' Initialize total counter
    Total = 0
    For I = 1 To 50
        For J = 1 To 50
            ' Sum elements after Erase to make sure all are zero
            Total = Total + Matrix(I, J)
        Next J
    Next I

    Msg = "An array has been created, filled, and erased. When "
+   & "the Erase statement was executed, zeros "
+   & "replaced the previous contents of each element."
+   & " The total of all elements is now " & Total
+   & ", showing that all elements have been cleared."
    ' Display message
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Dim statement
ReDim statement

Erl function

Returns the line number for the most recent run-time error.

Syntax Erl

Returns Integer

- When it runs an application, Actuate Basic uses Erl to report the number of the line at which the most recent error occurred, or of the line most closely preceding it.
- When Erl is 0, it means one of three things:
 - No run-time error has occurred.
 - An error could have occurred, but there was no line number just before the point at which the error occurred, or your program contains no line numbers.
 - Actuate Basic has reset Erl to 0 because it executed Resume or On Error, or because it executed Exit Sub or Exit Function from within an error handling routine.

- Erl returns only a line number, not a line label.
- Tips**
- To preserve the value of Erl before it gets reset to 0, immediately assign it to a variable.
 - To set the value of Erl indirectly, simulate an error condition using an Error statement.

Example In the following example, the program generates an error because it attempts to divide a number by zero. It then displays a message indicating the line number of the error.

```
Sub Start( )
    Dim XVar, YVar, ZVar
    Super::Start( )
    ' Set up error handler
    On Error GoTo ErrorHandler
    YVar = 1
    ' Now cause division by zero error:
    XVar = YVar / ZVar
    Exit Sub
```



```

' Error handler starts here
ErrorHandler:
    ShowFactoryStatus( "Error occurred at program line " & Erl )
    Resume Next
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Err statement
Error statement
On Error statement
Resume statement

Err function

Returns the code number for the most recent run-time error.

Syntax Err

Returns Integer

- Returns an Integer between 0 and 2,147,483,647.
- When Actuate Basic runs an application, it uses Err to report the occurrence of a run-time error and its error code.
- When Err is 0, it means no run-time error has occurred.
- Actuate Basic sets or resets Err to 0 each time it executes Resume or On Error or when it executes Exit Sub or Exit Function from within an error handling routine.

- Tips**
- To preserve the value of Err before it is reset to 0, immediately assign it to a variable.
 - To set the value of Err directly, use an Err statement. To set it indirectly, simulate an error condition using an Error statement.

Example In the following example, the program generates an error because it attempts to divide a number by zero. It then displays the code number of the error.

```

Sub Start( )
    Dim XVar, YVar, ZVar
    Super::Start( )
    ' Set up error handler
    On Error GoTo ErrorHandler
    YVar = 1
    ' Now cause division by zero error:
    XVar = YVar / ZVar
    Exit Sub

```

```
' Error handler starts here
ErrorHandler:
    ShowFactoryStatus( "Error number " & Err & " occurred" )
    Resume Next
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Erl function
Err statement
Error statement
On Error statement
Resume statement
Error, Error\$ functions
Error statement

Err statement

Sets Err to a given value.

Syntax Err = <error code>

Parameters **<error code>**
Numeric expression between 0 and 2,147,483,647 indicating the code of the most recent run-time error.

Description

- When it runs an application, Actuate Basic uses Err to record the occurrence of a run-time error and its error code.
- When Err is 0, it means no run-time error has occurred.
- Actuate Basic sets or resets Err to 0 whenever it executes Resume or On Error, or whenever it executes Exit Sub or Exit Function from within an error handling routine.

Tips

- To define and use your own error code, use a value for <error code> that is greater than any of the standard Actuate Basic error codes. You can work down from error code 2,147,483,647 to find an available user-defined error number. Write a routine that assigns that number to Err whenever certain error conditions that you define are true. Also write an error handling routine that translates the error number into an understandable message for the user.
- There are many user-defined codes among the standard ones.
- The Error statement can set Err to any value, because it simulates any run-time error.
- To preserve the value of Err before it gets reset to 0, immediately assign it to a variable.

Example The following example prompts the user for a filename, attempts to open the file to verify its existence, then handles a range of errors that might result:

```
Sub Start( )
    Dim FileName As String
    Super::Start( )
    ' Set up error handler
    On Error Resume Next
    FileName = "ThisFileShouldNotExist.txt"
    Do
        ' Clear any error
        Err = 0
        ' Attempt to open file
        Open FileName For Input As #1
        ' Handle error, if any
        Select Case Err
            ' No error = success!
            Case 0
                ShowFactoryStatus( UCase$( FileName ) & " found." )
            ' I/O errors
            Case 14
                ShowFactoryStatus( "File not found." )
                ' Don't try again = failed!
                Exit Do
            ' Handle all other cases
            Case Else
                ShowFactoryStatus( "Error: Sorry! Cannot continue!" )
                ' Don't try again = failed!
                Exit Do
        End Select
    Loop Until Err = 0
    ' Clean up
    Close #1
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Erl function
Err function
Error, Error\$ functions
Error statement

Error, Error\$ functions

Returns the error message for the most recent run-time error, or for a specified error number.

Syntax Error[(**<error code>**)]

Error\$[(**<error code>**)]

Parameters **<error code>**

Numeric expression between 1 and 2,147,483,647 inclusive that is the error number to be displayed as a message string by Error[\$]. If **<error code>** is not defined by Actuate Basic, Error[\$] returns the message string: User-defined error.

Returns Error: Variant

Error\$: String

- With **<error code>**, the Error[\$] function returns the message for the specified error number. In cases where context-sensitive information is inserted in the message at run time, the context-sensitive string is replaced with a space character. For example, in the following message, a space is inserted where the array element index number would normally appear:

Control array element ' ' doesn't exist.

- Without **<error code>**, the Error[\$] function returns the message for the most recent run-time error. If no error has occurred, the Error[\$] function returns an empty string.

Example The following example shows error messages for user input number errors:

```
Sub Start( )
    ' Demo of Error$ function and Error statement
    Dim Msg As String
    Dim UserError As Integer
    Super::Start( )
    ' Set up error handler
    On Error GoTo ErrorHandler
    ' Get a random number in the range 1 to 256
    UserError = 255 * Rnd + 1
    ' Simulate given error
    Error UserError
    Exit Sub
    ' Error handler starts here
ErrorHandler:
    Msg = "The message for error number "
    +   & Err & " is:" & Error( Err )
    ShowFactoryStatus( Msg )
    Resume Next
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Erl function
Err function
Error statement

Error statement

Simulates the occurrence of an error. Also, generates a user-defined error.

Syntax Error <error code>[,<message> [,<message>...]]

Description By setting the value of Err to <error code>, this statement simulates the occurrence of a specified error. It then passes control to whatever error-handling routine you have enabled, if any, so that in a debugging session you can verify whether or not that error-handler works.

If you have not enabled an error-handler when your program executes this statement, Actuate Basic stops your program and displays its own internal error message if it has one corresponding to <error code>, or User-defined error if it does not.

Parameters **<error code>**
Integer between 1 and 2,147,483,647 that is the error you wish to artificially generate.

For example, the following statement causes Actuate Basic to stop your program and display the message Division by zero, whether or not your program has actually attempted to divide anything by zero:

```
Error 8
```

<message>

You can pass any number of arguments in order to replace standard error messages. All extra messages are converted to strings and concatenated together. Then, the concatenated message is displayed instead of the standard error message.

- Tips**
- To define your own error code, use a value for <error code> that is greater than any of the standard Actuate Basic error codes. You can work down from error code 2,147,483,647 to find an available user-defined error number.
 - You will find many user-defined codes among the standard error codes Actuate Basic uses.

Example The following example prompts the user for an error number, simulates the appropriate error, then passes control to an error handler. The error handler then retrieves the corresponding message.

Exit statement

```
Sub Start( )
    ' Demo of Error$ function and Error statement
    Dim Msg As String, NL As String
    Dim UserError As Integer
    Super::Start( )
    ' Set up error handler
    On Error GoTo ErrorHandler
    ' Get a random number in the range 1 to 256
    UserError = 255 * Rnd + 1
    ' Simulate given error
    Error UserError
    Exit Sub
    ' Error handler starts here
ErrorHandler:
    Msg = "The message for error number "
+    & Err & " is:" & Error(Err)
    ShowFactoryStatus( Msg )
    Resume Next
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Erl function
Err function
Err statement
On Error statement
Resume statement

Exit statement

Terminates execution of the instructions specified in a Do Loop or For Next structure, or in a Function or Sub procedure.

Syntax Exit { Do | For | Function | Sub }

Parameters **Exit Do**
Keyword used to terminate a Do...Loop statement.

- When it encounters Exit Do, Actuate Basic transfers control to the statement following the Loop keyword.
- If it encounters Exit Do within a nested loop, the program transfers control to the loop that is nested one level above the one in which it occurs.
- Use Exit Do only within a Do Loop statement.

Exit For

Keyword used to terminate a For...Next statement.

- When it encounters Exit For, Actuate Basic transfers control to the statement following the Next keyword.
- If it encounters Exit For within a nested loop, the program transfers control to the loop that is nested one level above the one in which it occurs.
- Use Exit For only within a For Next statement.

Exit Function

Keyword used to terminate a Function statement. When it encounters Exit Function, Actuate Basic transfers control to the statement following the one that called the current Function statement.

Exit Sub

Keyword used to terminate a Sub statement. When it encounters Exit Sub, Actuate Basic transfers control to the statement following the one that called the current Sub statement.

- Tips**
- To stop a loop from continuing or repeating based upon whether or not a given expression is true, use Exit Do within a conditional structure like an If...Then...Else statement.
 - Do not confuse Exit with End. Use End to define the completion of a structure.

Example The following example shows how to use nested statements with Exit. When the generated random number matches one of those specified in the first Case clause, Actuate Basic exits the For...Next statement and the Do...Loop statement in two separate steps via both Exit For and Exit Do. When the random number matches one of those in the second Case clause, Actuate Basic exits both statements in one step, using Exit Do alone. A message reports in which Case clause the loops were terminated.

```
Sub Start( )
    Dim I As Integer, Num As Integer, Msg As String
    Dim BumpOut As Integer
    Super::Start( )
    ' Set a flag for ultimate exit
    BumpOut = False
    ' Generate random numbers
    Randomize Timer
    ' Set up an infinite loop
    Do
        ' If we exited FOR, let's also exit DO
        If BumpOut Then Exit Do
```

Exp function

```
For I = 1 To 1000
    ' Generate random number
    Num = Int(Rnd * 100)
    Select Case Num
        Case 7, 11, 13, 25
            ' This case causes an immediate exit from the For
            ' loop and will cause an exit from the Do loop on the
            ' next iteration
            ' Set flag for exit from Do next time
            BumpOut = True
            Exit For
        Case 29, 35, 87
            ' This case causes an immediate exit from both loops
            ' but leaves BumpOut set to false so we can tell
            ' where the exit occurred
            ' Directly exit in one step
            Exit Do
    End Select
Next I
Loop
Msg = "Exited because of " & Num
' We exited in the first Case clause
If BumpOut Then
    Msg = Msg & " (1st case: Two-step exit)."
Else
    Msg = Msg & " (2nd case: One-step exit)."
End If
ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Do...Loop statement
End statement
For...Next statement
Function...End Function statement
Sub...End Sub statement

Exp function

Raises e to the specified power.

Syntax Exp(<power>)

Parameters	<p><power> Number, numeric expression, or Variant of VarType 8 (String) that specifies the exponent. The following rules apply to <power>:</p> <ul style="list-style-type: none"> ■ <power> cannot be greater than 709.782712893. ■ If <power> is a String, it is parsed according to the formatting rules of the current run-time locale.
Returns	<p>Double</p> <p>If <power> evaluates to Null, Exp returns Null.</p>
Tip	Exp is the inverse of Log.
Example	<p>The following example generates a trigonometric angle expressed in radians, then uses the Exp function to calculate the hyperbolic sin of that angle:</p> <pre>Sub Start() Dim Angle As Double, HyperSin As Double, Pi As Double Dim Msg As String Super::Start() Pi = 3.14159265358979 ' The angle in radians Angle = Rnd * Pi 'Calculate hyperbolic sine HyperSin = (Exp(Angle) - Exp(-1 * Angle)) / 2 Msg = "The hyperbolic sine of " & Angle & " is " & HyperSin ShowFactoryStatus(Msg) End Sub</pre> <p>For information about using the code examples, see “Using the code examples,” earlier in this chapter.</p>
See also	Log function

ExtendSearchPath function

Adds directories to search for included images and files specified in the FindFile function.

Syntax	ExtendSearchPath(<directory>)
Description	<p>Call ExtendSearchPath to specify additional directories to search when locating images and files specified in the FindFile function. Call this function once for each directory to be added to the search path.</p> <p>You can call ExtendSearchPath at factory time, view time, or both. If you call ExtendSearchPath at factory time, the directory is added to the search path only when locating files included at factory time. If you call ExtendSearchPath at view</p>

FileAttr function

time, the directory is added to the search path only when locating files included at view time.

Parameters **<directory>**
A directory to add to the search path.

Example The following example adds C:\Documents and M:\Documents to the complete search path at factory time:

```
Sub Start()  
    Super::Start( )  
    ExtendSearchPath( "C:\Documents\" )  
    ExtendSearchPath( "M:\Documents\" )  
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also FindFile function

FileAttr function

Returns the mode of an open file or its DOS file handle.

Syntax FileAttr(<file number>, <info type>)

Parameters **<file number>**
Numeric expression that is the number you used as a file descriptor when you opened the target file. <file number> must evaluate to the number of a currently open file.

<info type>
Numeric expression that specifies whether to return the open mode of the file (1), or the DOS file handle (2). <info type> must evaluate or round to 1 or 2.

In the following code example, Actuate Basic opens a file, then stores values returned by FileAttr in corresponding variables:

```
Open "TEST" For Input As #1  
OpenMode = FileAttr(1,1)  
DOSHandle = FileAttr(1,2)
```

Returns Integer

- When <info type> is 1, FileAttr returns a number that defines the mode under which the file was opened. Table 6-7 lists possible values for FileAttr when <info type> is 1, and the corresponding modes.

Table 6-7 Values for FileAttr and the corresponding modes

Return value	Mode for which file was opened
1	Input
2	Output
4	Random
8	Append
32	Binary

- When <info type> is 2, FileAttr returns the file handle that DOS has assigned to the open file.

Example In the following example, Actuate Basic creates a test file by opening it for Append. Then it displays a message indicating the DOS handle and open mode of the file.

```
Sub Start( )
    Dim FileNum As Integer, DOSHandle As Long
    Dim OpenMode As String, Msg As String
    Super::Start( )
    ' Get next available file number
    FileNum = FreeFile
    ' Create sample file
    Open "TESTFILE" For Append As FileNum
    ' Get file DOS handle
    DOSHandle = FileAttr(FileNum, 2)
    ' Determine OpenMode
    Select Case FileAttr(FileNum, 1)
        Case 1: OpenMode = "Input"
        Case 2: OpenMode = "Output"
        Case 4: OpenMode = "Random"
        Case 8: OpenMode = "Append"
        Case 32: OpenMode = "Binary"
    End Select
    ' Close test file
    Close FileNum
    Msg = "The file assigned DOS file handle " & DOSHandle
+   & " was opened for " & OpenMode & "."
    ShowFactoryStatus( Msg )
    ' Delete test file
    Kill "TESTFILE"
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetAttr function
 Open statement
 SetAttr statement

FileCopy statement

Copies a file. Similar to the DOS command Copy.

Syntax FileCopy <source>, <destination>

Parameters **<source>**

String expression that specifies the file to copy. Can include optional drive and path information. <source> cannot include wildcard characters and must refer to an existing file.

Default path: Current default drive and directory.

<destination>

String expression that specifies where <source> is to be copied. Can include optional drive and path information. <destination> must conform to platform’s file naming conventions and cannot include wildcard characters. The default path is the current default drive and directory.

<source> or <destination> can optionally specify full path information, in which case either has the following syntax:

[<drive:>] [\]<directory>[/<directory>]...(Windows)

[/]<directory>[/<directory>]...(UNIX)

<drive:>

Character, followed by a colon. Specifies the drive (Windows only).

<directory>

String expression that specifies the name of a directory or subdirectory.

The following example assumes a file named Temp.fil exists on a Windows system, and that it is located on the current drive and in the current directory. The following code copies it, places the new copy on drive D in the subdirectory \Files\Archives, and names that copy Temp.arc, while leaving Temp.fil alone where it is:

```
NewName = "D:\Files\Archives\Temp.arc"  
FileCopy "Temp.fil", NewName
```

Example The following example copies a file from the Actuate install directory:

```

Sub Start( )
    Dim SourceFile As String, DestFile As String, Msg As String
    Super::Start( )
    On Error GoTo ErrHandler
    SourceFile = "C:\Program Files\Actuate11\readme.rtf"
    DestFile = "C:\actuate_readme.rtf"
    ' Copy file to destination
    FileCopy SourceFile, DestFile
    Msg = "File readme.rtf copied to C:\actuate_readme.rtf"
    ShowFactoryStatus( Msg )
    Exit Function
    ErrHandler:
    Select Case Err
        ' Path not found
    Case 48
        ShowFactoryStatus( SourceFile & " not found." )
    Case 40
        ShowFactoryStatus( "Permission denied, or drive not
        available." )
    case Else
        Msg = "An error occurred. Try specifying the full path "
+         & "name of the source or destination files, "
+         & "or of both."
    End Select
    ShowFactoryStatus( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Kill statement
Name statement

FileDateTime function

Returns a string that indicates the date and time a specified file was created or last modified. The date is formatted according to the formatting rules of the current run-time locale.

Syntax FileDateTime(<file spec>)

Parameters **<file spec>**
String expression that specifies the name of a valid file. Can include optional drive and path information. The file and any path must exist. Wildcard characters are not allowed in <file spec>. The default path is the current default drive and directory.

<file spec> can optionally specify full path information, in which case it has the following syntax:

[<drive:>] [\]<directory>[<directory>]... (Windows)

[/]<directory>[/<directory>]... (UNIX)

<drive:>

Character, followed by a colon, that specifies the drive on which the file is located (Windows only).

<directory>

String expression that specifies the name of a directory or subdirectory that constitutes a branch in the full path specification of <file spec>.

The following example statement determines when the file Mydata.mdb on a Windows system in the subdirectory C:\Access was last modified, and converts the returned string to a date variant:

```
LastSaved = CDate(FileDateTime("C:\Access\Mydata.mdb"))
```

Returns String

Example The following example displays the date and time a file was created or last modified and its size in bytes:

```
Sub Start( )
    Dim Msg As String, TimeStamp As String, UserFile As String
    Super::Start( )
    On Error Goto ErrHandler
    ' Get file name
    UserFile = "C:\Program Files\Actuate11\readme.rtf"
    ' Get file date/time
    TimeStamp = FileDateTime( UserFile )
    Msg = UCase$( UserFile ) & " created or last modified on "
+   & Format( TimeStamp, "dddd, mmmm dd, yyyy" )
+   & " at " & Format( TimeStamp, "h:nn AM/PM" )
+   & ". Its size is " & FileLen( UserFile )
+   & " bytes."
    ShowFactoryStatus( Msg )
    Exit Sub
ErrHandler:
    Msg = "Sorry! An error occurred. "
+   & "Please change this method code "
+   & "to use a different file name."
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples” earlier in this chapter.

See also FileLen function

FileTimeStamp function

GetAttr function

LOF function

FileExists function

Determines whether or not a given file or directory exists.

Syntax FileExists(<filename or dirname> [As String]) [As Boolean]

Parameters **<filename or dirname>**

String expression enclosed in double quotation marks that is the name of the file, directory, or subdirectory the existence of which you wish to determine. The default path is the current drive and directory.

<filename or dirname> can optionally specify a full path, in which case it has the following syntax:

[<drive:>][\]<directory>[\<directory>]...(Windows)

[/]<directory>[/<directory>]...(UNIX)

<drive:>

Character, followed by a colon, that specifies the drive (Windows only).

<directory>

String expression that specifies the name of a directory or subdirectory.

Returns Boolean

True if the file or directory exists, False otherwise.

Tip It is good programming practice to evaluate Boolean variables by using the keywords True or False, instead of by inspecting their content for a nonzero (True) or zero (False) numeric value.

Example Assuming a file called Readme.txt exists in the current directory, the following statement assigns the value True to the variable FileAlreadyInstalled:

```
FileAlreadyInstalled = FileExists( "Readme.txt" )
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also FileDateTime function

GetAttr function

Kill statement

Name statement

Open statement

FileLen function

Returns the length of a given file in bytes.

Syntax FileLen(<file spec>)

Parameters **<file spec>**

String expression that specifies the name of a valid file. Can include optional drive and path information. The default path is the current default drive and directory. The following conditions apply to <file spec>:

- Must be an unambiguous specification. Wildcard characters are not allowed.
- Indicated file or files must exist.
- Path, if specified, must exist.

<file spec> can optionally specify full path information, in which case it has the following syntax:

[<drive:>] [\]<directory>[\<directory>]... (Windows)

[/]<directory>[/<directory>]... (UNIX)

<drive:>

Character, followed by a colon that specifies the drive on which the file is located (Windows only).

<directory>

String expression that specifies the name of a directory or subdirectory that constitutes a branch in the full path specification of <file spec>.

For example, the following statement determines the length of the file Mydata.mdb on a Windows system in the subdirectory C:\Access, and assigns the value to a variable:

```
SizeOfFile = FileLen("C:\Access\Mydata.mdb")
```

Returns Integer

If the file specified in <file spec> is open when you call FileLen, the value FileLen returns represents the length of the file before it was opened.

Example The following example displays the date and time a file was created or last modified and its size in bytes:

```
Sub Start( )
    Dim Msg As String, TimeStamp As String, UserFile As String
    Super::Start( )
    On Error Goto ErrHandler
    ' Get file name
    UserFile = "C:\Program Files\Actuate11\readme.rtf"
```



```

' Get file date/time
TimeStamp = FileDateTime( UserFile )
Msg = UCase$( UserFile ) & " created or last modified on "
+   & Format( TimeStamp, "dddd, mmmm dd, yyyy" )
+   & " at " & Format( TimeStamp, "h:nn AM/PM" )
+   & ". Its size is " & FileLen( UserFile )
+   & " bytes."
ShowFactoryStatus( Msg )
Exit Sub
ErrorHandler:
Msg = "Sorry! An error occurred. "
+   & "Please change this method code "
+   & "to use a different file name."
ShowFactoryStatus( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples” earlier in this chapter.

See also FileDateTime function
GetAttr function
LOF function

FileTimeStamp function

Returns the date and time the specified file was created or last modified.

Syntax FileTimeStamp(<file spec>)

Parameters <file spec>

String expression that specifies the name of a valid file. Can include optional drive and path information. The default path is the current default drive and directory. The following conditions apply to <file spec>:

- <file spec> must be an unambiguous specification. Wildcard characters are not allowed.
- Indicated file or files must exist.
- Path, if specified, must exist.

<file spec> can optionally specify full path information, in which case it has the following syntax:

[<drive>:] [\]<directory>[/<directory>]... (Windows)

[/]<directory>[/<directory>]... (UNIX)

FileTimeStamp function

<drive:>

Character, followed by a colon, that specifies the drive on which the file is located (Windows only).

<directory>

String expression that specifies the name of a directory or subdirectory that constitutes a branch in the full path specification of <file spec>.

For example, the following statement determines when the file Mydata.mdb on a Windows system in the subdirectory C:\Access was last modified, and converts the returned string to a date variant:

```
LastSaved = CDate(FileTimeStamp("C:\Access\Mydata.mdb"))
```

Returns Date

Example The following example displays the date and time a file was created or last modified and its size in bytes:

```
Sub Start( )
    Dim Msg As String, TimeStamp As String, UserFile As String
    Super::Start( )
    On Error Goto ErrHandler
    ' Get file name and date/time
    UserFile = "C:\Program Files\Actuate11\readme.rtf"
    TimeStamp = FileTimeStamp( UserFile )
    Msg = UCase$( UserFile ) & " created or last modified on "
+    & Format( TimeStamp, "dddd, mmmm dd, yyyy" )
+    & " at " & Format( TimeStamp, "h:nn AM/PM" )
+    & ". Its size is " & FileLen( UserFile )
+    & " bytes."
    ShowFactoryStatus( Msg )
Exit Sub
ErrHandler:
    Msg = "Sorry! An error occurred. "
+    & "Please change this method code "
+    & "to use a different file name."
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples” earlier in this chapter.

See also FileDateTime function
FileLen function
GetAttr function

FindFile function

Resolves a relative file name by searching for the file through the existing search path.

Syntax FindFile(<filename>)

Description Call FindFile to resolve a relative file name by searching for the file through the existing search path.

You can call FindFile at factory time, view time, or both. If you call FindFile at factory time, Actuate searches for the specified file only at run time. In this case, Actuate searches the following:

- 1 If the referring report object design (.rod) file is open, the design search path.
For information about the design search path, see *Accessing Data using e.Report Designer Professional*.
- 2 The search path specified in the ExtendSearchPath function when ExtendSearchPath is called at factory time.
- 3 Global search path.
For information about the global search path, see *Accessing Data using e.Report Designer Professional*.
- 4 Configuration file search path.
For information about the configuration file search path, see *Accessing Data using e.Report Designer Professional*.

If you call FindFile at view time, Actuate searches for the specified file only at view time. In this case, Actuate searches the following:

- 1 The search path specified in the ExtendSearchPath function when ExtendSearchPath is called at view time.
- 2 Global search path.
For information about the global search path, see *Accessing Data using e.Report Designer Professional*.
- 3 Configuration file search path.
For information about the configuration file search path, see *Accessing Data using e.Report Designer Professional*.

Parameters <filename>
The relative file path.

- Returns**
- If the file is found, the absolute path to the file.
 - If the file is not found, an empty string.

Example The following example sets a file name in a relative path to search for, and calls ExtendSearchPath to add C:\Program Files\Actuate11\ and M:\Documents\ to the search path:

```
Sub Start( )
    Dim RelativeFile As String, FullFileName As String
    Dim Msg As String
    Super::Start( )
    ' Add search paths
    ExtendSearchPath( "C:\Program Files\Actuate11\" )
    ' Add search paths
    ExtendSearchPath( "M:\Documents\" )
    ' Set file name
    RelativeFile = "readme.rtf"
    ' Find full name
    FullFileName = FindFile( RelativeFile )
    ' Verify full file name
    If FullFileName = "" Then
        Msg = "File not found!"
    Else
        Msg = "Full file name is " & FullFileName
    End If
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples” earlier in this chapter.

See also ExtendSearchPath function

Fix function

Removes the fractional part of a numeric expression and returns the integer that remains.

Syntax Fix(<number to truncate>)

Parameters <number to truncate>

A numeric expression from which the fractional part is removed so that only the integer component is returned.

The returned data type depends on the data type of <number to truncate> as shown in Table 6-8.

Table 6-8 Relationship of data type of <number to truncate> to the data type returned

Data type of <number to truncate>	Data type returned
Variant of VarType 8 (String) that can convert to a number	Variant of VarType 5 (Double). If a String, it is parsed according to the formatting rules of the current run-time locale. For example: Fix("123,456") returns 123.456 on a French locale Fix ("123,456") returns 123456.00 on an English locale
Any other data type	Same data type as <number to truncate>
Null	Null

Returns Integer

Int and Fix are functionally similar but not identical. For negative values, Int returns the first negative integer less than or equal to <number to round>. Fix returns the first negative integer greater than or equal to <number to round>. CInt is also similar, but not identical, to both Int and Fix.

Using some sample values as arguments, Table 6-9 shows the differences between Int, Fix, and CInt.

Table 6-9 Differences of values between Int, Fix, and CInt

Value	Int (Value)	Fix (Value)	CInt (Value)
3.7	3	3	4
3.2	3	3	3
3	3	3	3
-3	-3	-3	-3
-3.2	-4	-3	-3
-3.7	-4	-3	-4

Tip Fix is equivalent to Sgn (<number to round>) * Int (Abs (<number to round>)).

Example The following example prompts the user for a number and displays the return values from Int, Fix, and CInt:

```
Sub Start( )
    Dim Num As Double, Msg As String
    Super::Start( )
```

```
' Get a random number between 1 and 256
Num = 255 * Rnd + 1
ShowFactoryStatus( "Int(" & Num & ") = " & Int( Num ) )
ShowFactoryStatus( "Fix(" & Num & ") = " & Fix( Num ) )
ShowFactoryStatus( "CInt(" & Num & ") = " & CInt( Num ) )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also CInt function
Int function

Format, Format\$ functions

Formats a numeric expression, date variant, or string according to the specified pattern and locale.

Syntax `Format(<exprs to format>)`
 `Format(<exprs to format>, <format pattern>)`
 `Format$(<exprs to format>, <format pattern>, <locale>)`

Parameters **<exprs to format>**
Expression to display according to the specified <format pattern>.

Format[\$] works differently depending on whether <exprs to format> is numeric, date, or string data. Format[\$] parses numeric values specified as a String according to the current run-time locale before applying <format pattern>. For example, in the French run-time locale, the following string:

```
Format( "1234,56", "Currency", "pt_PT")
```

results in the following output:

```
€ 1.234
```

This is because Format [\$] parses the string according to the French locale, which uses the comma (,) as a decimal separator then uses the specified locale, Portugal, for formatting and output.

<format pattern>

A keyword that has been predefined in Actuate Basic or a string of format characters that specifies how the expression displays. The <locale> argument, if specified, determines <format pattern>. The following conditions apply to <format pattern>:

- If <format pattern> is omitted or is zero-length, and <exprs to format> is a numeric expression, Format[\$] does the same thing as Str\$. Positive numbers

converted to strings using `Format[$]` lack a leading space, whereas those converted using `Str$` retain a leading space.

- Do not mix different types format expressions, such as numeric, date/time or string in a single `<format pattern>` argument.
- Numeric values specified as an Integer or Double must use a period (.) as a decimal separator and cannot include a thousands separator. For example, 32434.28 is valid, but 3,2434.28 and 3434,28 are invalid.
- Numeric values specified as a String must use the user-specified locale format for decimal and thousands separator.
- Enclose `<format pattern>` within quotes.

<locale>

String expression that specifies the locale to use for determining `<format pattern>` and the output format. If the locale is not specified, Null, or invalid, `Format[$]` uses the current run-time locale.

Returns `Format`: Variant
 `Format$`: String

If any parameter evaluates to Null, `Format[$]` returns Null.

Using Format[\$] with numeric data

Format numeric data using one of the following methods:

- Use the format keywords that have been predefined in Actuate Basic.
- Create your own user-defined formats using standard characters or symbols that have special functional meanings when used in a `Format[$]` expression.

Table 6-10 lists the predefined numeric format keywords that you can use with `Format[$]` examples and their results.

Table 6-10 Predefined numeric format keywords

Keyword	Description	Example/Result
General number	Returns as is, without rounding or applying any formats.	<code>Format (3434.2899, "General number")</code> Returns 3434.2899

(continues)

Table 6-10 Predefined numeric format keywords (continued)

Keyword	Description	Example/Result
Currency	Returns as a string with thousands separators and rounded to the nearest hundredth if needed. Two digits to the right of the decimal separator. Encloses negative numbers in parentheses. If <locale> is specified, the currency format depends on the specified locale. If <locale> is not specified, the currency format of the current run-time locale is used.	Format(3434.2899, "Currency") Returns \$3,434.29 on en_US run-time locale
Fixed	Returns at least one digit to the left and two digits to the right of the decimal separator. Rounds to the nearest hundredth.	Format(3434.2899, "Fixed") Returns 3434.29 Format(.3122, "Fixed") Returns 0.31
Standard	Returns with thousands separators and rounded to the nearest hundredth, if needed. At least two digits to the right of the decimal separator.	Format(3434.2899, "Standard") Returns 3,434.29
Percent	Returns * 100 with a percent sign to the right. Two digits to the right of the decimal separator. Rounds to the nearest hundredth. The return type is a string. Do not use in a method for formatting <code>AcDoubleControl</code> and <code>AcIntegerControl</code> controls.	Format(0.2899, "Percent") Returns 28.99% Format(0.28999, "Percent") Returns 29.00%
Scientific	Returns in standard scientific notation, appropriately rounded. The return type is a string. Do not use in a method for formatting <code>AcDoubleControl</code> and <code>AcIntegerControl</code> controls.	Format(3434.2899, "Scientific") Returns 3.43E+03

Table 6-10 Predefined numeric format keywords (continued)

Keyword	Description	Example/Result
Yes/No	Returns No if zero, Yes otherwise.	Format (3434.2899, "Yes/No") Returns Yes
True/False	Returns False if zero, True otherwise.	Format (3434.2899, "True/False") Returns True
On/Off	Returns Off if zero, On otherwise.	Format (3434.2899, "On/Off") Returns On

User-defined numeric formats

A format expression for numbers can have up to four sections, separated by semicolons. You can use double quotation marks (") for adding literal strings and backslashes (\) to add literal characters.

Table 6-11 shows the symbols or characters you can use to create your own user-defined formats, and the effect of each symbol on the resulting format string.

Table 6-11 Symbols and characters for creating custom numeric formats

Symbol	Description	Examples/Results
0	Zero-digit placeholder. If <exprs to format> has fewer digits than <format pattern>, the empty digits are filled with zeros. If <exprs to format> has more digits to the right of the decimal than <format pattern>, the result is rounded to the number of places in <format pattern>; if it has more digits to the left of the decimal, the extra digits are displayed without modification.	Format (3434.2899, "000.000") Returns 3434.290 Format (129.557, "0000.00") Returns 0129.56
#	Null digit placeholder. If <exprs to format> has fewer digits than the format pattern, empty digits become Null, not filled with blanks. Therefore, the resulting string can be shorter than the original format pattern.	Format (434.2899, "#,##0.0") Returns 434.3 Format (434.2899, "000###0.00") Returns 000434.29

(continues)

Table 6-11 Symbols and characters for creating custom numeric formats (continued)

Symbol	Description	Examples/Results
%	Percentage placeholder. Multiplies <exprs to format> by 100 and appends a % character.	Format(.75, "###%") Returns 75% Format(.75, "0##.000%") Returns 075.000%
.	Decimal placeholder. Indicates where to place the decimal point. If <locale> is specified, the decimal separator character of the specified locale is used. Otherwise, the current run-time locale is used.	Format(3434.28, "0.0") Returns 3434.3 Format(3434.28, "0.00") Returns 3434.28
,	Thousands separator. If <locale> is specified, the thousands separator character of the specified locale is used. Otherwise, the current run-time locale is used.	Format(3434.2899, "#,##0.00") Returns 3,434.29
E- or e-	Returns <exprs to format> in scientific notation. You must place a digit placeholder (0 or #) to the immediate left of the symbol. Place an appropriate number of digit placeholders to the right of the symbol to display the exponent. A minus sign is displayed if the result has a negative exponent.	Format(1500000, "0.0E-") Returns 1.5E6 Format(1500000, "#0.0E-") Returns 15.0E5
E+ or e+	Same as E-. The plus sign causes the polarity of the exponent to display whether positive (+) or negative (-).	Format(1500000, "0.0E+") Returns 1.5E+6 Format(15000, "#0.0e+") Returns 15.e+3

Table 6-11 Symbols and characters for creating custom numeric formats (continued)

Symbol	Description	Examples/Results
\$	Currency symbol. Displays the currency symbol based on the specified locale.	<pre>Format(total, "(\$)#,##0.00","de_DE") or Format(total, "€#,##0.00","de_DE") Returns € 8.790,00 Format(total, "(\$)#,##0.00", "en_US") Returns \$ 8,790.00</pre>
-, (,), [space], +	Literal characters that do not affect the format of the expression. [space] is Chr\$(32).	<pre>Format\$(5551212, "##0-0000") Returns 555-1212 Format\$(1111111111, "####) ##0-0000") Returns (111) 111-1111 Format\$(150,"+##0") Returns +150</pre>

Format[\$] with Format sections

Unless <format pattern> specifies one of the predefined format keywords, a format expression for numbers can have up to four sections, separated by semicolons. If you use semicolons with nothing between them, the missing section is printed using the format of the positive value.

The examples in Table 6-12 assume settings in the user's Control Panel are for the United States.

Table 6-12 Working with format sections in numeric formats

Use	Description	Example/Result
1 section	<format pattern> applies to all values.	<pre>Format\$(4.15, "\$#,##0.00") Returns \$4.15 Format\$(-4.15, "\$#,##0.00") Returns -\$4.15</pre>

(continues)

Table 6-12 Working with format sections in numeric formats (continued)

Use	Description	Example/Result
2 sections	(1) Applies to positive values and zero.	<code>Format\$(-7, "\$#,##0.00;\$(#,##0.00)")</code>
	(2) Applies to negative values.	Returns <code>\$ (7.00)</code>
		<code>Format\$(-7, "\$#,##0.00; \L\o\s\s: #,##0.00")</code> Returns <code>Loss: 7.00</code>
3 sections	(1) Applies to positive values.	<code>Format\$(0, "#,###; (#,###); \Z\e\r\o!")</code>
	(2) Applies to negative values.	
	(3) Applies to zero.	Returns <code>Zero!</code>
4 sections	(1) Applies to positive values.	<code>Format\$(-25, "#; (#); \Z\e\r\o; \N\i\l")</code>
	(2) Applies to negative values.	
	(3) Applies to zero.	Returns <code>(25)</code>
	(4) Applies to Null.	<code>Format\$(25-25, "#; (#); \Z\e\r\o; \N\i\l")</code> Returns <code>Zero</code> <code>Format\$(Null, "#; (#); \Z\e\r\o; \N\i\l")</code> Returns <code>Null</code>

Using Format[\$] for date data

Numbers can be used to represent date and time information. You can format date and time serial numbers using either date-and-time formats or numeric formats because date/time serial numbers are stored as floating point values.

To format date and time, use one of the following methods:

- Use the format keywords that have been predefined in Actuate Basic.
- Create your own user-defined formats using standard characters or symbols that have special functional meanings when used in a format expression.

If <locale> is specified, symbols are formatted according to formatting rules of the specified locale. Otherwise, symbols are formatted according to the formatting rules of the current run-time locale.

Table 6-13 shows the predefined date-and-time format keywords you can use and the effects of each on the resulting format pattern.

Table 6-13 Predefined data-and-time format keywords

Keyword	Description	Example/Result
"General date"	Returns a date and time.	Format\$(30267.83681, "General date") Returns 11/12/82 8:05:00 PM
"Long date"	Returns a Long Date as defined in the user's Control Panel.	Format\$(30267.83681, "Long date") Returns Friday, November 12, 1982
"Medium date"	Returns a date with the month name abbreviated to 3 letters.	Format\$(30267.83681, "Medium date") Returns 12-Nov-82
"Short date"	Returns a Short Date as defined in the user's Control Panel.	Format\$(30267.83681, "Short date") Returns 11-12-82
"Long time"	Returns a Long Time as defined in the user's Control Panel. Includes hours, minutes, and seconds.	Format\$(0.83681, "Long time") Returns 8:05:00 PM
"Medium time"	Returns hours and minutes in 12-hour format, including the A.M./P.M. designation.	Format\$(0.83681, "Medium time") Returns 8:05 PM
"Short time"	Returns hours and minutes in 24-hour format.	Format\$(0.83681, "Short time") Returns 20:05

User-defined date formats

You can use double quotation marks (") for adding literal strings and backslashes (\) to add literal characters. Table 6-14 shows the symbols or characters that you can use to create your own user-defined date formats, and the effect of each symbol on the resulting format string.

In all cases, assume DateVar = CVDate("11/12/82") or DateVar = CVDate("9/9/82") to demonstrate use of leading zeros, unless otherwise noted.

If <locale> is specified, the results are formatted according to the format of the specified locale. Otherwise, the results are formatted according to the formatting rules of the current run-time locale.

Note that the symbol for minute is n, not m, which is the symbol for month.

Table 6-14 Symbols to use to create custom date-and-time formats

Symbol	Description	Example/Result
/, -	Date separator	Format\$(DateVar, "mm/dd/yy") Returns 11/12/82 Format\$(DateVar, "mm-dd-yy") Returns 09-09-82
d	Day of the month without leading zero (1-31)	Format\$(DateVar, "/d/") Returns /12/ Format\$(DateVar, "/d/") Returns /9/
dd	Day of the month with leading zero if needed (01-31)	Format\$(DateVar, "/dd/") Returns /12/ Format\$(DateVar, "/dd/") Returns /09/
ddd	Three-letter abbreviation for day of the week	Format\$(DateVar, "ddd") Returns Fri
dddd	Full name of day of the week	Format\$(DateVar, "dddd, mm/dd") Returns Friday, 11/12
dddddd	Short Date string, as defined in the user's Control Panel	Format\$(DateVar, "dddddd") Returns 11/12/82
ddddddd	Long Date string, as defined in the user's Control Panel	Format\$(DateVar, "ddddddd") Returns November 12, 1982
w	Day of the week as a number (Sunday = 1, Saturday = 7)	Format\$(DateVar, "w") Returns 6
ww	Week of the year as a number (1-53). The week begins on a Sunday.	Format\$(DateVar, "ww") Returns 46

Table 6-14 Symbols to use to create custom date-and-time formats

Symbol	Description	Example/Result
www	Custom week of the year as a number. The date you specify determines the day on which the week begins.	Format\$(DateVar, "www") Returns 46
m	Number of the month without leading zero (1-12)	Format\$(DateVar, "m") Returns 11
mm	Number of the month with leading zero (01-12)	Format\$(DateVar, "mm") Returns 11 Format\$(DateVar, "mm") Returns 09
mmm	Three-letter abbreviation for month name	Format\$(DateVar, "mmm") Returns Nov
mmmm	Full name of the month	Format\$(DateVar, "mmmm") Returns November
q	Number of the quarter (1-4)	Format\$(DateVar, "q") Returns 4 "Quarter" & Format\$(DateVar, "q") Returns Quarter 4
qq	Number of the year half (1-2)	Format\$(DateVar, "qq") Returns 2
y	Number of the day of the year (1-366)	Format\$(DateVar, "y") Returns 316 Val (Format\$(DateVar, "y") + 19) Returns 335
yy	Last two digits of the year (00-99)	Format\$(DateVar, "yy") Returns 82
yyyy	All four digits of the year (100-9999)	Format\$(DateVar, "yyyy") Returns 1982
c	Date variant as dddddd tttt	Format\$(DateVar, "c") Returns 11/12/82

Using Format[\$] with time data

The fractional part of a number that represents a date represents a time of day on that date.

For example, the CVDate function converts numbers to date variants. CVDate(30632) is 11/12/83. No time of day is returned, because 30632 has no fractional part. By contrast, CVDate(30632.83) returns 11/12/83 7:55:12 P.M., because 30632.83 does have a fractional part, and the fractional part, .83, corresponds to about 7:55 P.M. ($0.83 \text{ hours} * 24 = 19.92 \text{ hours from midnight, or } 7:55:12\text{P.M.}$).

Table 6-15 assumes DateVar = "11/12/82 20:05:07". Format[\$] returns times returned by Format[\$] in 24-hour format unless you use one of the A.M./P.M. format symbols.

Note that the symbol for minute is n, not m, which is the symbol for month.

Table 6-15 Symbols for using time data with Format[\$]

Symbol	Description	Example/Result
:	Time separator	Format\$(DateVar, "hh:nn:ss") Returns 20:05:00
h	Hour without leading zero (0-23)	Format\$(DateVar, "h:nn AM/PM") Returns 8:05 PM
hh	Hour with leading zero (00-23)	Format\$(DateVar, "hh:nn AM/PM") Returns 08:05 PM
n	Minute without leading zero (0-59)	Format\$(DateVar, "h:n AM/PM") Returns 8:5 PM
nn	Minute with leading zero (00-59)	Format\$(DateVar, "hh:nn AM/PM") Returns 08:05 PM
s	Second without leading zero (0-59)	Format\$(DateVar, "h:n:s AM/PM") Returns 8:5:7 PM
ss	Second with leading zero (00-59)	Format\$(DateVar, "h:nn:ss AM/PM") Returns 8:05:07 PM

Table 6-15 Symbols for using time data with Format[\$]

Symbol	Description	Example/Result
AM/ PM or am/pm	Designation AM/am for any hour before noon and PM/pm for any hour after. Case-sensitive.	Format\$(DateVar, "hh:nn:ss am/pm") Returns 08:05:07 pm
A/P or a/p	Designation A/a for any hour before noon and P/p for any hour after. Case-sensitive.	Format\$(DateVar, "hh:nn:ss A/P") Returns 08:05:07 P
AMPM	Uses formats set by 11:59 and 23:59 as defined in the user's Control Panel. Default is AM/PM.	Format\$(DateVar, "hh:nn AMPM") Returns 08:05 PM
tttt	Uses format set by Time as defined in the user's Control Panel. Default is h:nn:ss.	Format\$(DateVar, "h:nn tttt") Returns 8:05 PM

Using Format[\$] with string data

You can format strings with Format[\$].

Table 6-16 shows the symbols or characters you can use to create your own user-defined formats, and the effect of each symbol on the resulting format string.

Table 6-16 Symbols for using string data with Format[\$]

Symbol	Description	Example/Result
@	Character placeholder. Returns a character, or a space if there is no character in the corresponding position. Placeholders fill from right to left unless the format pattern uses a ! character.	Format\$("5101212111", "(@@@)@@@-@@@@") Returns (510) 121-2111 Format\$("1212111", "(@@@)@@@-@@@@") Returns () 121-2111
&	Character placeholder that does not return a space if the format pattern contains more placeholders than there are characters in the data source value. Placeholders fill from right to left unless the format pattern uses a ! character.	Format\$("6176789999", "(&&&) &&&-&&&&") Returns (617) 789-9999 Format\$("6789999", "&&& &&&-&&&&") Returns () 678-9999

(continues)

Table 6-16 Symbols for using string data with Format[\$] (continued)

Symbol	Description	Example/Result
<	Lowercase conversion. Converts an expression to lowercase.	Format\$ ("Smith, John", "<") Returns smith, john
>	Uppercase conversion. Converts an expression to uppercase.	Format\$ ("Smith, John", ">") Returns SMITH, JOHN
!	Specifies that placeholders fill from left to right.	Format\$("5551212", "!(&&&)&&&-&&&& + ext") Returns (555) 121-2 + ext Format\$("5551212", "!(@@@)@@@-@@@@ + ext") Returns (555)121-2 + ext

Example The following example displays a random number in various formats:

```

Sub Start( )
    Dim FormatData As Integer, Msg as String
    Super::Start( )
    ' Generate random number to format
    FormatData = Int( 100000 * rnd )
    ' Display number formatted in various ways
    Msg = "Format result for format value #0: "
+    & Format( FormatData, "#0" )
    ShowFactoryStatus( Msg )
    Msg = "Format result for format value 000000: "
+    & Format( FormatData, "000000" )
    ShowFactoryStatus( Msg )
    Msg = "Format result for format value #,##0: "
+    & Format( FormatData, "#,##0" )
    ShowFactoryStatus( Msg )
    Msg = "Format result for format value #,##0.00: "
+    & Format( FormatData, "#,##0.00" )
    ShowFactoryStatus( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also CVDate function
DateValue function

ParseDate function
Str, Str\$ functions

For...Next statement

Repeats a block of instructions a specified number of times.

Syntax For <counter variable> = <start> **To** <end> [Step <step size>]
 [<statement block>]
 [Exit For]
 [<statement block>]

Next [<counter variable >]

Parameters **<counter variable>**

Numeric variable that keeps track of the number of times the set of statements between For and Next has been executed.

<start>

Numeric expression indicating the first number at which <counter variable> is to begin counting. The initial value of <counter variable>.

<end>

Numeric expression indicating the number at which <counter variable> is to stop counting; the final value of <counter variable>. As soon as <counter variable> stops execution, Actuate Basic skips everything between the For and Next keywords, and transfers control to the statement following Next.

Step

Keyword that specifies what number to add to <counter variable> every time after the loop finishes executing. The sum of <counter variable> and <step size> returns the next, new value for <counter variable>.

<step size>

The number the program adds to <counter variable>, at the end of every trip through the loop, in order to determine the next value of <counter variable>.

Default: 1

<statement block>

Any valid Actuate Basic statements.

Exit For

Keyword that causes Actuate Basic to terminate the loop immediately, and to transfer control to the statement following Next. Exit For statement can be placed anywhere in the loop any number of times, although only one will be executed.

For...Next statement

Next

Keyword that defines the completion of a For...Next statement, and causes the program to add <step size> to <counter variable>.

Default: If you omit <counter variable> on the Next line, Actuate Basic adds the value of <step size> to the <counter variable> associated with the most recent For statement.

- Description**
- First, Actuate Basic sets <counter variable> to <start>.
 - Table 6-17 summarizes what Actuate Basic does next, which depends upon the sign of <step size>.

Table 6-17 Execution of For...Next statements with <step size>

<step size>	Loop executes when...	Stops execution when...
Positive	<counter variable> <= <end>	<counter variable> > <end>
Negative	<counter variable> >= <end>	<counter variable> < <end>

- If Actuate Basic executes the loop, it adds <step size> to <counter variable> at the line starting with Next.
- Then Actuate Basic compares this new value of <counter variable> to <end>.
- If the conditions described in the table are satisfied, Actuate Basic executes the loop again.
- Otherwise, Actuate Basic skips everything between the For and Next keywords and transfers control to the statement immediately following Next.

Rule If a For...Next loop is opened by its For clause and closed by its corresponding Next clause, nested loops must be closed in the reverse order as shown in the following example:

```
For I = 1 To 10
  For J = 1 To 10
    For K = 1 To 10
      L = I + J + K
    Next K
  Next J
Next I
```

When you nest For...Next statements, you must use a different counter variable for each block. Traditionally, the letters I, J, K, and so forth, declared as Integers, are used as counter variables.

- Tips**
- To avoid confusion when debugging, do not change the value of <counter variable> from inside the loop.

- To make your program more efficient, dimension <counter variable> as an Integer.
- To evaluate a certain condition and then determine whether or not a loop continues, use Exit For within a conditional structure like If...Then...Else.
- To ascertain or set the contents of a multidimensional array, use nested For...Next loops.

Example The following example uses two nested loops to put seven lines of the uppercase alphabet into a message:

```
Sub Start( )
    Dim I As Integer, Rep As Integer
    Super::Start( )
    ' Perform seven repetitions
    For Rep = 7 To 1 Step -1
        ' Convert alpha to numeric values
        For I = Asc("A") To Asc("Z")
            ' Convert back, append letters to string
            ShowFactoryStatus( Chr$( I ) )
        Next I
        ' Add newline after each repetition
    Next Rep
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Do...Loop statement
Exit statement
While...Wend statement

FreeFile function

Returns the next unused system file number.

Syntax FreeFile

Returns Integer

When you open a file, you must supply a number by which to reference it throughout the program. This number must not already be in use by another currently open file. FreeFile eliminates the need for you to keep track of which file numbers are currently in use by finding the next available number.

Tip The number that FreeFile returns does not change until you actually open a file with it. So to be sure FreeFile is always current, immediately open a file with the number it gives you, instead of waiting until later to do so.

Function...End Function statement

Example The following example assigns the return value of FreeFile to the variable FileNum%, then uses FileNum to open the file, Test.dat:

```
FileNum% = FreeFile
Open "Test.dat" for Output As FileNum%
```

The following example creates a test file and opens it to determine an unused file number:

```
Sub Start( )
    Dim FileNumber As Integer, Msg As String
    Super::Start( )
    ' Open a file
    Open "Test1.fil" For Output As #1
    ' Get unused file number
    FileNumber = FreeFile
    ' Create a test file
    Open "Test2.fil" For Output As FileNumber
    ' Close all files
    Close
    Msg = "The file number FreeFile returned was: " & FileNumber
    ShowFactoryStatus( Msg )
    Msg = "The files will now be deleted."
    ShowFactoryStatus( Msg )
    ' Delete files from disk
    Kill "Test1.fil"
    Kill "Test2.fil"
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Open statement

Function...End Function statement

Declares and defines the name, code, and arguments that constitute an Actuate Basic function, and returns a value to the calling expression or statement.

Syntax [Static] Function <name of function> [((<list of arguments>))] [As <data type>]
 [<statements>]
 [Exit Function]
 [<statements>]
 <name of function> = <return value>
End Function

Parameters Static

Keyword that instructs Actuate Basic to preserve the values of the procedure's local variables between calls.

Rules:

- You cannot use Static to affect variables declared outside the procedure.
- You should avoid using Static in recursive procedures.

<name of function>

The name you assign to the procedure.

Rules for <name of function>:

- Subject to the same constraints as variable names, as well as to the following additional constraints:
 - Can include a type declaration character.
 - Cannot be the same as any other name recognized at the global or module level, such as that of:
 - A procedure in a declared dynamic-link library (DLL)
 - A variable
 - A constant
- Can be overloaded. That is, you can define another function or procedure that has the same name, as long as the respective arguments are unique. For example, the following are both permissible in the same program:

```
Sub Potato(intTomato As Integer)
...
End Sub

Sub Potato(dblTomato As Double, strEggplant As String)
...
End Sub
```

<list of arguments>

The variable name or names that the function uses internally to store and manipulate the values (arguments) that you pass to it from the calling statement.

Each of the <variable name> components of the <list of arguments> corresponds to a value or variable that is in the same relative position in the calling statement. It does not matter what you call the variable that is passed to the function; the function will process the value it receives as an argument. The <statements> in the procedure process arguments it receives to produce the single value that is returned to the calling procedure.

In the following example, the function Square expects to be supplied with a single argument, a numeric expression, which it squares:

Function...End Function statement

```
Function Square(X)
    Square = X ^ 2
End Function
```

The following statements will pass the value 4 to the function Square and receive back the value 16 after Square has completed. The statement will then continue; it will multiply the value it received from the function Square times 2 and print the resulting value.

```
MyNumber = 4
Print #1, Square(MyNumber) * 2
```

Here are the steps in the process:

- 1 First, the value 4 is assigned to the variable MyNumber.
- 2 The value of MyNumber is passed to the function Square. Square assigns the value it receives from the calling statement to the variable X.
- 3 Square processes X and assigns the resulting value to the name of the function itself—Square—and returns control to the statement that called it.
- 4 The calling statement continues processing the new value of MyNumber (16); it multiplies it by 2, and prints the result (32).

<statements>

One or more valid Actuate Basic statements. These statements constitute the body of the function procedure.

<return value>

The value the function returns to the calling statement after the function has completed. Usually, <return value> is a variable that contains the final result of all the changes the argument or arguments underwent in the course of the execution of the <statements>.

Exit Function

Keyword that signals Actuate Basic to terminate the function procedure and transfer control to the statement following the one that called the procedure. You can use multiple Exit Function statements, anywhere in a function procedure, but only one is executed.

<list of arguments> has the following syntax:

```
[ByVal] <variable name> [As <data type>] [, [ByVal] <variable name>
[As <data type>]...
```

ByVal

Keyword that instructs Actuate Basic to pass the argument to the procedure by value rather than by reference, so that whatever change the function makes to the argument variable has no affect on its original value in the calling procedure.

Rule for ByVal: Cannot be used with a variable of user-defined type, object type, or with an array variable.

<variable name>

Name of the variable to pass as an argument. If the function changes the value of <variable name> internally, then it also changes its value externally.

Rules for <variable name>:

- You must use ByVal if you do not want the function's changes to an argument variable to affect the variable's value in the calling statement.

Example:

```
Function SquareRoot (ByVal UserNum)
```

- For array variables, use the parentheses but omit the number of dimensions.

Example:

```
Function SalesTax (MyArray())
```

- If <variable name> is undeclared within the function but has the same name as another procedure, a Global or module-level constant or variable, or an object, Actuate Basic assumes your function refers to that external name. This can cause name conflicts. To avoid such conflicts, explicitly declare each <variable name> within the function.

As <data type>

Clause that declares the data type of <variable name>. You can also specify the data type of <returned value> by appending this clause after the <list of arguments>.

Rule for As <data type>: <data type> can specify any valid Actuate Basic or user-defined data type except fixed-length String.

Examples

```
Function SalesTax(Customer As String, Amount As Currency)
Function SalesTax(ByVal Customer As String, Amount)
```

Description

Like a Sub statement, a Function can take arguments, execute a series of statements, and change the values of its arguments. However, unlike a Sub statement, a Function can also return a value directly and can be used in an expression.

You can use the same name for two or more different procedures, as long as you make sure the procedures take a different number of arguments, or that the arguments are of different data types. For example, you can write two different square root functions—one that operates on integers, and another that operates on doubles. Their respective first lines might look like the following:

```
Function SquareRoot(intParam As Integer) As Integer
Function SquareRoot(dblParam As Double) As Double
```

Actuate Basic will know which procedure you mean by the type of value you pass when you call the procedure. For instance, if you write a call to SquareRoot(5), the compiler will choose the first SquareRoot function. But if you call SquareRoot(5.1234567), or SquareRoot(5.000), it will execute the second one.

Rules:

- You cannot define a Function statement from within another Function statement.
- You cannot use GoTo to enter or exit a Function statement.

Tips ■ Functions can be recursive. Actuate Basic sets a run-time stack limit of 200. A report using recursion with a large number of iterations might exceed this limit.

- To avoid possible name conflicts between <variable name> and the names of other variables, constants, procedures, or objects, explicitly declare all variables within the function with Dim, ReDim, or Static. That way, you can use a common variable name like SaleDate within a function procedure, even if there is a global variable named SaleDate. Name conflicts can arise only when you use a variable in a procedure that you did not explicitly declare within the procedure.
- To distinguish between a variable and a function with the same name in your code, use the function's name with parentheses and the variable's name without parentheses. Where the function takes no parameters, append an empty pair of parentheses. For example:

```
' Assign global variable Homonym to CopyVar1
CopyVar1 = Homonym
' Assign return value of function Homonym to CalculatedVar2
CalculatedVar2 = Homonym()
```

- To evaluate a condition and then determine whether or not the function procedure should continue, use Exit Function within a conditional structure like If...Then...Else.
- To guard against the wrong data type being passed to or returned from a function, use As <data type> clauses.

Example The following example generates a number, then calls a user-defined function that returns the number's square root.

To use this example, paste the function SquareRoot after the End Sub of the procedure or save it in your Actuate code module (.bas) file.

```
Sub Start( )
    Dim Msg As String, NumRoot
    Dim UserNum As Double
    Super::Start( )
    UserNum = 255 * Rnd + 1
    ' Call the SquareRoot function here to process UserNum
    NumRoot = SquareRoot(UserNum)
    ' NumRoot has now been set to the square root of UserNum
    Msg = "The square root of " & UserNum
```

```

Select Case NumRoot
    Case 0:    Msg = Msg & " is zero."
    Case -1:   Msg = Msg & " is an imaginary number."
    Case Else: Msg = Msg & " is " & NumRoot
End Select
ShowFactoryStatus( Msg )
End Sub
'
' This function finds the square root of a number. It takes one
' input argument X (data type Double) and returns a value that
' is also data type Double.
'
Function SquareRoot (X As Double) As Double
    ' Sgn returns 1 if a number is positive, -1 if it's negative,
    ' and 0 if it's zero. This fact is important here since we
    ' only want to operate on a number greater than zero
    ' Evaluate sign of argument
    Select Case Sgn(X)
        Case 1
            SquareRoot = Sqr(X)
            ' OK if positive, so exit
            Exit Function
        Case 0
            SquareRoot = 0
        Case -1
            SquareRoot = -1
    End Select
End Function

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Dim statement
 Static statement
 Sub...End Sub statement

FV function

Returns the future value of an annuity based on periodic, constant payments, and on an unvarying interest rate.

Syntax FV(<rate per period>,<number pay periods>,<each pmt>,<present value>,<when due>)

Parameters **<rate per period>**
 Numeric expression that specifies the interest rate that accrues per period.

Rule for <rate per period>: Must be given in the same units of measure as <number pay periods>. For instance, if <number pay periods> is expressed in months, then <rate per period> must be expressed as a monthly rate.

<number pay periods>

Numeric expression that specifies the total number of payment periods in the annuity.

Rule for <number pay periods>: Must be given in the same units of measure as <rate per period>. For instance, if <rate per period> is expressed as a monthly rate, then <number pay periods> must be expressed in months.

<each pmt>

Numeric expression that specifies the amount of each payment.

Rule for <each pmt>: Must be given in the same units of measure as <rate per period>. For instance, if <rate per period> is expressed in months, then <each pmt> must be expressed as a monthly payment.

<present value>

Numeric expression that specifies the value today of a future payment, or stream of payments.

Example for <present value>: If you put \$23.94 in the bank today and leave it there for 15 years at an interest rate of 10% compounded annually, you end up with about \$100. The present value of \$100 is approximately \$23.94.

<when due>

Numeric expression that specifies whether each payment is made at the beginning (1), or at the end (0) of each period.

Default 0

Rule for <when due>: Must be 0 or 1.

Examples The following example assumes you deposit \$10,000 in a savings account for your daughter when she is born. If the account pays 5.7% compounded daily, how much will she have for college in 18 years? The answer, \$27,896.60, is assigned to the variable TotalValue.

```
TotalValue = FV(0.057/365, 18*365, 0, -10000, 1)
```

The following example is almost the same as the previous one. In this one, however, assume that the interest is compounded monthly instead of daily, and that you have decided to make an additional monthly deposit of \$55 into the account. The future value assigned to TotalValue in this case is \$48,575.82.

```
TotalValue = FV(0.057/12, 18*12, -55, -10000, 1)
```

Returns Double

An annuity is a series of cash payments, constant in value, made over a period of time. An annuity can be an investment, such as a monthly savings plan, or a loan,

such as a home mortgage. The future value of an annuity is the cash balance you want after you have made your final payment.

- Examples**
- You set up a savings plan with a goal of having \$75,000 in 18 years to pay for your child's education. For this plan, the future value is \$75,000.
 - You take out a loan for \$11,000. The future value is \$0.00, as it is for any typical loan.
- Rules**
- <rate per period>, <number pay periods>, and <each pmt> must all be expressed in terms of the same units, weekly/weeks, monthly/months, yearly/years, and so on.
 - You must express cash paid out, such as deposits to savings, using negative numbers, and cash received, such as dividend checks, using positive numbers.
- Example** The following example defines an amount to save or invest each month, the annual percentage rate (APR) of the interest, the total number of payments, and prompts for when during the month payments will be made. Then it tells the user what the future value of such a savings plan or investment will be.

To use the following example, paste the Declare section into a source code (.bas) library file:

```
Declare
    Global Const ENDPERIOD = 0
    Global Const BEGINPERIOD = 1
End Declare
Sub Start( )
    Dim EachPmt As Double, APR As Double
    Dim TotalPmts As Double, PayWhen As Integer
    Dim PresentVal As Double, FutureVal As Double
    Dim Msg as String, Fmt As String
    Super::Start( )
    ' Specify money format
    Fmt = "$###,###,##0.00"
    ' Amount to save each month
    EachPmt = 2000
    ' The annual percentage rate for the interest
    APR = 0.0325
    ' The number of months to save
    TotalPmts = 60
    ' Assume payment at month's end. Change to BEGINPERIOD
    ' for payment at month beginning
    PayWhen = ENDPERIOD
    ' Amount in the savings account now
    PresentVal = 12000
    ' Now do the real work
    FutureVal =
+     FV(APR / 12, TotalPmts, -EachPmt, -PresentVal, PayWhen)
```

Get statement

```
' Format the resulting information for the user
Msg = "Starting with " & Format( PresentVal, Fmt )
+   & " and saving " & Format( EachPmt, Fmt )
+   & " every month at an interest rate of "
+   & Format( APR, "##.00%" ) & " for a period of "
+   & TotalPmts & " months will give you "
+   & Format( FutureVal, Fmt ) & "."
ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also IPmt function
NPer function
Pmt function
PPmt function
PV function
Rate function

Get statement

Reads data from a disk file into a variable.

Syntax Get [#] <open file number>, [<record number>], <receiving variable>

Parameters <open file number>

Numeric expression that is the number you assigned as a descriptor for the target file when you opened it.

<record number>

Numeric expression between 1 and 2,147,483,647:

- For files opened in Random mode, <record number> is the number of the record to be read.
- For files opened in Binary mode, it is the byte position at which reading starts, where the first byte in a file is at position 1, the second byte at position 2, and so on.

Default: The next record or byte—that is, the one following the last Get or Put statement, or the one pointed to by the last Seek function.

Rule for <record number>: If you omit <record number> you must still include the delimiting commas that would have been on either side of it had you included it.

<receiving variable>

String expression that specifies the variable that is to receive input from the open file.

Rules for <receiving variable>:

- Cannot be an object variable, user-defined data type structure, handle to a class, CPointer, or Java object.
- Cannot be an array variable that refers to an entire array, although you can use a variable that denotes a single element of an array.

Description You can use the Get statement to read from files opened only in random or binary mode. You cannot use the Get statement to read from files opened in input mode. The behavior of Get varies depending upon the mode in which the file was opened.

For files opened in random mode

If the length of the data you read is less than the length specified in the Len clause of the Open statement, the next Get skips the data you did not read and reads subsequent records starting at the record-length boundary, specified by Len.

Example The first Get stores bytes 1-4 of the disk file Myfile.txt into the variable HoldingVar1. The second Get skips to the record-length boundary (20) and starts counting from there, which means it stores bytes 21-25 into HoldingVar2. The intervening bytes (5-20) are ignored.

```
Dim HoldingVar1 As String
Dim HoldingVar2 As String
HoldingVar1 = "1234"
HoldingVar2 = "1234"
Open "Myfile.txt" for Random As #1 Len = 20
Get #1, , HoldingVar1
Get #1, , HoldingVar2
```

Table 6-18 summarizes how Get behaves depending on the data type of <receiving variable>. Open here refers to the particular statement that opened the file in question.

Table 6-18 Execution of Get statements with <receiving variable> data types

<receiving variable>	Get reads, in order	Rules
Variable-length string	1 2-byte descriptor containing string length 2 Data that goes into <receiving variable>	Record length specified in the Len clause of Open must be at least 2 bytes greater than the actual length of the string.

(continues)

Table 6-18 Execution of Get statements with <receiving variable> data types (continued)

<receiving variable>	Get reads, in order	Rules
Numeric Variant (Variant Types 0-7)	3 2-byte descriptor identifying VarType of the Variant 4 the data that goes into <receiving variable>	Len clause length must be at least 2 bytes greater than the actual number of bytes required to store the variable.
String Variant (Variant Type 8)	5 2-byte VarType descriptor 6 2 bytes indicating the string length 7 Data that goes into <receiving variable>	Len clause length must be at least 4 bytes greater than the actual length of the string.
Any other type of variable	8 Data that goes into <receiving variable>	Len clause length must be greater than or equal to the length of the data.

For files opened in binary mode

All the Random descriptions and rules above apply except that the Len clause in the Open statement has no effect.

Example The first statement stores the first 4 bytes of the disk file Myfile.txt into the variable HoldingVar1. The second stores the next 5 bytes into HoldingVar2. No data is ignored.

```
Dim HoldingVar1 As String
Dim HoldingVar2 As String
Open "Myfile.txt" for Binary As #1
Get #1, , HoldingVar1
Get #1, , HoldingVar2
```

For variable-length strings that are not elements of user-defined types, Get does not expect a 2-byte descriptor to tell it how many bytes to read; it reads the number of bytes equal to the number of characters already in the string.

Example The following statements reads 12 bytes from file #1:

```
VariLen$ = String$(12, "*")
Get #1, , VariLen$
```

Tip To avoid corrupting or misreading data, be sure your record lengths and variable lengths match the lengths of the data you want to read or write.

Example The following example prompts the user for three customer names. It writes each name to a test file and then reads the names back.


```

Sub Start( )
    Dim CustName As String
    Dim I As Integer, Max As Integer, Msg As String
    Super::Start( )
    ' Create a sample data file
    Open "Testfile.dat" For Random As #1 Len = 50
    ' Put records into file on disk
    Put #1, 1, "Customer 1"
    Put #1, 2, "Customer Two"
    Put #1, 3, "Third Customer"
    Close #1
    ' Close the file we've written and open again for reading
    Open "Testfile.dat" For Random As #1 Len = 50
    ' Calc total # of records
    Max = LOF( 1 ) \ 50 + 1
    ' Read file backwards
    For I = Max To 1 Step -1
        ' Seek statement used
        Seek #1, I
        ' Get record at that position
        Get #1, , CustName
        Msg = "Record #" & ( Seek2( 1 ) - 1 ) & " contains: "
+         & CustName
        ShowFactoryStatus( Msg )
    Next I
    ' Close test file
    Close #1
    Msg = "Now removing file from disk."
    ShowFactoryStatus( Msg )
    ' Delete file from disk
    Kill "Testfile.dat"
End Function

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also Open statement
 Put statement
 Seek statement
 Type...End Type statement

GetAFCROXVersion function

Returns either the integer or the decimal component of the version number of the AFC library (Afcnnnn.rox).

GetAppContext function

Syntax GetAFCROXVersion(<numpart>)

Parameters <numpart>

Number or numeric expression that tells GetAFCROXVersion whether you want to know the integer part of the version number, or the decimal part.

Rule: Must be either 0 or 1.

Returns Integer

If <numpart> is 0, GetAFCROXVersion returns the integer (major) component of the version number.

If <numpart> is 1, GetAFCROXVersion returns the decimal (minor) component of the version number.

Example The following example determines both parts of the version number of the AFC library and puts the parts together, interpolating the decimal point where it belongs:

```
Dim AFCTotal As Integer, AFCMinor As Integer
Dim AFCTotal as String
AFCTotal = GetAFCROXVersion(0)
AFCMinor = GetAFCROXVersion(1)
' Put the two parts together and prefix some identifying text:
AFCTotal = "AFC Version: " & (AFCTotal) & "." & (AFCMinor)
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetAppContext function
GetFactoryVersion function
GetOSUserName function
GetROXVersion function
GetServerName function
GetServerUserName function

GetAppContext function

Indicates which Actuate application is currently running.

Syntax GetAppContext

Returns AppContext

You interpret the value that GetAppContext returns depending on whether GetAppContext is called from a client or a server machine at run time.

On a client, GetAppContext returns the context of the Actuate application being used—for example, e.Report Designer Professional.

On a server, GetAppContext returns the context of server, not the context of Management Console or e.Report Designer Professional.

Table 6-19 shows how Actuate maps the return value from GetAppContext to the corresponding Actuate application. Other values refer to unsupported products.

Table 6-19 Relationships of return values from GetAppContext to Actuate applications

GetAppContext value	Application
DWBContext	e.Report Designer Professional (ERDPro)
ServerContext	Server
UnknownContext	An unknown context

Example The following example determines which Actuate application is running at the time you call GetAppContext:

```
Dim ApplicationContext As AppContext, MyValue As String
MyValue = "Application Context = "
ApplicationContext = GetAppContext

Select Case ApplicationContext
    Case ServerContext
        MyValue = MyValue & "Server"
    Case DWBContext
        MyValue = MyValue & "e.Report Designer Professional"
    Case Else
        MyValue = MyValue & "unknown context"
End Select
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetAFCROXVersion function
GetFactoryVersion function
GetOSUserName function
GetROXVersion function
GetServerName function
GetServerUserName function

GetAttr function

Determines the attributes of a file, directory, or volume.

Syntax GetAttr(<file dir or vol name>)

GetAttr function

Parameters <file dir or vol name>

String expression that specifies the file, directory, or volume for which you wish to determine what attributes are set.

Default path: Current drive and directory.

Rules:

- Must refer to a valid file, directory, or volume.
- Reference must be unambiguous.

<file dir or vol name> can optionally specify a full path, in which case it has the following syntax:

[<drive:>][\]<directory>[<directory>]...(Windows)

[/]<directory>[<directory>]...(UNIX)

<drive:>

Character, followed by a colon, that specifies the drive (Windows only).

<directory>

String expression that specifies the name of a directory or subdirectory.

Example Assuming Testfile.dat has both the system and read-only attributes set, the following statement assigns the value 5 (4 + 1) to the variable ATTRIBS:

```
ATTRIBS = GetAttr("Testfile.dat")
```

Returns Integer

- The operating system assigns one or more attributes to each file, directory, and volume. These attributes indicate whether the item is a normal, read-only, hidden, or system file; a volume label; a directory; whether it has been modified since the last backup; or some combination of these.
- If the file has multiple attributes, the return value will be the bitwise AND of all the values that apply. For example, a return value of 3 indicates a file is both read-only and hidden (1 + 2).
- Table 6-20 shows certain constant names that are defined in Header.bas and their corresponding return values and attributes. The return value of GetAttr is the sum of one or more return values. The return values not supported under UNIX are 0.

Table 6-20 Header.bas constants with their return values and attributes

Return value	Constant name	File attribute	Operating system
0	ATTR_NORMAL	Normal	Windows, UNIX
1	ATTR_READONLY	Read-only	Windows, UNIX
2 or 0	ATTR_HIDDEN	Hidden	Windows

Table 6-20 Header.bas constants with their return values and attributes

Return value	Constant name	File attribute	Operating system
4 or 0	ATTR_SYSTEM	System file	Windows
8 or 0	ATTR_VOLUME	Volume label	Windows
16	ATTR_DIRECTORY	Directory label	Windows, UNIX
32 or 0	ATTR_ARCHIVE	Changed since last backup	Windows

Tip To determine—without having to do any arithmetic—whether a file has a particular, single attribute, use the BAnd operator to perform a bitwise test. If this statement evaluates to nonzero you know that, whatever other attributes it has, the file is read-only.

```
GetAttr("TESTFILE.DAT") BAnd ATTR_READONLY
```

Example The following Windows example displays a message indicating the attributes of a given file:

```
Sub Start( )
    Dim Attr As Integer, FName As String, Msg As String
    Super::Start( )
    On Error Goto ErrorHandler
    ' Set file name to check
    FName = "C:\Program Files\Actuate11\readme.rtf"
    ' Determine the file's attributes
    Attr = GetAttr(FName)
    Msg = "The value returned by GetAttr is: " & Attr
    ShowFactoryStatus( Msg )
    ' Disregard the Archive attribute
    If Attr > 7 And Attr <> 16 Then
        If Attr BAnd ATTR_ARCHIVE Then
            Attr = Attr BAnd BNot ATTR_ARCHIVE
        Else
            Attr = Attr BOr ATTR_ARCHIVE
        End If
    End If
    ' Correlate some attribute codes and code sums to messages
    Select Case Attr
        Case ATTR_NORMAL
            Msg = "Normal"
        Case ATTR_READONLY
            Msg = "Read-only"
        Case ATTR_HIDDEN
            Msg = "Hidden"
        Case ATTR_HIDDEN + ATTR_READONLY
            Msg = "Hidden and Read-only"
```

GetClassID function

```
Case ATTR_SYSTEM
    Msg = "System"
Case ATTR_READONLY + ATTR_SYSTEM
    Msg = "Read-only and System"
Case ATTR_HIDDEN + ATTR_SYSTEM
    Msg = "Hidden and System"
Case ATTR_READONLY + ATTR_HIDDEN + ATTR_SYSTEM
    Msg = "Read-only, Hidden, and System"
Case ATTR_DIRECTORY
    Msg = "Directory"
End Select
ShowFactoryStatus( UCase$(FName) & " is a " & Msg & " file.")
Exit Function

ErrorHandler:
    Msg = "Sorry, an error occurred. Please change the name or
path "
    Msg = Msg & "of the file in this method code and try again."
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples” earlier in this chapter.

See also FileDateTime function
 FileLen function
 SetAttr statement

GetClassID function

Returns the ID number that Actuate assigns automatically to all classes. Objects of the same class have the same ID number.

Syntax GetClassID(<object reference>, <offset>)

Parameters <object reference>

The name of the variable that refers to the object for which you want the ID.

<offset>

An integer that indicates the level of the class hierarchy for which you want the ID. Must be 0 or a negative number. Specify 0 to return only the class ID, -1 to return the ID of the classes' superclass, and so on.

Returns Integer that is the class ID.

Null if <offset> is a positive number or a negative number higher than the class hierarchy.

- Tips**
- Use GetClassID when you want to check if an object is of a given type without the overhead of a string compare.
 - To find out an object's class, use GetClassName.
 - To find out if an object is an instance of a specified class or is an instance of a subclass of a specified class, use IsKindOf.

Example The following example displays the Class Name and Class ID of the current component, creates two new label components, then displays the Class Name and Class ID of each of the new components:

```
Sub Start ( )
    Dim ClassIDVar, ClassNameVar
    Dim MyLabel1 As AcLabelControl, MyLabel2 As AcLabelControl
    Dim Msg As String
    Super::Start ( )
    ClassIDVar = GetClassID(Me, 0)
    ClassNameVar = GetClassName(Me, 0)
    Msg = "My Class ID is: " & ClassIDVar
    ShowFactoryStatus( Msg )
    Msg = "My Class Name is: " & ClassNameVar
    ShowFactoryStatus( Msg )

    Set MyLabel1 = New AcLabelControl
    Set MyLabel2 = New AcLabelControl

    Msg = "The Class Name for MyLabel1 is: "
+   & GetClassName(MyLabel1)
    ShowFactoryStatus( Msg )
    Msg = "Its Class ID is: "
+   & GetClassID(MyLabel1)
    ShowFactoryStatus( Msg )
    Msg = "The Class Name for MyLabel2 is: "
+   & GetClassName(MyLabel2)
    ShowFactoryStatus( Msg )
    Msg = "Its Class ID is: " & GetClassID(MyLabel2)
    ShowFactoryStatus( Msg )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetClassName function
IsKindOf function

GetClassName function

Returns the name of the object's class.

Syntax GetClassName(<object reference>, <offset>)

Parameters **<object reference>**

The name of the variable that refers to the object for which you want the class name.

<offset>

An integer that indicates the level of the class hierarchy for which you want the class name. Must be 0 or a negative number. Specify 0 to return only the class name, -1 to return the name of the classes' superclass, and so on.

Returns String

The name of the class. If the class is nested, the name is the fully qualified name, for example, MyReport::MyFrame::MyControl.

Null if <offset> is a positive number or a negative number higher than the class hierarchy.

- Tips**
- Use GetClassName to test for a specific class before performing an action.
 - To find out if an object is an instance of a specified class or is an instance of a subclass of a specified class, use IsKindOf.

Example The following example displays the Class Name and Class ID of the current component, creates two new label components, then displays the Class Name and Class ID of each of the new components:

```
Sub Start ( )
    Dim ClassIDVar, ClassNameVar
    Dim MyLabel1 As AcLabelControl, MyLabel2 As AcLabelControl
    Dim Msg As String
    Super::Start ( )
    ClassIDVar = GetClassID( Me, 0 )
    ClassNameVar = GetClassName( Me, 0 )
    Msg = "My Class ID is: " & ClassIDVar
    ShowFactoryStatus( Msg )
    Msg = "My Class Name is: " & ClassNameVar
    ShowFactoryStatus( Msg )

    Set MyLabel1 = New AcLabelControl
    Set MyLabel2 = New AcLabelControl

    Msg = "The Class Name for MyLabel1 is: "
+   & GetClassName(MyLabel1)
    ShowFactoryStatus( Msg )
    Msg = "Its Class ID is: "
+   & GetClassID(MyLabel1)
    ShowFactoryStatus( Msg )
    Msg = "The Class Name for MyLabel2 is: "
+   & GetClassName(MyLabel2)
```



```

    ShowFactoryStatus( Msg )
    Msg = "Its Class ID is: " & GetClassID(MyLabel2)
    ShowFactoryStatus( Msg )
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetClassID function
 IsKindOf function

GetClipboardText function

Returns a text string from the operating environment Clipboard.

Syntax GetClipboardText(<format>)

Parameters **<format>**
 One of the Clipboard formats Actuate Basic recognizes as shown in Table 6-21.

Table 6-21 Clipboard formats

Symbolic constant	Value	Clipboard format
CF_LINK	&HBF00	DDE conversation information
CF_TEXT	1	Text

If <format> is omitted, CF_TEXT is assumed.

Returns String

If there is no text string on the Clipboard that matches the expected format, a zero-length string ("") is returned.

Example The following example places the current date on the Clipboard, then displays the contents of the Clipboard:

```

Sub Start( )
    Dim Msg As String
    Super::Start( )
    On Error Resume Next
    Msg = "The Clipboard contains: " & GetClipboardText
    ShowFactoryStatus( Msg )
    Msg = "Placing today's date on the clipboard."
    ShowFactoryStatus( Msg )
    ClearClipboard

```

GetDisplayHeight function

```
SetClipboardText (Format$ (Date, "dddd, mm/dd/yyyy"))
Msg = GetClipboardText
ShowFactoryStatus( "The Clipboard now contains: " & Msg )
End Function
```

For information about using the code examples, see “Using the code examples” earlier in this chapter.

See also ClearClipboard function
SetClipboardText function

GetDisplayHeight function

Returns the height required to display a given text string without truncating it, in twips.

Can be used to dynamically adjust the height of a container when you have a large amount of text that might otherwise overflow.

Syntax GetDisplayHeight (<context>, <width>, <theText>, <theFont>, <format>)

Description Different devices display or print fonts slightly differently. This means, for example, that a visual box filled with text may look correct on the screen, but incorrect in a printed report because the target device truncates some of the text.

GetDisplayHeight supports calculating exactly how tall the formatted text will be when a given display or printer device renders it.

Parameters

<context>
String expression. Specifies whether to return the height for display, or for the default printer. Valid values are display and default_printer.

<width>
Integer expression. Specifies the width of the control displaying the text, in twip. <width> is used to determine the height of the control to display all the text for this control. GetDisplayHeight assumes that at least one character fits on each line. Width must be a positive Integer.

<theText>
String expression. The text whose height you want to determine. The string must not be empty.

<theFont>
AcFont data type.

<format>
AcTextPlacement data type.

Returns Integer

- The height of the formatted text for the specified device, in twips.

- When negative, an error has occurred. Table 6-22 shows the meaning of the error codes.

Table 6-22 Error codes for GetDisplayHeight

Error code	Description
-2	Wrong number of parameters passed
-3	<context> is not a string, or represents a nonsupported context
-4	<width> is not a positive integer
-5	<theText> is not a string, or it is an empty string
-6	<AcFont.FaceName> is an empty string
-7	<AcFont.Size> is not a positive integer
-8	<AcFont.Bold> internal error
-9	<AcFont.Italic> internal error
-10	<AcFont.Underline> internal error
-11	<AcFont.StrikeThrough> internal error
-12	<AcTextPlacement.MultiLine> internal error
-13	<AcTextPlacement.WordWrap> is not 0, 2, or 3
-14	Default printer is selected, but no default printer has been set
-15	Implementation failed to get information on the device
-16	Operation caused an exception
-17	<Font.Script> is not a string or empty

Example The following example determines display height based on given text parameters:

```
Sub Start( )
    Dim myFont As AcFont
    Dim myTextPlacement As AcTextPlacement
    Dim theText as String
    Dim Msg As String
    Super::Start( )
    ' Specify font characteristics and text to measure
    myFont.FaceName = "Arial"
    myFont.Size = 14
    myFont.Script = " "
    theText = "Text that the display height is being queried for."
    Msg = "The required height for the text: " & theText
    ShowFactoryStatus( Msg )
End Sub
```

GetFactoryVersion function

```
Msg = "in a control of width 1 inch is "  
+   & GetDisplayHeight(  
+       "display",OneInch,theText,myFont,myTextPlacement )  
ShowFactoryStatus( Msg )  
Msg = "in a control of width 2 inches is "  
+   & GetDisplayHeight(  
+       "display", OneInch*2,theText,myFont,  
+       myTextPlacement )  
ShowFactoryStatus( Msg )  
Msg = "in a control of width 3 inches is "  
+   & GetDisplayHeight(  
+       "display", OneInch*3, theText, myFont,  
+       myTextPlacement )  
ShowFactoryStatus( Msg )  
End Sub
```

For information about using the code examples, see “Using the code examples” earlier in this chapter.

GetFactoryVersion function

Returns either the integer or the decimal component of the version number of the Factory that the report object executable (.rox) file is using.

Syntax GetFactoryVersion(<numpart>)

Parameters <numpart>

Number or numeric expression that tells GetFactoryVersion whether you want to know the integer part of the Factory’s version number, or the decimal part.

Rule: Must be either 0 or 1.

Returns Integer

- If <numpart> is 0, GetFactoryVersion returns the integer (major) component of the Factory’s version number.
- If <numpart> is 1, GetFactoryVersion returns the decimal (minor) component of the Factory’s version number.

Example The following example determines both parts of the version number of the Factory that the ROX is using and puts the parts together, interpolating the decimal point where it belongs:

```
Dim FactVerMajor As Integer, FactVerMinor As Integer  
Dim FactVerTotal As String  
FactVerMajor = GetFactoryVersion(0)  
FactVerMinor = GetFactoryVersion(1)
```

```
' Put the two parts together and prefix some identifying text:
FactVerTotal = "Factory Version: " & (FactVerMajor) & "." &
+ (FactVerMinor)
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetAppContext function
 GetAFCROXVersion function
 GetOSUserName function
 GetROXVersion function
 GetServerName function
 GetServerUserName function

GetFontAverageCharWidth function

Returns the average width (in twips) of a character in the specified font.

Syntax GetFontAverageCharWidth()

Parameters
 AcFont data type.

Returns Integer specifying the average width of characters in twips of the font (generally defined as the width of the letter *x*). This value does not include the overhang required for bold or italic characters.

Example The following example overrides the Start method of a dynamic text control. It uses the average character width to compute the initial size of the control.

```
Sub Start( )
    Dim width As Double
    Dim fontHeight As Double
    ' Get the label size
    width = GetFontAverageCharWidth( Font ) * 20
    fontHeight = GetFontDisplayHeight( Font )
    Size.width = width
    Size.height = fontHeight
    Super::Start( )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetFontDisplayHeight function
 GetTextWidth function

GetFontDisplayHeight function

Returns the height (in twips) needed to display a character in the specified font.

Syntax GetFontDisplayHeight()

Parameters
 AcFont data type.

Returns Integer representing the height (in twips) needed to display a character in the specified font. A font's height is the sum of its ascent, descent, and leading area.

Example The following example overrides the Start method of a dynamic text control. It uses the font display height to compute the initial size of the control.

```
Sub Start( )  
    Dim width As Double  
    Dim fontHeight As Double  
    ' Get the label size  
    width = GetFontAverageCharWidth( Font ) * 20  
    fontHeight = GetFontDisplayHeight( Font )  
    Size.width = width  
    Size.height = fontHeight  
    Super::Start( )  
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetDisplayHeight function
 GetFontAverageCharWidth function

GetHeadline function

Returns the headline associated with the completed request for a report.

Syntax GetHeadline

Returns String

The current text of the headline.

Description Headlines are associated with the completed request for a report.

By default, the headline is set to the value of the Headline parameter that appears in the Output Options section of the Requester. Use GetHeadline to programmatically determine the headline text.

To change the headline use SetHeadline, do not change the Headline parameter itself.

Example The following example overrides Start() on the report root. This code displays the current headline, sets a new headline, then displays the new headline.

```
Sub Start( )
    Super::Start( )
    ' Getting the current headline.
    ShowFactoryStatus( "Original headline is: " & GetHeadline )
    ' Setting and displaying the new headline
    SetHeadline( "New Headline" )
    ShowFactoryStatus( "New headline is: " & GetHeadline )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also SetHeadline statement

GetJavaException function

Accesses the last Java exception thrown by the application.

Syntax GetJavaException

Returns A Basic object which is a handle to the Java Exception object if the method succeeded.

An undefined handle if the call failed.

Example The following example triggers a Java exception and then displays the error:

```
Sub Start( )
    Dim javaObj As Object
    Dim Msg As String
    Super::Start( )
    On Error Goto HandleError
    ' Trigger a java exception
    Set javaObj = CreateJavaObject( "JavaClassName" )
    javaObj.TryToDoSomething( )
HandleError:
    ' Retrieve error code
    Dim errorCode As Integer
    errorCode = Err
    ' If it is a java error, display error string
    If errorCode = E_JAVAEXCEPTIONOCCURRED Then
        Dim exceptionObj As Object
        Set exceptionObj =GetJavaException
```

GetLocaleAttribute function

```
Msg = "Java exception: " & exceptionObj.toString()
ShowFactoryStatus( Msg )
End If
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

GetLocaleAttribute function

Retrieves locale attributes. You can use this information, for example, in formatting functions and functions that parse strings.

Syntax GetLocaleAttribute (<locale>, <attrib>)

Parameters <locale>

The name of the locale for which to retrieve attributes.

<attrib>

The enum value of the attribute to retrieve:

- AC_LOCALE_CURRENCY
- AC_LOCALE_CURRENCY_FORMAT
- AC_LOCALE_CURRENCY_RADIX
- AC_LOCALE_CURRENCY_THOUSAND_SEPARATOR
- AC_LOCALE_DATE_LONG
- AC_LOCALE_DATE_SEPARATOR
- AC_LOCALE_DATE_SHORT
- AC_LOCALE_MONTHS_LONG
- AC_LOCALE_MONTHS_SHORT
- AC_LOCALE_NUM_RADIX
- AC_LOCALE_NUM_THOUSAND_SEPARATOR
- AC_LOCALE_TIME_AM_STRING
- AC_LOCALE_TIME_FORMAT
- AC_LOCALE_TIME_PM_STRING
- AC_LOCALE_TIME_SEPARATOR
- AC_LOCALE_WEEKDAYS_LONG
- AC_LOCALE_WEEKDAYS_SHORT

Returns String

Example The following example returns the names of valid days of the week:

```
'Parse the numeric string "1.001,99" specified in French
locale
sep1000 = GetLocaleAttribute("fr",
+ AC_LOCALE_NUM_THOUSAND_SEPARATOR)
radix = GetLocaleAttribute("fr", AC_LOCALE_NUM_RADIX)
ParseNumeric("1.001,99", sep1000, radix)
```



```
' Get the names of valid days of week in short format
' for the current run-time locale
weekNames = GetLocaleAttributes(GetLocaleName(),
+ AC_LOCALE_ WEEKDAYS_SHORT)
' In the English locale, the following string is returned
' " Mon,Tue,Wed,Thu,Fri,Sat,Sun"
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

GetLocaleName function

Retrieves the name of the current run-time locale.

Syntax GetLocaleName

Description This function retrieves the name of the current run-time locale.

Returns String

Example The following example displays the locale name:

```
Sub Start( )
    Super::Start( )
    ' Display message containing locale name
    ShowFactoryStatus( "The current locale name is: " &
+                      GetLocaleName )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

GetObjectIDString function

Returns a unique identifying string for an object within an ROI.

Syntax GetObjectIDString(<object>)

Parameters **<object>**
The handle or reference that refers to the object of which you want information. It can be an array reference, expression, or variable.

Returns String representing a unique identifier for the object.

GetOSUserName function

Returns the operating system (login) name of the user. For server, returns the login name of the account running the server.

Syntax GetOSUserName

Returns String

The login name of the user, or the login name of the account running the server.

Example The following example retrieves the user's login name and puts it in a variable along with some identifying text:

```
Dim OSUserName As String
OSUserName = "OS User Name is: " & ( GetOSUserName )
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetAppContext function
 GetAFCROXVersion function
 GetFactoryVersion function
 GetROXVersion function
 GetServerName function
 GetServerUserName function

GetPid function

Returns the process ID of the Factory.

Syntax GetPid

Returns Integer identifying the process ID of the Factory.

Example The following example uses the process ID to generate a unique temporary file name. Basic factories are not multithreaded, allowing for unique file names per process.

```
Sub Finish( )
    Dim fileName As String
    Dim pId As Integer
    Static fileSequence As Integer
    ' Determine process id
    pId = GetPid
    ' Generate file name. Use a static variable to sequence
    ' through filenames.
    fileSequence = fileSequence + 1
```

```

    FileName = "TEST" & pId & fileSequence & ".DAT"
    ShowFactoryStatus(
+      "File name " & fileName & " has been generated." )
End Sub

```

GetReportContext function

Returns the value of the global ReportContext variable, which specifies whether the report is in the factory, viewing, or printing stage of the life cycle.

Syntax GetReportContext

Returns ReportContext

One of the following values defined in Header.bas:

```

UnknownReportContext
FactoryReportContext
ViewerReportContext
PrintReportContext

```

Description Use GetReportContext in conjunction with GetAppContext.

Table 6-23 gives some examples of how the GetReportContext and GetAppContext functions work together to determine which Actuate application is being used and what the report context is at the time.

Table 6-23 Examples of how GetReportContent and GetAppContext determine the Actuate application in use and the report context

If GetAppContext returns this...	And GetReportContext returns this...	You are in the...
ServerContext	ViewerReportContext	View process
ServerContext	FactoryReportContext	Factory server
ServerContext	PrintReportContext	Factory server

Example The following example determines whether the report is running in the View process:

```

InViewServer = ((GetReportContext = ViewerReportContext)
+ And (GetAppContext = ServerContext))

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetAppContext function

GetReportScalingFactor function

Returns the scaling factor.

Syntax GetReportScalingFactor

Description Use GetReportScalingFactor to retrieve the scaling factor and adjust the size of the browser scripting control's rectangle based on the current scaling factor.

When the scaling factor changes, the DHTML converter scales controls on the report page, but does not scale or change the output of custom browser code. Make sure that the output of custom browser code can be viewed with different scaling factors, especially 75% and 100%.

Returns Double

1.0 corresponds to a 100% zoom.

Example The following example shows how to use GetReportScalingFactor to change the width and height of the HTML element produced by the custom browser code:

```
Dim dhtmlCode As String
Dim zoom As Double
zoom = GetReportScalingFactor
dhtmlCode = "<SPACER TYPE=""block"" HEIGHT=" + Str$(150 * zoom)
dhtmlCode = dhtmlCode + " WIDTH=" + Str$(250 * zoom) + ">"
BrowserCode = dhtmlCode
```

For information about using the code examples, see "Using the code examples," earlier in this chapter.

GetROXVersion function

Returns either the integer or the decimal component of the version number of the report object executable (.rox) file.

Syntax GetROXVersion(<numpart>)

Parameters <numpart>

Number or numeric expression that tells GetROXVersion whether you want to know the integer part of the version number, or the decimal part.

Rule: Must be either 0 or 1.

Returns Integer

- If <numpart> is 0, GetROXVersion returns the integer (major) component of the version number.
- If <numpart> is 1, GetROXVersion returns the decimal (minor) component of the version number.

Example The following example determines both parts of the version number of the ROX and puts the parts together, interpolating the decimal point where it belongs:

```
Dim ROXMajor As Integer, ROXMinor As Integer
Dim ROXTotal As String
ROXMajor = GetROXVersion(0)
ROXMinor = GetROXVersion(1)
' Put the two parts together and prefix some identifying text:
ROXTotal = "ROX Version: " & (ROXMajor) & "." & (ROXMinor)
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetAFCROXVersion function
 GetAppContext function
 GetFactoryVersion function
 GetOSUserName function
 GetServerName function
 GetServerUserName function

GetSearchFormats function

Retrieves a list of supported DHTML search formats, places the supported formats into a string array, and returns the number of elements in the string array.

Syntax GetSearchFormats(<formatArray>()) As Integer

Parameters <formatArray>

String array to contain the list of supported search formats. The search formats determine how the DHTML viewing environment presents search results.

Returns The number of elements in the array.

The supported formats that GetSearchFormats returns depend upon the formats available in a particular viewing environment. For example, the following formats might be supported:

- XMLDisplay (DISPLAY)
- Download formats:
 - CSV
 - TSV
 - ANALYSIS

Example The following example retrieves a list of supported formats:

GetServerName function

```
Function BrowserCode() As String
    Dim fmtArray() As String
    Dim count As Integer
    Dim i As Integer
    Dim DhtmlStr As String

    DhtmlStr = "<SELECT NAME='search_format'>"
    count = GetSearchPageFormats(fmtArray)
    For i = 1 To count
        DhtmlStr = DhtmlStr + "<OPTION VALUE=" + fmtArray(i) + ">"
        DhtmlStr = DhtmlStr + fmtArray(i) + "</OPTION>"
    Next i
    DhtmlStr = DhtmlStr + "</SELECT>"
    BrowserCode = dhtmlStr
End Function
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also IsSearchFormatSupported function

GetServerName function

Returns the name of the machine on which iServer is running.

Syntax GetServerName

Returns String

Example The following example displays in a control the name of the machine on which iServer is running:

```
Dim ServerName as String
ServerName = "Server Name: " & (GetServerName)
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetAFCROXVersion function
GetAppContext function
GetFactoryVersion function
GetOSUserName function
GetROXVersion function
GetServerUserName function

GetServerUserName function

Returns the login name of the user logged into iServer.

Syntax GetServerUserName

Returns String

Example The following example displays the login name of the user logged into iServer:

```
Sub Start()  
    Dim ServerUserName as String  
    ServerUserName = "Server User Name: " & GetServerUserName  
    ShowFactoryStatus ServerUserName  
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetAFCROXVersion function
 GetAppContext function
 GetFactoryVersion function
 GetOSUserName function
 GetROXVersion function
 GetServerName function

GetTextWidth function

Returns the width of a text string in twips.

Syntax GetTextWidth(<text>,)

Parameters **<text>**
 The text string whose length is to be calculated.

 AcFont data type.

Returns The integer width of the text in twips.

Example The following example overrides the Start method of a dynamic text control. It uses the text width to compute the initial size of the control.

```
Sub Start( )  
    Dim width As Double  
    Dim fontHeight As Double  
    Dim text As String
```

GetUserAgentString function

```
' Get the label size
text = "Testing text"
width = GetTextWidth( text, Font )
fontHeight = GetFontDisplayHeight( Font )
Size.width = width
Size.height = fontHeight
Super::Start( )
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetDisplayHeight function
 GetFontAverageCharWidth function

GetUserAgentString function

Returns the unparsed user agent string a web browser sends with every HTTP request.

Syntax GetUserAgentString

Returns String

Example The following example generates different output for Microsoft Internet Explorer and Mozilla Firefox:

```
Function GetText() As String
    Dim str As String
    str = GetUserAgentString
    If Len(str) = 0 Then
        GetText = "...Not in a web browser."
    Else
        If InStr(str, "MSIE") = 0 Then
            'Not MSIE.
            GetText = str + "...In Firefox"
        Else
            GetText = str + "...In MSIE"
        End If
    End If
End Function
```

GetValue function

Finds the value of a variable in an object dynamically at run time.

Syntax GetValue(<object reference>, <variable name>|<index>)

Parameters	<p><object reference> AnyClass expression that specifies an object which has a variable whose value you want to find.</p> <p><variable name> String expression that specifies the name of the variable whose value you want to find.</p> <p><index> Integer expression that specifies the index of the variable whose value you want to find.</p> <p>Indexing starts at 1. The index order puts all superclass variables before those defined in a subclass.</p> <p>Within a given class, the index order of variables is the order in which the variables are defined in the Actuate Basic source. If e.Report Designer Professional generates the Basic source for a class, it lists the variables in alphabetical order.</p>
Description	<p>You typically use GetValue in conjunction with GetVariableCount, GetVariableName, GetValueType, and SetValue to work with variables in objects whose types you do not know in advance.</p>
Returns	<p>Variant</p> <p>The value of the specified variable if it exists. If the specified variable does not exist, GetValue returns Null. It is not an error if the variable does not exist.</p>
Tip	<p>You cannot use the value GetValue returns to determine whether or not the specified variable exists by checking whether the returned value is Null. This is because GetValue will also return Null if the variable exists but has a value of Null. Instead, use GetValueType to check whether the variable exists.</p> <p>If you know the class of the object, you should use the following technique to provide improved performance and compile-time error checking. You can access the variables in a class by declaring an object variable reference that points to an instance of that class, then access the variables through that object reference variable. For example, sometimes you are given an object reference variable that points to a base class, such as AcDataRow, but you are interested in a derived class, such as CustomerRow. You declare a temporary object reference variable of the derived class and set it equal to the reference to the base class as shown in the following example:</p>
	<pre>Sub OnRow(row as AcDataRow) Dim custRow As CustomerRow Set custRow = row MyVariable = custRow.CustomerName End Sub</pre>
Example	<p>The following example shows how to use GetVariableCount, GetVariableName, GetValueType, GetValue, and SetValue together:</p>

GetValueType function

```
' Simulate the behavior of the CopyInstance statement,  
' but only copy integers > 0 whose names begin "Z_"  
Dim vCount As Integer  
Dim vName As String  
Dim vType As Integer  
Dim vValue As Variant  
Dim i As Integer  
vCount = GetVariableCount( fromObject )  
For i = 1 To vCount  
    vName = GetVariableName( fromObject, i )  
    vType = GetValueType( fromObject, vName )  
    If (Left( vName, 2 ) = "Z_") And (vType = V_INTEGER) Then  
        vValue = GetValue( fromObject, vName )  
        If (vValue > 0) Then  
            SetValue( toObject, vName, vValue )  
        End If  
    End If  
Next i
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetValueType function
 GetVariableCount function
 GetVariableName function
 SetValue function

GetValueType function

Finds the data type of a variable in an object dynamically at run time.

Syntax GetValueType(<object reference>, <variable name>[<index>])

Parameters **<object reference>**
AnyClass expression that specifies an object which has a variable whose data type you want to find.

<variable name>
String expression that specifies the name of the variable whose data type you want to find.

<index>
Integer expression that specifies the index of the variable whose data type you want to find.

Indexing starts at 1. The index order puts all superclass variables before those defined in a subclass. Within a given class, the index order of variables is the order in which the variables are defined in the Actuate Basic source. If e.Report

Designer Professional generates the Basic source for a class, it lists the variables in alphabetical order.

Description You typically use GetValueType in conjunction with GetVariableCount, GetVariableName, GetValue, and SetValue to work with variables in objects whose types you do not know in advance.

Returns Integer indicating the data type of the specified variable, if it exists. If the specified variable does not exist, GetValueType returns Null. It is not an error if the variable does not exist.

Table 6-24 shows the values VarType returns, the Variant data types they indicate, and the names of the corresponding symbolic constants stored in Header.bas.

Table 6-24 VarType values with their Variant data types and symbolic constants

GetValueType returns	Data type of variable	Symbolic constant
0	Empty	V_EMPTY
1	Null	V_NULL
2	Integer	V_INTEGER
3	Long	V_LONG
4	Single	V_SINGLE
5	Double	V_DOUBLE
6	Currency	V_CURRENCY
7	Date	V_DATE
8	String	V_STRING

Tip Test the value GetValueType returns with the IsNull function to determine whether or not the specified variable exists. For example:

```
Dim valueType As Integer
valueType = GetValueType( anObject, "SomeVariable" )
Assert( Not IsNull( valueType ), "SomeVariable not found!" )
```

Example The following example shows how to use GetVariableCount, GetVariableName, GetValueType, GetValue, and SetValue together:

```
' Simulate the behavior of the CopyInstance statement,
' but only copy integers > 0 whose names begin "Z_"
Dim vCount As Integer
Dim vName As String
Dim vType As Integer
Dim vValue As Variant
Dim i As Integer
```

GetVariableCount function

```
vCount = GetVariableCount( fromObject )
For i = 1 To vCount
    vName = GetVariableName( fromObject, i )
    vType = GetValueType( fromObject, vName )
    If (Left( vName, 2 ) = "Z_") And (vType = V_INTEGER) Then
        vValue = GetValue( fromObject, vName )
        If (vValue > 0) Then
            SetValue( toObject, vName, vValue )
        End If
    End If
Next i
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetValue function
 GetVariableCount function
 GetVariableName function
 SetValue function

GetVariableCount function

Returns the number of variables in an instance. Used in conjunction with GetVariableName.

Syntax GetVariableCount(<object reference>)

Parameters <object reference>

Any class expression. An object variable that refers to the object that has the variables you want to count.

Indexing of variables starts at 1. The index order puts all superclass variables before those defined in a subclass.

Within a given class, the index order of variables is the order in which the variables are defined in the Actuate Basic source. If Actuate generates the Basic source, as is standard for a data row, then Actuate lists the variables in alphabetical order.

Returns Integer

Tip Use GetVariableName and GetVariableCount to loop over all the variables in an instance, and get both the variables’ names and values. You can write highly customized reports, or general purpose libraries using these functions.

Example 1 The following example shows how to use GetVariableCount, GetVariableName, GetValueType, GetValue, and SetValue together:

```
' Simulate the behavior of the CopyInstance statement,
' but only copy integers > 0 whose names begin "Z_"
```

```

Dim vCount As Integer
Dim vName As String
Dim vType As Integer
Dim vValue As Variant
Dim i As Integer
vCount = GetVariableCount( fromObject )
For i = 1 To vCount
    vName = GetVariableName( fromObject, i )
    vType = GetValueType( fromObject, vName )
    If (Left( vName, 2 ) = "Z_") And (vType = V_INTEGER) Then
        vValue = GetValue( fromObject, vName )
        If (vValue > 0) Then
            SetValue( toObject, vName, vValue )
        End If
    End If
Next i

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

Example 2 The following example retrieves the count of members in a local class. In it, the New() method of a data row component has been overridden. The method instantiates the parent class and then subtracts the member count of the parent class from the member count of the current class.

```

Sub New( )
    Super::New( )
    ' Count local members of a class by instantiating
    ' a parent class and then subtracting the count of
    ' those members from the count of the local members.
    Static localCount As Variant
    If IsEmpty( localCount ) Then
        localCount = 0
        Dim r As AcDataRow
        Set r = New AcDataRow
        Dim parentCount As Integer
        parentCount = GetVariableCount( r )
        Set r = New MyDataRow
        localCount = GetVariableCount( r ) - parentCount
        Set r = Nothing
    End If
End Sub

```

Example 3 The following example retrieves the index of the first local variable in a data row class:

```

Sub New( )
    Super::New( )

```

GetVariableName function

```
' Compute the index of the first local variable in a
' data row subclassed from AcDataRow.
Static firstRowVariableIndex As Integer
if (firstRowVariableIndex = 0) Then
    Dim r As AcDataRow
    Set r = New AcDataRow
    firstRowVariableIndex = GetVariableCount( r ) + 1
    Set r = Nothing
End If
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetValue function
 GetValueType function
 GetVariableName function
 SetValue function

GetVariableName function

Returns the name of the variable at a given index.

Syntax GetVariableName(<object reference>, <index>)

Parameters **<object reference>**

Any class expression. An object variable that refers to the object that has the variable whose name you want to find.

<index>

Integer that specifies the index of a variable.

Indexing starts at 1. The index order puts all superclass variables before those defined in a subclass.

Within a given class, the index order of variables is the order in which the variables are defined in the Actuate Basic source. If Actuate generates the Basic source, as is standard for a data row, then Actuate lists the variables in alphabetical order.

Returns String

Tip Use GetVariableName and GetVariableCount to loop over all the variables in an instance, and get both the variables’ names and values. You can write highly customized reports or general purpose libraries using these functions.

Example The following example shows how to use GetVariableCount, GetVariableName, GetValueType, GetValue, and SetValue together:

```

' Simulate the behavior of the CopyInstance statement,
' but only copy integers > 0 whose names begin "Z_"
Dim vCount As Integer
Dim vName As String
Dim vType As Integer
Dim vValue As Variant
Dim i As Integer
vCount = GetVariableCount( fromObject )
For i = 1 To vCount
    vName = GetVariableName( fromObject, i )
    vType = GetValueType( fromObject, vName )
    If (Left( vName, 2 ) = "Z_") And (vType = V_INTEGER) Then
        vValue = GetValue( fromObject, vName )
        If (vValue > 0) Then
            SetValue( toObject, vName, vValue )
        End If
    End If
Next i

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also GetValue function
 GetValueType function
 GetVariableCount function
 SetValue function

GetViewPageFormats function

Retrieves a list of supported DHTML viewing formats, places the supported viewing formats into a string array, and returns the number of elements in the string array.

Syntax GetViewPageFormats(<formatArray>)

Parameters <formatArray>

String array to contain the list of supported DHTML viewing formats. The viewing formats determine how the DHTML viewing environment presents a report.

Returns The number of elements in the array.

The supported viewing formats that GetViewPageFormats returns depend upon the viewing formats available in a particular viewing environment. For example,

your DHTML viewing environment might support the following viewing formats:

- XMLDisplay
- XMLCompressedDisplay
- DHTML
- DHTMLLong
- DHTMLRaw
- PDF

The viewing formats are display formats. Formats such as CSS and XMLStyle might be supported, but are not display formats. The `GetViewPageFormats` function returns only display formats.

You can use `GetViewPageFormats` to dynamically build a view page URL such as `?ViewPage&format=PDF`.

Example The following example retrieves a list of supported viewing formats:

```
Function BrowserCode() As String
    Dim formatArray() As String
    Dim count As Integer
    Dim i As Integer
    Dim DhtmlStr As String

    DhtmlStr = "<SELECT NAME='view_format'>"
    count = GetViewPageFormats(formatArray)
    For i = 1 To count
        DhtmlStr = DhtmlStr + "<OPTION VALUE=" + formatArray(i) +
+         ">"
        DhtmlStr = DhtmlStr + formatArray(i) + "</OPTION>"
    Next i
    DhtmlStr = DhtmlStr + "</SELECT>"
    BrowserCode = dhtmlStr
End Function
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

See also `IsViewPageFormatSupported` function

GetVolumeName function

Retrieves the name of the Encyclopedia volume on which the file is stored.

Syntax `GetVolumeName`

- Description** This function retrieves the name of the Encyclopedia volume on which the file is stored.
- Returns** If the file is stored in the Encyclopedia, the name of the Encyclopedia volume.
If the file is not stored in the Encyclopedia, an empty string.
- Example** The following example shows how to use GetVolumeName. To use this example, create an empty report named ShowVolumeName. Override the report's Start() method and paste the following code into the method editor:
- ```
Sub Start()
 Super::Start()
 ShowFactoryStatus("Volume is: " & GetVolumeName)
End Sub
```
- Run this report from e.Report Designer Professional to produce the following output in the Output window:
- ```
Running...
Starting...
Generating ShowVolumeName.roi ...
Volume is:
Finishing...
Idle.
```
- Publish the report to iServer. In this example, the Encyclopedia volume is named seamore. Run the report from Actuate Management Console or Actuate Information Console to produce the following output in Job Status messages:
- ```
Starting...
Generating rotp:/ShowVolumeName.roi;0 ...
Volume is: seamore
Finishing...
Headline:
Job completed.
```
- For information about using the code examples, see “Using the code examples,” earlier in this chapter.
- See also** ShowFactoryStatus statement

---

## Global statement

Declares and allocates memory for variables, and declares the variables to be available to all procedures in all modules.

- Syntax** Global <variable name> [[(<subscripts>)] [As <type>] [, <variable name> [[(<subscripts>)] [As <type>]]...]

## Global statement

### Parameters <variable name>

A name you create for the new variable.

### <subscripts>

Each <subscripts> argument specifies the number of elements in a dimension. The number of <subscripts> arguments specifies the number of dimensions in the array.

Array dimensions using the following syntax:

[<lower>] **To** <upper>],[<lower>] **To** <upper>]...

Rules for <subscripts>:

- If you do not specify <subscripts> between parentheses, Actuate Basic declares a dynamic array.
- <lower> and <upper> can range from -32,768 to 32,767 inclusive.
- <lower> must always be less than <upper>.
- Use no more than 60 dimensions in a Global statement.
- Do not later use ReDim to declare more than 8 dimensions for a dynamic array you declared with Global.

**Examples** The statements within the following Declare...End Declare block are equivalent if you do not use Option Base:

```
Declare
 Global P(7,5)
 Global P(0 to 7, 0 to 5)
 Global P(7, 0 to 5)
End Declare
```

The following example declares a dynamic array:

```
Global TestArray()
```

### As <type>

Specifies a data type or class for the variable. If you specify a class, the variable can hold a reference to an instance of that class or descendant classes.

Rule for As <type>: If you do not specify As <type>, Actuate Basic uses the data type you declared with Dim or defaults to a Variant.

**Rule** Use Global within a Declare...End Declare block in your .bas source file.

- Tips**
- To avoid assigning incorrect variable types, use the As clause to declare variables.
  - To create a dynamic array with more than eight dimensions, declare it with ReDim, not Global or Dim.

- Use global variables sparingly; declare variables in local scope if at all possible. Global variables are most useful when values must be shared or accessed by several tasks. Adding a lot of global variables makes debugging more complicated; in addition, variables with global scope must be kept in memory while the application is running.
- To avoid debugging problems, note that variables declared with Global are automatically initialized as shown in Table 6-25.

**Table 6-25** Initialization of variables that are declared with Global

| Type                    | Initialized as       |
|-------------------------|----------------------|
| Numeric                 | 0                    |
| Variant                 | Empty                |
| Variable-length strings | Zero-length String   |
| CPointer                | Null                 |
| User-defined            | Separate variables   |
| Object or Class         | Nothing (before Set) |

To initialize one or more of your global variables to some default value (other than zero), write a procedure that initializes the variables, then call that procedure from the OnStartViewer() method of the report.

**Example** The following Declare statement uses Global to declare two variables, TestArray and PrintFlag. TestArray is a global dynamic array variable. PrintFlag is a global integer variable. Several parts of the application check PrintFlag to determine whether a print action has been completed.

To use the following example, paste the Declare block and Sub block at or near the beginning of your Actuate Basic code module (.bas) file:

```
Declare
 ' Global dynamic array
 Global TestArray()
 ' Global integer variable
 Global PrintFlag as Integer
End Declare

Sub LoadGlobalArray()
 Dim I As Integer, Size As Integer, Msg As String

 ' First check if the global array has already been printed.
 If PrintFlag Then
 Msg = "That information has already been printed."
 ShowFactoryStatus(Msg)
 End If
End Sub
```

## GoTo statement

```
Else
 ' Otherwise, set up TestArray for printing
 Size = Int(10 * Rnd + 1)
 ReDim TestArray(Size)
 For I = 1 to Size
 TestArray(I) = Int(10 * Rnd + 1)
 Msg = TestArray(I)
 ShowFactoryStatus(Msg)
 Next I
 ' Set print flag to True to notify the whole application
 PrintFlag = True
End If
End Sub
```

Paste the following line into the Start() method of a label or other component in the method editor:

```
LoadGlobalArray
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Const statement  
Dim statement  
GetAFCROXVersion function  
GetAppContext function  
GetFactoryVersion function  
GetOSUserName function  
GetROXVersion function  
GetServerUserName function  
Option Base statement  
ReDim statement  
Static statement  
Type...End Type statement

---

## GoTo statement

Branches to a specified line within a procedure unconditionally and without returning to the calling statement.

**Syntax** GoTo { <line label> | <line number> }

**Parameters** **<line label>**  
The name of any existing program label that marks the statement to execute next.  
Rules for setting up <line label>:

- Must begin with an alphabetic character and end with a colon.

- Must not be an Actuate Basic keyword.
- Must be unique to the module in which it appears.
- Must be the first non-blank characters on the line.
- Is not case-sensitive.

**Example**

```
Sub Start()
 Super::Start()
 ' Using Goto with a line label
 On Error Goto MyErrorHandler
 ...
 Exit Sub
 ' The line label
MyErrorHandler:
 ...
End Sub
```

#### <line number>

The number of any program line that marks the statement to execute next.

Rules for setting up <line number>:

- Must consist entirely of decimal digits (0 through 9).
- Must not end with a colon.
- Must be unique to the module in which it appears.
- Must not be greater than 2,147,483,647 if you intend to use the Erl function.
- Can begin in any column, but must be the first non-blank character on the line.

**Example**

```
Sub Start()
 500 Dim X, Y, Z
 505 Super::Start()
 ' Set up error handler
 510 On Error GoTo 550
 520 Y = 1
 'Now cause division by zero error:
 530 X = Y / Z
 540 Exit Sub
 ' Error handler
 550 ShowFactoryStatus("Error occurred at line " & Erl)
 560 Resume Next
End Sub
```

**Rule** GoTo can branch only to lines that exist within the procedure in which it appears.

**Tips**

- Using GoTo in your code makes it difficult to understand and debug. To avoid confusion, use GoTo rarely. Instead, use more structured control statements,

such as Do...Loop, For...Next, If...Then...Else, and Select Case, or define Function and Sub procedures.

- Evaluate Boolean variables by using the keywords True or False.

**Example** The following example uses GoTo to branch around a subroutine:

```
Sub Start()
 Dim UserNum as Integer, HalfNum As Double
 Super::Start()
 HalfNum = 0
 UserNum = Int(255 * Rnd + 1)
 ' Branch around subroutine
 GoTo ThisPlusColon
 ShowFactoryStatus("This message never appears.")
Routine:
 ' GoTo detours around this subroutine
 HalfNum = UserNum / 2
ThisPlusColon:
 ShowFactoryStatus("UserNum is: " & UserNum
+ & ". HalfNum is still: " & HalfNum)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Erl function  
Do...Loop statement  
For...Next statement  
Function...End Function statement  
If...Then...Else statement  
Select Case statement  
Sub...End Sub statement

---

## Hex, Hex\$ functions

Converts a numeric expression from decimal to hexadecimal notation, and from numeric to string.

**Syntax** Hex(<numeric expression>)  
Hex\$(<numeric expression>)

**Parameters** **<numeric expression>**  
Numeric expression to be converted from decimal to hexadecimal notation.

**Examples** The following statements are equivalent. Each returns &H010, which is the full form of the hexadecimal equivalent of decimal number 16.

```
"&H" & Hex$(16)
"&H" & Hex$(2*8)
```

In the following example, the first statement returns decimal value 32, and the second statement returns decimal value 37:

```
("&H" & Hex$(16)) * 2
Hex$(16) * 2 + 17
```

**Returns** Hex: Variant  
Hex\$: String

- Hex[\$] rounds <numeric expression> to the nearest whole number before evaluating it.
- If <numeric expression> evaluates to Null, Hex[\$] returns Null.
- If the data type of <numeric expression> is Integer, Variant of VarType 2 (Integer), or Variant of VarType 0 (Empty), Hex[\$] returns up to four hexadecimal characters.
- If <numeric expression> is of any other numeric or Variant data type, Hex[\$] returns up to eight hexadecimal characters.

- Tips**
- To represent a hexadecimal number directly, precede a number in the correct range with the radical prefix &H. The valid range for hex numbers is &H0 to &HFFFFFFF. For example, use &H010 \* 2 to generate the decimal value 32, &H010 is hexadecimal notation for decimal value 16.
  - To generate the full hexadecimal representation of <numeric expression>, supply the radical prefix &H, because Hex[\$] does not return that component.
  - To ensure correct results when you assign the output of Hex to a variable, be sure the variable is of type Variant.

**Example** The following example generates a decimal number, then uses Hex[\$] to convert that number to hexadecimal notation:

```
Sub Start()
 Dim Msg, Num
 Super::Start()
 ' Generate a number
 Num = 255 * Rnd + 1
 Msg = Num & " in decimal notation is &H"
 + & Hex$(Num) & " in hexadecimal notation."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Oct, Oct\$ functions  
Val function

---

## Hour function

Returns the hour of the day as an integer from 0 (midnight) to 23 (11:00 P.M.), inclusive, based on a specified date expression.

**Syntax** Hour(<date expression>)

**Parameters** <date expression>

Date expression, or any numeric or string expression that can be interpreted as a date, a time, or both a date and a time:

- Can be a string expression such as November 12, 1982 8:30 P.M., Nov. 12, 1982 08:30 PM, 11/12/82 8:30PM, 08:30pm, or any other string that can be interpreted as a date or both a date and a time in the valid range.
- Can be a date serial number such as 30267.854, which corresponds to November 12, 1982 at 8:30 P.M., or any other number that can be mapped to a date or both a date and a time in the valid range.
- For date serial numbers, the integer component to the left of the decimal represents the date itself while the fractional component to the right of the decimal represents the time of day on that date, where January 1, 1900, at precisely noon has the date serial number 2.5, and negative numbers represent dates prior to December 30, 1899 (0).

Default if no time specified: 0

Rules:

- If <date expression> includes a date, it must be a valid date, even though Hour does not return a date. A valid date is any date in the range January 1, 100 through December 31, 9999, inclusive, expressed in one of the standard date formats.
- If <date expression> includes a time, it must be in the range 00:00:00 (12:00:00 A.M.) through 23:59:59 (11:59:59 P.M.), in either 12- or 24-hour notation.
- If <date expression> is a numeric expression, it must be in the range -657,434 to +2,958,465, inclusive.
- If <date expression> is a variable containing a date serial number, the variable be explicitly declared as one of the numeric types.
- <date expression> is parsed according to the formatting rules of the current run-time locale.

**Examples** The following statements are equivalent. Each assigns 14 to the variable UserHour.

```
UserHour = Hour("6/7/64 2:35pm")
UserHour = Hour("14:35")
```



```
UserHour = Hour("June 7, 1964 2:35 PM")
UserHour = Hour("Jun 7, 1964") + 14
UserHour = Hour(23535.6076)
UserHour = Hour(0.6076)
```

**Returns** Integer

- If <date expression> cannot be evaluated to a date, Hour returns Null.

Example:

```
Hour("This is not a date.") returns Null
```

- If <date expression> fails to include all date components, such as day, month, and year, Hour returns Null.

Examples:

```
Hour("Nov 12, 1982 7:11 AM") returns 7, but
```

```
Hour("Nov 1982 7:11 AM") returns Null
```

- If <date expression> is Null, Hour returns Null.

The following assumes that the AC\_CENTURY\_BREAK property is set to the default value of 30. For information about using AC\_CENTURY\_BREAK, see *Accessing Data using e.Report Designer Professional*.

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000. For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).
- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

Note that a date can contain an abridged month, such as Nov. 12, 1982 as opposed to November 12, 1982.

**Tip** If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

**Example** The following example displays the number of hours, minutes, and seconds remaining until midnight:

```
Sub Start()
 Dim HrDiff As Integer, MinDiff As Integer, SecDiff As Integer
 Dim RightNow As Double, Midnight As Double
 Dim TotalDiff As Double, TotalMinDiff As Double
 Dim TotalSecDiff As Double, Msg As String
```

## Hour function

```
Super::Start()
Midnight = TimeValue("23:59:59")
' Get current time
RightNow = Now
' Get diffs from midnight
HrDiff = Hour(Midnight) - Hour(RightNow)
MinDiff = Minute(Midnight) - Minute(RightNow)
SecDiff = Second(Midnight) - Second(RightNow) + 1

' Restate seconds and minutes if necessary
If SecDiff = 60 Then
 ' Add 1 to minute
 MinDiff = MinDiff + 1
 ' And set 0 seconds
 SecDiff = 0
End If

If MinDiff = 60 Then
 ' Add 1 to hour
 HrDiff = HrDiff + 1
 ' And set 0 minutes
 MinDiff = 0
End If

' Now get totals
TotalMinDiff = (HrDiff * 60) + MinDiff
TotalSecDiff = (TotalMinDiff * 60) + SecDiff
TotalDiff = TimeSerial(HrDiff, MinDiff, SecDiff)

' Prepare msg for display
Msg = "There are a total of "
+ & Format(TotalSecDiff, "#,##0")
+ & " seconds until midnight. That translates to "
+ & HrDiff & " hours, "
+ & MinDiff & " minutes, and "
+ & SecDiff & " seconds. "
+ & "In standard time notation, it becomes "

' Remember not to use "mm" for minutes! m is for month.
Msg = Msg & Format(TotalDiff, "hh:nn:ss") & "."
ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Day function  
Minute function  
Month function  
Now function

Second function  
 Time, Time\$ functions  
 Weekday function  
 Year function

---

## If...Then...Else statement

Executes an instruction or block of instructions based on a condition or series of conditions.

### Syntax **Single-line If...Then...Else statement**

If <condition> Then <then-statement> Else <else-statement>

### **Block, multiple-line If...Then...Else statement**

If <condition> Then

    <then-statement>

[[Elseif <condition> Then

    <then-statement>]]

[Else

    <else-statement>]]]

End If

### Parameters **<condition>**

A numeric or string expression that can be evaluated and that determines whether to execute the associated <statements>. When <condition> evaluates to zero or Null, the condition is False. Otherwise, <condition> is True.

### **<then-statement>, <else-statement>**

One or more Actuate Basic expressions which can include nested If...Then...Else statements. The <then-statement> executes if the preceding <condition> is true. The <else-statement> executes if all previous <conditions> are False. Only one block of <statements> is executed in an If...Then...Else statement: the block of statements following the first <condition> found to be true, or, if no <condition> is found to be true, the <else-statement> block.

### **If**

Keyword that begins every If...Then...Else statement and precedes the first <condition> to be tested.

### **Then**

Keyword that separates <condition> from <then-statement> in an If...Then...Else statement. When <condition> evaluates to True, the <then-statement> is

## If...Then...Else statement

executed. When <condition> evaluates to False, the <then-statement> is ignored, and the program execution tests the next <condition> that it finds.

### Else

A keyword that tells the program what to do when all previous conditions are False.

### ElseIf

Keyword that begins an alternative <condition> to be evaluated when the previous <condition> is false. You can use multiple ElseIf clauses. (Tip: if you have several ElseIf clauses, consider using a Select Case statement instead.) Actuate Basic evaluates each ElseIf <condition> in turn, but only until the first true one is encountered. When an ElseIf <condition> evaluates to true, its <then-statements> are executed and control resumes after End If.

### End If

Keyword that signals the end of an If...Then...Else statement. A multi-line block If...Then...Else statement must be closed with End If. It is not required for a single-line If...Then...Else statement.

Rule: If, Else, ElseIf, and End If must be the first statement on a line. Else, ElseIf, and End If can be preceded by a line number or a line label.

**Tip** It is good programming practice to evaluate Boolean variables by using the keywords True or False instead of by inspecting their content for a nonzero (True) or zero (False) numeric value.

**Example** The following example generates a number between 1 and 10000. Then it returns the number of digits in the number.

```
Sub Start()
 Dim UserNum As Integer, NumDigits As Integer
 Dim Msg As String, Unit As String
 Super::Start()
 UserNum = Int(10000 * Rnd + 1)
 If UserNum < 10 Then
 ' 1 digit
 NumDigits = 1
 ElseIf UserNum < 100 Then
 ' 2 digits
 NumDigits = 2
 ElseIf UserNum < 1000 Then
 ' 3 digits
 NumDigits = 3
 ElseIf UserNum < 10000 Then
 ' 4 digits
 NumDigits = 4
 Else
```

```

' Prepare msg if none of our conditions was met
Msg = "Sorry, the number " & userNum & " is too high."
End If
' Prepare a msg for display if at least one condition was met
If UserNum < 10000 Then
 If NumDigits > 1 Then
 Unit = " digits."
 Else
 Unit = " digit."
 End If
 Msg = "The number " & userNum & " has " & NumDigits & Unit
End If
' Display message
ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** End statement  
Exit statement  
Select Case statement

---

## IIf function

Evaluates an expression and returns one of two supplied values; if the expression that is the first argument is true, IIf returns the second argument, if false, IIf returns the third.

All three arguments must be valid. That is, none can generate an error since all three are always evaluated whether <condition> is True or False.

**Syntax** IIf(<condition>, <value if true>, <value if false>)

**Parameters** **<condition>**  
Numeric or string expression to be evaluated.

**<value if true>**

Numeric or string expression that specifies the value or expression to return if <condition> is true.

**<value if false>**

Numeric or string expression that specifies the value or expression to return if <condition> is false.

**Example** The following statement assigns the double-precision value 112.335577 to the variable, ValidMsg, if the variable contains a value less than 5. It assigns the string

## Input statement

expression: Sorry, invalid response, if the value of UserAns is greater than or equal to 5.

```
ValidMsg = IIf(UserAns < 5, 112.335577,
+ "Sorry, invalid response")
```

**Returns** Same type as that of <value if true> or <value if false>, depending on which is returned.

**Example** The following example finds the day of the week and displays an appropriate message:

```
Sub Start()
 Dim TodaysDay As Integer, ValidMsg As String
 Super::Start()
 TodaysDay = Weekday(Now)
 ValidMsg =
+ IIf(TodaysDay = 1 Or TodaysDay = 7, "Weekend!", "Work day")
 ShowFactoryStatus(ValidMsg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** If...Then...Else statement  
Select Case statement

---

## Input statement

Reads data from a sequential file and assigns the data to variables.

**Syntax** Input #<open file number>, <variable list>

**Description** The Input statement places each data item in the file into one or more of the variables in <variable list>. Data items in the file must appear in the same order as the variables in <variable list> and each variable in <variable list> must be of the same data type as the target data item.

The Input statement reads each data item and assigns it to a corresponding variable according to its data type. Table 6-26 summarizes the behavior of Input.

**Table 6-26** Behavior of Input

| Variable in<br><variable list> | Behavior of Input                                                                                                                                                                                                                |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Numeric                        | Assumes first nonspace character it encounters to be the start of a number. Assumes the first space, comma, or end-of-line it encounters to be the end of a number. Inputs blank lines and data of an invalid data type as zero. |

**Table 6-26** Behavior of Input

| Variable in<br><variable list> | Behavior of Input                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| String                         | Assumes the first nonspace character it encounters to be the start of a character string. If that character is a double quote ("), it ignores the mark itself and inputs all the succeeding characters until it encounters the next double quote, including spaces and commas. If string data are not delimited by double quotes, it assumes the first line, space, or end-of-line character to be the end of the string. Inputs blank lines as zero-length strings. |

Table 6-27 summarizes how Input determines what Variant type to assign to Variants in <variable list>.

**Table 6-27** Types of input data and the corresponding Variant types

| Input data                                             | Variant type assigned                                                                                    |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| No data, but only a delimiting comma, or a blank line. | VarType 0 (Empty)                                                                                        |
| The literal Null.                                      | VarType 1 (Null)                                                                                         |
| Valid number.                                          | An appropriate numeric Variant (types 2 through 6)                                                       |
| Date literal. A date of the form yyyy-mm-dd hh:nn:ss). | VarType 7 (Date)<br>Tip: When either the date or time portion is present, the other portion is optional. |
| None of the above.                                     | VarType 8 (String)                                                                                       |

The following rules apply to Input:

- Input generates an error if it reaches the end of file while it is inputting a data item.
- Data items in a file should appear in the same order as the variables in <variable list> to which they correspond.

**Parameters**

**<open file number>**  
Numeric expression that is the file number assigned by Open statement when the target file was opened.

Rules for <open file number>:

- The number sign (#) preceding the file number is required.

- The file must be open.

**<variable list>**

Comma-delimited list of the variables that act as containers for values read from the file.

Rules for <variable list>:

- Cannot contain array variables, but can contain variables that reference an element of an array. For instance, MyArray() refers to an entire array and is therefore not allowed, but MyArray(23) refers to a specific element in the array and is therefore a valid variable.
- Cannot be an object variable, user-defined data type structure, handle to a class, or CPointer.

**Example** The following code fragment opens an existing file named Test.fil, assigns data from it to a variable called FileData, and constructs a message:

```
Open "Test.fil" For Input As #1
Do While Not EOF(1)
 Input #1, FileData
 ShowFactoryStatus(FileData)
Loop
Close #1
Kill "Test.fil"
```

- Tips**
- To prevent Input from encountering the end-of-file before it is finished processing data, use it within a loop that tests for the end-of-file condition. For more information, see EOF function.
  - Match data in the file with variables of the proper data type, that is:
    - Assign string data to string or Variant variables.
    - Assign numeric data to numeric or Variant variables.
    - Assign date data to date or Variant variables.
    - Assign uniquely Variant data—like Empty and Null values—only to Variant variables.

**Example** The following example creates a test file and reads nonnumeric values from the test file into a variable. The example overrides Start() to generate the test file. To use this example, paste the procedure MakeSomeData after the End Function of the Start() procedure or save it in an Actuate code module (.bas) file.

```
Sub Start()
 Dim FileData As String
 Super::Start()
 ' Create test file
 MakeSomeData
```



```

' Open to read test file
Open "Test.fil" For Input As #1
Do While Not EOF(1)
 ' Read a line of data
 Input #1, FileData
 ' Construct message
 ShowFactoryStatus(FileData)
Loop

' Close file
Close #1
' Delete test file
Kill "Test.fil"
End Sub

Sub MakeSomeData()
 ' Create the test file used in Start
 ' Open to write test file
 Open "Test.fil" For Output As #1
 ' Write sample data
 Write #1, "This is the first line of the file."
 Write #1, "This is the second line."
 ' Close test file
 Close #1
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Input, Input\$ functions  
Write statement

---

## Input, Input\$ functions

Returns a specified number of characters from a sequential file. The Input function can be used only with files opened in Input or Binary mode.

**Syntax** Input(<number of chars>,<file number>)  
Input\$(<number of chars>, <file number>)

**Parameters** **<number of chars>**  
Numeric expression for the number of characters to read from the file. <number of chars> must be between 1 and 2,147,483,647.

For example, the following code fragment opens a file in the current directory named Myfile.txt, reads 51 characters from that file into a variable called ReadChunk, then closes the file:

## Input, Input\$ functions

```
Open "Myfile.txt" For Input As #1
ReadChunk = Input$(51, #1)
Close #1
```

### <file number>

Integer that is the file number assigned by Open statement when the target file was opened. File <file number> must be open.

**Returns** Input: Variant  
Input\$: String

Returns all the characters it reads, including commas, carriage returns, linefeeds, quotation marks, and leading spaces.

**Example** The following example reads one character at a time from a file. When it encounters an ANSI character code 10 (linefeed), it displays the entire line of text in a message box for up to five lines.

```
Sub Start()
 Dim Collector, UsersFile, DisplayMe
 Dim LineCount As Integer
 Super::Start()
 ' Set file name
 UsersFile = "C:\Program Files\Actuate11\erDPro\AcUninst.txt"
 If Len(UsersFile) Then
 ' Open specified file
 Open UsersFile For Input As #1
 LineCount = 0
 ' read in to the end of file, or max of 5 lines
 ' whichever comes first.
 Do While Not EOF(1) And LineCount < 5
 ' Obtain 1 character
 Collector = Input$(1, 1)
 ' If not a linefeed, then collect it
 If Collector <> Chr(10) Then
 DisplayMe = DisplayMe & Collector
 ' If it is a linefeed, then display it
 Else
 ShowFactoryStatus(DisplayMe)
 ' Clear the line
 DisplayMe = ""
 LineCount = LineCount + 1
 End If
 ' Loop if not EOF
 Loop
 ' Close the file
 Close #1
 End If
End Sub
```

For information about using the code examples, see “Using the code examples” earlier in this chapter.

**See also** Input statement  
InputB, InputB\$ functions

---

## InputB, InputB\$ functions

Returns a specified number of bytes from a sequential file. This function can be used only with files opened in Input or Binary mode.

These functions are provided for backward compatibility with previous Actuate releases. Actuate uses UCS-2 as internal encoding, therefore passing strings consisting of characters from different code pages might produce unexpected results. For this reason, Actuate recommends you use the Input and Input\$ functions instead of the InputB and InputB\$ functions.

**Syntax** InputB(<number of bytes>,<file number>)  
InputB\$(<number of bytes>, <file number>)

**Parameters** **<number of bytes>**

Numeric expression for the number of bytes to read from the file. <number of bytes> must be between 1 and 2,147,483,647.

The following example opens a file in the current directory, Myfile.txt, reads 51 bytes from that file into a variable, ReadChunk, then closes the file:

```
Open "Myfile.txt" For Input As #1
ReadChunk = InputB$(51, #1)
Close #1
```

**<file number>**

Integer that is the file number assigned by Open statement when the target file was opened. File <file number> must be open.

**Returns** InputB: Variant  
InputB\$: String

Returns all the bytes read, including commas, carriage returns, linefeeds, quotation marks, and leading spaces.

**See also** Input statement  
Input, Input\$ functions

---

## InStr function

Returns the starting position of the occurrence of one string within another.

**Syntax    Syntax 1**

InStr(<string being searched>, <string to find>)

**Syntax 2**

InStr(<start>, <string being searched>, <string to find>)

**Parameters    <start>**

Position (number of characters) within <string being searched> at which to begin searching. The following rules apply for <start>:

- If you do not supply a <start> position, Actuate Basic begins searching at 1, the first character.
- Must be a number or numeric expression.
- Must be between 1 and 2,147,483,647, inclusive.

**<string being searched>**

String you are inspecting to locate <string to find>. <string being searched> must be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a variant that can evaluate to a string.

**<string to find>**

String you are seeking within <string being searched>. <string to find> must be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a variant that can evaluate to a string.

**Returns    Integer**

- If <string to find> is found within <string being searched>, InStr returns the position of the first character at which the match was found.
- If <string to find> is not found within <string being searched>, InStr returns 0.
- If <string to find> is zero-length, InStr returns the value of <start>.
- If <string being searched> is zero-length, InStr returns 0.
- If <start> is greater than <string being searched>, InStr returns 0.
- If any parameter evaluates to Null, InStr returns Null.

**Example**    The following example returns the position of a randomly generated character from within the alphabet:

```
Sub Start()
 Dim Alphabet As String, Position As Integer
 Dim Msg As String, Letter As String
 Super::Start()

 Alphabet = "ABCDEFGHIJKLMNOPQRSTUVWXYZ"
```

```

' Randomly generate a letter to find in the alphabet
Letter = Chr$(Int(26 * Rnd + 65))

' Determine where in the alphabet the letter is positioned
Position = InStr(Alphabet, Letter)
Msg = "The letter " & Letter & " is in position " & Position
+ & " in the alphabet."
ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Left, Left\$ functions  
 Len function  
 Mid, Mid\$ functions  
 Right, Right\$ functions

---

## InStrB function

Returns the starting byte of the occurrence of one string within another.

This function is provided for backward compatibility with previous Actuate releases. Actuate uses UCS-2 as internal encoding, therefore passing strings consisting of characters from different code pages might produce unexpected results. For this reason, Actuate recommends you use the InStr function instead of the InStrB function.

### Syntax **Syntax 1**

InStrB(<string being searched>, <string to find>)

### Syntax 2

InStrB(<start>, <string being searched>, <string to find>)

### Parameters **<start>**

Position (byte count) within <string being searched> at which to begin searching.

The following conditions apply to <start>:

- If you do not supply a <start> position, Actuate Basic begins searching at 1, the first byte.
- <start> must be a number or numeric expression.
- <start> must be between 1 and 2,147,483,647, inclusive.

**<string being searched>**

String you are inspecting to locate <string to find>. <string being searched> must be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a variant that can evaluate to a string.

**<string to find>**

String you are seeking within <string being searched>. <string being searched> must be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a variant that can evaluate to a string.

**Returns** Integer

- If <string to find> is found within <string being searched>, InStrB returns the position of the first byte at which the match was found.
- If <string to find> is not found within <string being searched>, InStrB returns 0.
- If <string to find> is zero-length, InStrB returns the value of <start>.
- If <string being searched> is zero-length, InStrB returns 0.
- If <start> is greater than <string being searched>, InStrB returns 0.

**See also** Format, Format\$ functions  
 LeftB, LeftB\$ functions  
 LenB function  
 MidB, MidB\$ functions

## Int function

Returns the largest integer that is less than or equal to a given numeric expression.

**Syntax** Int(<number to round>)

**Parameters** **<number to round>**

Numeric expression from which the fractional part is removed so that an integer value is returned.

**Returns** ■ If <number to round> is a Variant of type 8 (String) that can convert to a number, Int returns Variant of type 5 (Double). If <number to round> is a String, it is parsed according to the formatting rules of the current run-time locale. For example:

```
Fix("123,456") returns 123.456 on a French locale
Fix ("123,456") returns 123456.00 on an English locale
```

- If <number to round> is not a Variant of type 8 (String) that can convert to a number, Int returns the same data type as <number to round>.
- If <number to round> is Null, Int returns Null.

- Int and Fix are similar but not identical. For negative values, Int returns the first negative integer less than or equal to <number to round> while Fix returns the first negative integer greater than or equal to <number to round>. CInt is also similar to Int and Fix. Table 6-28 shows the differences between Int, Fix, and CInt using sample values as arguments.

**Table 6-28** Examples of differences between Int, Fix, and CInt

| Value | Int(Value) | Fix(Value) | CInt(Value) |
|-------|------------|------------|-------------|
| 3.7   | 3          | 3          | 4           |
| 3.2   | 3          | 3          | 3           |
| 3     | 3          | 3          | 3           |
| -3    | -3         | -3         | -3          |
| -3.2  | -4         | -3         | -3          |
| -3.7  | -4         | -3         | -4          |

**Tip** Fix is equivalent to  $\text{Sgn}(\text{<number to round>}) * \text{Int}(\text{Abs}(\text{<number to round>}))$ .

**Example** The following example prompts the user for a number and displays the values that Int, Fix, and CInt return:

```
Sub Start()
 Dim Num As Double, Msg As String

 Super::Start()
 ' Get a random number between 1 and 256
 Num = 255 * Rnd + 1
 Msg = "Int(" & Num & ") = " & Int(Num)
 ShowFactoryStatus(Msg)
 Msg = "Fix(" & Num & ") = " & Fix(Num)
 ShowFactoryStatus(Msg)
 Msg = "CInt(" & Num & ") = " & CInt(Num)
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** CInt function  
 Format, Format\$ functions  
 RightB, RightB\$ functions

## IPmt function

Returns the interest payment for a given period of an annuity, based on periodic, constant payments, and on an unvarying interest rate.

**Syntax** IPmt(<rate per period>,<single period>, <number pay periods>, <present value>, <future value>, <when due>)

The following conditions apply to IPmt parameters:

- <rate per period> and <number pay periods> must be expressed in terms of the same units (weekly/weeks, monthly/months, yearly/years).
- You must express cash paid out, such as deposits to savings, using negative numbers, and cash received, such as dividend checks, using positive numbers.

**Parameters** **<rate per period>**

Numeric expression that specifies the interest rate that accrues per period. <rate per period> must be given in the same units of measure as <number pay periods>. For instance, if <number pay periods> is expressed in months, then <rate per period> must be expressed as a monthly rate.

**<single period>**

Numeric expression that specifies the particular period for which you want to determine how much of the payment for that period represents interest. <single period> must be in the range 1 through <number pay periods>.

**<number pay periods>**

Numeric expression that specifies the total number of payment periods in the annuity. <number pay periods> must be given in the same units of measure as <rate per period>. For instance, if <rate per period> is expressed as a monthly rate, then <number pay periods> must be expressed in months.

**<present value>**

Numeric expression that specifies the value today of a future payment or stream of payments.

For example, if you put \$23.94 in the bank today and leave it there for 15 years at an interest rate of 10% compounded annually, you end up with about \$100. In this case, the present value of \$100 is approximately \$23.94.

**<future value>**

Numeric expression that specifies the cash balance you want after you have made your final payment.

**Examples**

- You set up a savings plan with a goal of having \$75,000 in 18 years to pay for your child's education. For this plan, the future value is \$75,000.
- You take out a loan for \$11,000. The future value is \$0.00, as it is for any typical loan.



**<when due>**

Numeric expression that specifies whether each payment is made at the beginning (1) or at the end (0) of each period. The default is 0, end of period. <when due> must be 0 or 1.

The following example assumes you are making monthly payments the first of each month on a loan of \$20,000, over 36 months, at an APR of 11.5%. How much of your 5th payment represents interest? The answer, \$171.83, is assigned to Interest5.

```
Interest5 = IPmt(.115/12, 5, 36, -20000, 0, 1)
```

**Returns** Double

An annuity is a series of cash payments, constant in value, made over a period of time. An annuity can be an investment, such as a monthly savings plan, or a loan, such as a home mortgage. Each payment consists of two components, principal and interest. IPmt returns the interest component of the payment.

**Example** The following example prompts the user for various particulars about a loan. It then returns the total amount of interest that will be paid on the loan.

To use this example, paste the first portion at or near the beginning of your Actuate Basic source code (.bas) file.

```
Declare
 Global Const ENDPERIOD = 0
 Global Const BEGINPERIOD = 1
End Declare

Sub Start()
 Dim FutVal As Double, PresVal As Double
 Dim APR As Double, TotPmts As Integer
 Dim PayWhen As Integer, Period As Integer, IntPmt As Double
 Dim SumInt As Double, Fmt As String, Payment As Double
 Dim Msg as String
 Super::Start()
 ' Specify money format
 Fmt = "$###,###,##0.00"
 ' Normally 0 for a loan
 FutVal = 0
 ' Amount to borrow
 PresVal = 300000
 ' The annual percentage rate (APR) for your loan
 APR = 0.0625
 ' The number of monthly payments to make
 TotPmts = 240
 ' Assume payment at month end
 PayWhen = ENDPERIOD
```

## IRR function

```
' Do the computational work
For Period = 1 To TotPmts
 IntPmt = IPmt(APR / 12, Period, TotPmts, -PresVal,
+ FutVal, PayWhen)
 SumInt = SumInt + IntPmt
Next Period

' Set up display for the user
Msg = "You will pay a cumulative total of "
+ & Format(SumInt, Fmt) & " in interest for this "
+ & "loan, which represents about "
+ & Format(SumInt / PresVal, "##.0%") & " of the "
+ & Format(PresVal, Fmt) & " you are borrowing."
ShowFactoryStatus(Msg)

Payment = Pmt(APR / 12, TotPmts, -PresVal, FutVal, PayWhen)
Msg = "Your payments will be " & Format(Payment, Fmt)
+ & " per month."
ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** FV function  
NPer function  
Pmt function  
PPmt function  
PV function  
Rate function

---

## IRR function

Returns the internal rate of return for a series of periodic cash flows, payments and receipts, in an existing array.

**Syntax** IRR(<casharray>(),<starting guess>)

The following conditions apply to IRR parameters:

- You must express cash paid out, such as deposits to savings, using negative numbers, and cash received, such as dividend checks, using positive numbers.
- <casharray>() must contain at least one negative and one positive number.
- In cases where you have both a positive cash flow (income) and a negative one (payment) for the same period, use the net flow for that period.

- If no cash flow or net cash flow occurs for a particular period, you must type 0 (zero) as the value for that period.

**Parameters** **<casharray>()**

Specifies the name of an existing array of Doubles representing cash flow values. The <casharray> array must contain at least one positive value (receipt) and one negative value (payment).

**<starting guess>**

Numeric expression. Specifies the value you estimate IRR will return. In most cases, this is 0.1 (10 percent).

The following example assumes you have filled the array MyArray() with a series of cash flow values. The internal rate of return is assigned to the variable IRRValue.

```
IRRValue = IRR(MyArray(), .1)
```

**Returns** Double

- The internal rate of return is the interest rate for an investment consisting of payments and receipts that occur at regular intervals. The cash flow for each period does not need to be constant, as it does for an annuity.
- IRR is closely related to the net present value function, NPV, because the rate of return calculated by IRR is the interest rate corresponding to a net present value of zero. IRR calculates by iteration. Starting with the value of <starting guess>, it repeats the calculation until the result is accurate to within 0.00001 percent. If it cannot determine a result after 20 iterations, the function fails.

- Tips**
- Because IRR uses the order of values within the array to interpret the order of payments and receipts, be sure to type your payment and receipt values in the correct sequence.
  - If IRR fails, try a different value for <starting guess>.

**Example** The following example returns the internal rate of return for a series of five cash flows contained in the array, CashValues(). The first array element is a negative cash flow that represents business start-up costs. The remaining four cash flows represent positive cash flows for the subsequent four years. The variable, Guess, holds the estimated internal rate of return. Option Base is assumed to be set to zero.

```
Sub Start()
 ' Set up the array
 Static CashValues(5) As Double
 Dim Guess As Double, Fmt As String
 Dim ReturnRate As Double, Msg As String
 Super::Start()
 ' Start guess at 10%
 Guess = .1
```

## IsDate function

```
' Define % format
Fmt = "#0.00"
' Business start-up costs
CashValues(0) = -80000
' Now type positive cash flows reflecting
' income for four successive years:
CashValues(1) = 23000: CashValues(2) = 27000
CashValues(3) = 31000: CashValues(4) = 35000
' Calculate internal rate
ReturnRate = IRR(CashValues, Guess) * 100
Msg = "The internal rate of return for the cash flows is: "
+ & Format(ReturnRate, Fmt) & " percent."
ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** MIRR function  
NPV function  
Option Base statement  
Rate function

---

## IsDate function

Determines whether the given argument can be converted to a date.

**Syntax** IsDate(<exprs>)

**Parameters** <exprs>

Variant expression to test to determine whether it is a date, can be evaluated as a date, or can be converted into a date.

The following conditions apply to <exprs>:

- The range of valid dates is January 1, 100, through December 31, 9999, inclusive.
- Numbers can be converted to a date.
- <exprs> is parsed according to the formatting rules of the current run-time locale.

**Returns** Integer

- Returns 1 (True) if <exprs> can be converted to a date. Otherwise, returns 0 (False).
- If <exprs> fails to include all date components, such as day, month, and year, IsDate returns False.

- Tips**
- To convert any number between -657,434 and 2,958,465 into a date, use CVDDate. For example, use CVDDate(34040.34) to return 3/12/93 7:55:12 A.M.
  - If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

**Examples** The following statements are equivalent. They all return True.

```
IsDate("11/12/82")
IsDate("November 12, 1982")
IsDate("Nov 12, 1982")
IsDate("N" & "ov " & "12, " & (1980 + 2))
IsDate(5)
IsDate(5.3)
```

The following example tests today's date and a number and, if possible, converts the number to a date:

```
Sub Start()
 Dim DateStr As String, Msg As String
 Dim Number As String
 Super::Start()
 Number = CStr(4000000 * Rnd)
 DateStr = CStr(Now)
 ' Test the string
 If IsDate(DateStr) Then
 Msg = "Today's date is: "
 Msg = Msg & Format(CVDDate(DateStr), "dddddd")
 ShowFactoryStatus(Msg)
 End If
 ' Test the number
 If IsDate(Number) Then
 Msg = "The number " & Number & " as a date is: " &
+ Format(CVDDate(Number), "dddddd")
 ShowFactoryStatus(Msg)
 Else
 If IsNumeric(Number) Then
 If Val(Number) >= -657434
+ And Val(Number) <= 2958465 Then
 Msg = "The number " & Number & " is not in "
+ & "date format. However, it will be "
+ & "interpreted as the date:"
+ & Format(CVDDate(Number), "dddddd")
 ShowFactoryStatus(Msg)
 End If
 End If
 End If
End Sub
```

## IsEmpty function

```
Else
 Msg = "Sorry, the number " & Number &
+ " cannot be converted to a date."
 ShowFactoryStatus(Msg)
End If
End if
End If
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** CVDate function  
IsEmpty function  
IsNull function  
IsNumeric function  
VarType function

---

## IsEmpty function

Reports whether the given variable has been initialized.

**Syntax** IsEmpty(<exprs>)

**Parameters** <exprs>  
Variant expression to test whether it has ever been assigned a value.

**Returns** Integer

- Returns 1 (True) if <exprs> contains the Empty value. Otherwise, returns 0 (False).
- Returns 0 (False) if <exprs> contains more than one Variant.

**Tip** Empty and Null are different. A variable can contain the Null value only if you explicitly assign Null to the variable.

**Example** The following example tests a variable to determine whether it has ever held a value. If not, it reports that the variable has not been initialized and asks the user whether to initialize it.

```
Sub Start()
 Dim MyVar, Msg As String
 Super::Start()
 'Test MyVar
 If IsEmpty(MyVar) Then
 ShowFactoryStatus("MyVar is uninitialized.")
```

```

 ' Initialize MyVar
 MyVar = 32.5
 ShowFactoryStatus("MyVar set to " & MyVar)
 ShowFactoryStatus("The value of IsEmpty(MyVar) is now:"
+ & IsEmpty(MyVar))
 Else
 ShowFactoryStatus("MyVar initialized to " & MyVar)
 End If
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    IsDate function  
               IsNull function  
               IsNumeric function  
               VarType function

---

## IsKindOf function

Determines if a specified object is an instance of a specified class.

**Syntax**    IsKindOf(<object>, <class>)

**Parameters**    <object>

The variable name that refers to the object about which you want information.

              <class>

The class to test for the membership of an instance of <object>.

**Returns**    Integer

- Returns 1 (True) if <object> is a member of <class>.
- Returns 0 (False) if <object> is not a member of <class>.

- Tips**
- Use IsKindOf to test if an object is an instance, or an instance of a subclass, of a specified class.
  - To find out an object’s class, use GetClassName.

**Example**    The following example tests if an object is either an instance of MyLabel or an instance of a subclass of MyLabel. If True, the example sets the object’s background color to red.

```

Sub Start()
 Dim MyLabel As AcLabelControl, Msg As String
 Super::Start()
 Set MyLabel = New AcLabelControl

```

## IsNull function

```
If IsKindOf(MyLabel, "AcLabelControl") Then
 Msg = "Yes, MyLabel is an AcLabelControl. "
+ & "We will now set its background color to red."
 ShowFactoryStatus(Msg)
 MyLabel.BackgroundColor = Red
End If
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    GetClassID function  
              GetClassName function

---

## IsNull function

Determines whether the given Variant or Variant expression contains the Null value.

**Syntax**    IsNull(<exprs>)

**Parameters**    <exprs>

Variant expression to test. Any expression that contains a Null is itself Null and therefore False. That is why both the following expressions evaluate to False, no matter what value MyVar contains:

```
If MyVar = Null
If MyVar <> Null
```

For example, assuming you have assigned the Null value to MyVar, the following statements are equivalent. Each returns 1 (True).

```
IsNull(MyVar)
IsNull(MyVar = Null)
IsNull(MyVar <> Null)
IsNull(MyVar + 5000)
```

**Returns**    Integer

- Returns 1 (True) if <exprs> contains the Null value. Otherwise, returns 0 (False).
- The only way to determine whether a variable contains Null is to use IsNull.

**Tip**    Empty and Null are different. If a variable contains the Empty value, it means it has never yet been assigned any value. A variable can contain the Null value only if you have explicitly assigned Null to it.

**Example**    The following example tests MyVar to determine whether it contains the Null value. The variable MyVar is first initialized to Null but the first time though the



loop it is changed to a zero-length string. The second time through the loop, MyVar is again set to Null and the loop exits.

```
Sub Start()
 Dim MyVar
 Super::Start()
 ' Initialize variable as Null
 MyVar = Null
 Do
 ' Evaluate variable
 If IsNull(MyVar) Then
 ' Report if Null
 ShowFactoryStatus("MyVar is Null.")
 ' Assign zero-length string
 MyVar = ""
 Else
 ' Report if not Null
 ShowFactoryStatus("MyVar is not Null.")
 ' Assign Null to variable
 MyVar = Null
 End If
 ' Loop until MyVar is Null
 Loop Until IsNull(MyVar)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    IsDate function  
               IsEmpty function  
               IsNumeric function  
               VarType function

---

## IsNumeric function

Tests if the type of a variable is or can be converted to Integer, Long, Single, Double, or Currency.

**Syntax**    IsNumeric(<exprs>)

**Parameters**    <exprs>

Variant expression to test to determine if it is, can be evaluated as, or can be converted to a numeric data type. For example, the following are equivalent. Each returns True.

```
IsNumeric("34040")
IsNumeric(34040)
IsNumeric(Val("343Haydn"))
```

## IsPersistent function

If <exprs> is a String, it is parsed according to the formatting rules of the current run-time locale.

**Returns** Integer

- Returns 1 (True) if <exprs> can be converted to a number. Otherwise, returns 0 (False).
- Returns 1 (True) if <exprs> is Empty.

**Tip** To extract a numeric value from a string that starts with numbers but also contains non-numeric characters, use Val.

**Example** The following example inspects each of four elements in an array of mixed types and reports whether or not the content of the variable is numeric:

```
Sub Start()
 Dim UserVar(4), Msg, Slot As Integer
 Super::Start()
 UserVar(1) = 12
 UserVar(2) = "twelve"
 UserVar(3) = "123four"
 UserVar(4) = Val("123four")
 For Slot = 1 to 4
 If IsNumeric(UserVar(Slot)) Then
 Msg = UserVar(Slot) & " is Numeric."
 Else
 Msg = UserVar(Slot) & " is not Numeric."
 End If
 ShowFactoryStatus(Msg)
 Next Slot
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** IsDate function  
IsEmpty function  
IsNull function  
Val function  
VarType function

---

## IsPersistent function

Reports if an instance of an object is persistent or transient.

**Syntax** IsPersistent(<object>)

**Parameters** **<object>**  
The variable name that refers to the object about which you want information.

**Returns** Integer

- Returns 1 (True) if <object> is persistent.
- Returns 0 (False) if <object> is transient.

**Example** The following example determines if specific objects are either transient or persistent:

```
Sub Start()
 Dim myObj As AcLabelControl, Msg As String
 Super::Start()
 ' Instance instantiation
 Set myObj = NewInstance("AcLabelControl")
 ' Determine persistent or transient nature of objects
 If (IsPersistent(me)) Then
 Msg = "The current object is persistent. "
 Else
 Msg = "The current object is transient. "
 End If
 if (IsPersistent(myObj)) Then
 Msg = Msg & "myObj is persistent."
 Else
 Msg = Msg & "myObj is transient."
 End If
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** NewInstance function  
NewPersistentInstance function

---

## IsSearchFormatSupported function

Determines whether the specified search format is supported or not.

**Syntax** IsSearchFormatSupported(<format> As String) As Boolean

**Parameters** <format>

The format for which to determine support. The supported formats depend on the formats available in a particular environment. For example, the following search formats might be supported:

- XMLDisplay (DISPLAY)
- Download formats:
  - CSV

## IsViewPageFormatSupported function

- TSV
- ANALYSIS

**Returns** True if the format is supported.  
False if the format is not supported.

**Example** The following example determines whether the ANALYSIS format is supported:

```
Function CreateSearchURL(format As String) As String
 Dim URL As String
 Dim format As String
 Dim searchCriteria As String

 SearchCriteria = "..."
 format = "ANALYSIS"
 If Not IsSearchFormatSupported(format) Then
 format = "CSV"
 End If
 URL = "http://" + format + " + format + searchCriteria
 CreateSearchURL = URL
End Function
```

**See also** GetSearchFormats function

---

## IsViewPageFormatSupported function

Determines whether the specified view format is supported.

**Syntax** IsViewPageFormatSupported(<format> As String) As Boolean

**Parameters** **<format>**  
The DHTML viewing format for which to determine support. The supported formats depend on the formats available in a particular environment. For example, the following viewing formats might be supported:

- XMLDisplay (DISPLAY)
- DHTML
- PDF

**Returns** True if the format is supported.  
False if the format is not supported.

**Example** The following example determines whether the PDF format is supported:

```
Function CreateSearchURL(format As String) As String
 Dim URL As String
 Dim format As String
```

```

Dim searchCriteria As String

SearchCriteria = "...
format = "PDF"
If Not IsViewPageFormatSupported(format) Then
 format = "DHTML"
End If
URL = "http://" format=" + format + searchCriteria
CreateSearchURL = URL
End Function

```

**See also**    GetViewPageFormats function

---

## Kill statement

Deletes a specified file or files from a disk.

**Syntax**    Kill <file spec>

**Description**    Kill is similar to the operating system commands ERASE and DEL.

**Parameters**    **<file spec>**  
String expression that specifies the name or names of the file or files to be deleted. Wildcard characters can be used. Can include optional drive and path information. The default path is the current default drive and directory.

The following rules apply to <file spec>:

- Indicated file or files must exist.
- Path, if specified, must exist.
- Indicated file must not currently be open by Actuate Basic.

<file spec> may optionally specify full path information, in which case it has the following syntax:

[<drive:>] [ \ ]<directory>[\<directory>]...<file spec> (Windows)

[/]<directory>[/<directory>]...<file spec> (UNIX)

**<drive:>**

Character, followed by a colon, that specifies the drive where <file spec> is located (Windows only).

**<directory>**

String expression that specifies the name of a directory or subdirectory where <file spec> is located.

For example, the following statement deletes all files in the Windows directory C:\Discard that have an extension of .doc:

```
Kill "C:\Discard*.doc"
```

- Tips**
- Be careful in how you use Kill, especially if you include wildcard characters in <file spec>. It is easy to delete files unintentionally, and Kill is irreversible.
  - To delete directories, use Rmdir.

**Example** The following example copies a file from the Actuate install directory to the root directory on the C: drive, and then deletes it. If the example cannot perform the operation, it issues an error message.

```
Sub Start()
 Dim SourceFile As String, DestFile As String, Msg As String
 Super::Start()
 ' Set up error handler
 On Error GoTo Errhandler55
 ' Copy file from installation to be deleted
 SourceFile = "C:\Program Files\Actuate11\readme.rtf"
 DestFile = "C:\actuatekill_readme.rtf"
 FileCopy SourceFile, DestFile
 Msg = "File C:\actuatekill_readme.rtf is now on your system."
 ShowFactoryStatus(Msg)
 ' Delete the file
 Kill DestFile
 Msg = "File C:\actuatekill_readme.rtf has been deleted."
 ShowFactoryStatus(Msg)
 Exit Sub
Errhandler55:
 Msg = "Error number " & Err & " occurred. " & Error$(Err)
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Name statement

---

## LBound function

Returns the smallest available subscript for the given dimension of an array.

**Syntax** LBound(<array name>[,<dimension>])

**Parameters** **<array name>**  
Name of an array variable.

**<dimension>**  
Numeric expression that specifies the array dimension for which you want to determine the lower bound.

The following rules apply to <dimension>:

- If you do not supply a <dimension>, Actuate Basic defaults to 1.
- Use 1 for the first dimension, 2 for the second, and so on.
- Must not be larger than the total number of dimensions in <array name>.
- Must not be zero, negative, or Null.

Table 6-29 shows the values LBound returns for an array with the following dimensions:

```
Dim MyArray(1 To 55, 0 To 27, -3 To 42)
```

**Table 6-29** Examples of LBound return values for an array

| Statement          | Returned value |
|--------------------|----------------|
| LBound(MyArray, 1) | 1              |
| LBound(MyArray, 2) | 0              |
| LBound(MyArray, 3) | -3             |

**Returns** Integer

If <dimension> is not an Integer, LBound rounds <dimension> to the nearest Integer before evaluating it.

- Tips**
- To determine the upper bound of an array, use UBound.
  - To determine the total number of elements in a given dynamic array dimension, take the value returned from UBound, subtract the value returned from LBound, and then add 1.

**Example** The following example determines the lower bounds of an array of 3 dimensions. The use of Rnd simulates changes in lower bounds that the user can make at run time.

```
Sub Start()
 Dim First As Integer, Sec As Integer, Third As Integer
 Dim Msg As String
 ' Declare array
 Dim MyArray()
 Super::Start()
 ' Generate random dimensions between 3 and 16 for array size.
 ' First, second, and third dimension
 First = Int(14 * Rnd + 3)
 Sec = Int(14 * Rnd + 3)
 Third = Int(14 * Rnd + 3)
```

## LCase, LCase\$ functions

```
' Set dimensions
ReDim MyArray(First To 30, Sec To 30 , Third To 30)
Msg = "MyArray has the following lower bounds: "
+ & Tab & "Dimension 1 -> " & LBound(MyArray, 1)
+ & Tab & "Dimension 2 -> " & LBound(MyArray, 2)
+ & Tab & "Dimension 3 -> " & LBound(MyArray, 3)
ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Dim statement  
UBound function

---

## LCase, LCase\$ functions

Converts all uppercase alphabetic characters in a string to lowercase.

**Syntax** LCase(<string exprs>)

LCase\$(<string exprs>)

**Parameters** <string exprs>

String expression to convert to lowercase characters.

For example, the following statements are equivalent. Each returns 6 jane street, 2nd fl.

```
LCase$("6 JANE STREET, 2ND FL")
LCase$("6 Jane Street, 2nd Fl")
LCase$("6 jAn" & "E sTreeT, 2nD fL")
```

**Returns** LCase: Variant

LCase\$: String

- If <string exprs> contains no uppercase alphabetic characters, LCase[\$] returns <string exprs> unchanged.
- LCase[\$] has no effect on non-alphabetic characters in <string exprs>.
- If <string exprs> evaluates to Null, LCase[\$] returns Null.

- Tips**
- To ensure uniformity in the data you get from the user so that, for example, name strings like MacManus, Macmanus, or macMaNus are always treated in the same way, first convert strings using LCase[\$] or UCase[\$].
  - To convert alphabetic characters in <string exprs> to uppercase, use UCase[\$].

**Example** The following example renders the alphabet in lowercase:



```

Sub Start()
 Dim LowerCase As String, UpperCase As String, Msg As String
 Super::Start()
 UpperCase = "ABCDEFGHIJKLMNOPQRSTUVWXYZ"
 ' Convert to lowercase
 LowerCase = LCase$(UpperCase)
 Msg = "LCase$ converts "" & UpperCase & "" to ""
+ & LowerCase & ""."
 ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** UCase, UCase\$ functions

---

## Left, Left\$ functions

Returns a segment of a Variant or String, starting at the first character.

**Syntax** Left(<string exprs>, <length>)

Left\$(<string exprs>, <length>)

**Parameters** <string exprs>

Source string from which you are copying the first portion. Can be a variable string, a literal string, a string constant, the return value of any function that returns a String, or a Variant that can evaluate to a String.

<length>

Numeric expression that specifies how many characters to copy from the left of <string exprs>. <length> must be an Integer or expression of type Long, and must be between 0 and 2,147,483,647.

The following statements are equivalent. Both return Widget:

```

Left$("Widget", 6)
Left$("Widget", 99)

```

**Returns** Left: Variant  
Left\$: String

- If <length> = 0, returns a zero-length string.
- If <length> is greater than or equal to the length of <string exprs>, returns an exact copy of <string exprs>.
- If any parameter evaluates to Null, Left[\$] returns Null.

- Tips**
- Use Len to find the number of characters in <string exprs>.
  - Use InStr to find the position of a specified character in <string exprs>.

**Example** The following example parses a string for a customer's first and last names:

```
Sub Start()
 Dim FName As String, Msg As String, LName As String
 Dim SpacePos As Integer, Customer As String
 Super::Start()
 Customer = "Manuel Barajas"
 ' Find the space
 SpacePos = InStr(1, Customer, " ")
 If SpacePos Then
 ' Get first and last name
 FName = Left$(Customer, SpacePos - 1)
 LName = Right$(Customer, Len(Customer) - SpacePos)
 Msg = "The first name is "" & FName & "." & """"
+ & " The last name is """"
+ & LName & "." & """"
 Else
 Msg = Customer & " does not have a first and last name!"
 End If
 ' Display the message
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Format, Format\$ functions  
Len function  
Mid, Mid\$ functions  
Right, Right\$ functions

---

## LeftB, LeftB\$ functions

Returns a segment of a Variant or String, starting at the first byte.

These functions are provided for backward compatibility with previous Actuate releases. Actuate uses UCS-2 as internal encoding, therefore passing strings consisting of characters from different code pages might produce unexpected results. For this reason, Actuate recommends you use the Left and Left\$ functions instead of the LeftB and LeftB\$ functions.

**Syntax** Left(<string exprs>, <length>)  
Left\$(<string exprs>, <length>)

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Parameters</b> | <p><b>&lt;string exprs&gt;</b><br/>Source string. Can be a variable string, a literal string, a string constant, the return value of any function that returns a String, or a Variant that can evaluate to a String.</p> <p><b>&lt;length&gt;</b><br/>Numeric expression that specifies how many bytes to copy from the left of &lt;string exprs&gt;. &lt;length&gt; must be an Integer or expression of type Long, and must be between 0 and 2,147,483,647.</p> <p>Example:<br/>The following statements are equivalent. Both return Widget.</p> <pre>LeftB\$( "Widget" , 6) LeftB\$( "Widget" , 99)</pre>                |
| <b>Returns</b>    | <p>LeftB: Variant<br/>LeftB\$: String</p> <ul style="list-style-type: none"> <li>■ If &lt;length&gt; = 0, the function returns zero-length string.</li> <li>■ If &lt;length&gt; is greater than or equal to the length of &lt;string exprs&gt;, the function returns an exact copy of &lt;string exprs&gt;.</li> <li>■ If any parameter evaluates to Null, LeftB[\$] returns Null.</li> </ul> <p><b>Tips</b></p> <ul style="list-style-type: none"> <li>■ Use LenB to find the number of bytes in &lt;string exprs&gt;.</li> <li>■ Use InStrB to find the position of a specified byte in &lt;string exprs&gt;.</li> </ul> |
| <b>See also</b>   | <p>InStrB function<br/>Left, Left\$ functions<br/>LenB function<br/>MidB, MidB\$ functions<br/>RightB, RightB\$ functions</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

---

## Len function

Returns the number of characters in a string expression.

**Syntax** Len(<string exprs>)  
Len(<variable name>)

**Parameters** **<string exprs>**  
String expression to test for character length.

**<variable name>**  
Variable to test for character length.

The following example returns 11:

## LenB function

```
Len("Smith, John")
```

The following example, which tests MyVar, a 4-byte Integer, returns 4:

```
Len(MyVar)
```

**Returns** Integer

- Regardless of its value, if <variable name> is of any numeric data type except Variant, Len returns the number of characters required to store any variable of that data type.
- Regardless of its Variant type, if <variable name> is a Variant, Len returns the number of characters required to store it as a String.
- If <string exprs> or <variable name> is Null, Len returns Null.

**Tip** Use Len to determine record size when you perform file input/output with random-access files using user-defined variable types. Actuate Basic does not notice a type mismatch if you dimension a variable, such as UserInput, as a String, and then later test it as an Integer, such as if UserInput = 0.

**Example** The following example returns the length of a name:

```
Sub Start()
 Dim AName As String, Msg as String
 Super::Start()
 AName = "Wang Xiaokun"
 Msg = "The name " & AName & " is " & Len(AName)
+ & " characters long, including the space(s)."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** LenB function  
Type...End Type statement  
VarType function

---

## LenB function

Returns the number of bytes in a string expression.

This function is provided for backward compatibility with previous Actuate releases. Actuate uses UCS-2 as internal encoding, therefore passing strings consisting of characters from different code pages might produce unexpected results. For this reason, Actuate recommends you use the Len function instead of the LenB function.

**Syntax** LenB(<string exprs>)

LenB(<variable name>)

**Parameters**    **<string exprs>**  
String expression to test for byte length.

**<variable name>**  
Variable to test for byte length.

**Returns**    Integer

- Regardless of its value, if <variable name> is of any numeric data type except Variant, LenB returns the number of bytes required to store any variable of any value that is of the same data type.
- Regardless of its Variant type, if <variable name> is Variant, LenB returns the number of bytes required to store it as a String.
- If <string exprs> or <variable name> is Null, LenB returns Null.

**Tip**    To determine record size when performing file input/output with random-access files using user-defined variable types, use LenB.

**See also**    Len function  
Type...End Type statement  
VarType function

---

# Let statement

Assigns a value to a variable.

**Syntax**    [Let] <variable> = <exprs>

**Description**    In some older versions of Basic, the Let keyword is required to begin a statement that assigns a value to a variable. In Actuate Basic, the use of Let is optional. The following conditions apply to the Let statement:

- If <variable> is a user-defined type declared with Type, <exprs> must be of the same user-defined type.
- The data types of <variable> and <exprs> must be compatible.
- In addition to the data type compatibilities listed in Table 6-30, you can assign Null to numeric, String, Variant, or CPointer variables.

**Table 6-30**    Compatibility of data types for <variable> and <exprs>

| Data type of <variable> | Valid data types for <exprs>                                                  |
|-------------------------|-------------------------------------------------------------------------------|
| Numeric                 | Numeric<br>Variant that converts to a numeric data type<br><i>(continues)</i> |

**Table 6-30** Compatibility of data types for <variable> and <exprs> (continued)

| Data type of <variable> | Valid data types for <exprs> |
|-------------------------|------------------------------|
| String                  | String<br>Non-Null Variant   |
| Variant                 | String<br>Numeric Variant    |
| CPointer                | CPointer                     |

**Parameters** **<variable>**  
The name of any variable to store <exprs>.

**<exprs>**  
String or numeric expression to assign to <variable>.

The following rules apply to <exprs>:

- If <exprs> is Variant, and <variable> is numeric, Actuate Basic converts <exprs> to a number, if possible, before assigning it to <variable>.
- If <exprs> is numeric, its value must fall into the range of the data type of <variable>.

For example, the following statements are equivalent:

```
Let N = 50
N = 50
```

The following example generates an error, because 2,147,483,647 is the upper limit of the range of the Integer data type variable to which it is being assigned:

```
N% = 2147483648
```

- Tips**
- Use IsNumeric to determine if a Variant variable converts to numeric.
  - To make assignments between variables of different user-defined types that have been defined by Type...End Type, use LSet or the = operator. Using the = operator to assign an <exprs> of one data type to a <variable> of a different type converts the value of <exprs> into the data type of <variable>.

**Example** The following example uses Let to assign a value to Pi:

```
Sub Start()
 Dim Msg As String, Pi As Double
 Super::Start()
 ' Assign a value to Pi with the Let statement
 Let Pi = 4 * Atn(1)
 ' Assign a value to Msg without Let statement
```

```

Msg = "The area of a circle of radius 3 inches is "
+ & (Pi * (3^2)) & " inches."
ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Const statement  
IsNumeric function  
LSet statement

---

## Line Input statement

Reads from a sequential file until it reaches a carriage-return-linefeed (CRLF) pair or the end of the file (EOF), and assigns the information to a variable.

**Syntax** Line Input #<file number>, <receiving variable>

**Description** Line Input reads data from a sequential file one line at a time.

Unlike Input, Line Input treats commas, spaces, and quotes no differently than it does any other characters. It is useful for reading plain ASCII files. Line Input stops reading into <receiving variable> when it encounters a carriage-return-linefeed character-pair (CRLF). It skips the carriage-return-linefeed character-pair itself and—assuming it is called again—continues reading from the first character after the CRLF until it reaches another CRLF or the end of the file (EOF).

**Parameters** **<file number>**  
Numeric expression that is the file number assigned to the target file when it was opened in the Input mode.

**<receiving variable>**  
String or variant expression to which Line Input assigns the data it reads from the target file.

The following example reads one line of data from Notes.txt into the variable A\$:

```

Open "Notes.txt" For Input As #2
Line Input #2, A$

```

The following example reads the first line of Poem.txt into the variable A\$, the second line into B\$, and the third into C\$:

```

Open "Poem.txt" For Input As #1
Line Input #1, A$
Line Input #1, B$
Line Input #1, C$

```

**Rules** ■ <file number> must match the number of a currently open file.

## ListToArray function

- The number sign (#) preceding <file number> is required.
- The file corresponding to <file number> must be open under the Input mode.
- You must have write access to the open file. That is, the file must not have been opened using a Lock Read or Lock Read Write clause.

**Example** The following example creates a test file, reads three lines from it, then deletes the test file:

```
Sub Start()
 Dim strEachLine(3) as String
 Dim I As Integer
 Super::Start ()
 Open "LineInputNum.txt" For Output As #1
 For I = 1 to 3
 Print #1, "This is line number " & I & " in the test file"
 Next I
 Reset
 Open "LineInputNum.txt" For Input As #1
 For I = 1 to 3
 Line Input #1, strEachLine(I)
 ShowFactoryStatus(strEachLine(I))
 Next I
 Reset
 ShowFactoryStatus("Deleting test file.")
 Kill "LineInputNum.txt"
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Input statement  
Open statement  
Print statement

---

## ListToArray function

Converts a list of values into an array.

**Syntax** ListToArray(<list>, <array>)  
ListToArray(<list>, <array>, <separator>)

**Description** Use ListToArray to convert string lists with list elements delimited by separator characters into arrays.

**Parameters** <list>  
String expression specifying the list to convert to an array.



**<array>**

Dynamic string array to populate with the elements of the list. This array is resized to exactly the number of elements found in the list. The base of the array is 1.

**<separator>**

Optional string expression specifying a single character used to delimit the elements in the list. If omitted or the value is an empty string or Null, a comma is used as the separator character. If the value is more than one character, only the first character is used.

- Returns**
- Integer. The number of elements in the list and hence the number of elements in the array.
  - If the list is an empty string, ListToArray returns 1 and the array contains a single empty element.
  - If the list is Null, ListToArray returns 0 and the array is reset to contain no elements.

**Tip** String lists are frequently found in external data, such as parameters and database columns. Use arrays as a more convenient format for calculations.

**Example** The following example declares a dynamic array and converts a list into an array:

```
Sub Start()
 Dim list As String
 Super::Start ()
 List = "A|B|C"
 ' Declare a dynamic array.
 Dim array() As String
 Dim numberOfElements As Integer
 numberOfElements = ListToArray(list, array, "|")
 Dim i As Integer
 For i = 1 To numberOfElements
 ShowFactoryStatus("Element " & I & " = " & array(i))
 Next i
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

---

## Loc function

Returns the current position in an open file.

**Syntax** Loc(<file number>)

## Loc function

**Parameters** <file number>

Numeric expression that is the file number used to open the file with Open statement.

Rule: File must be open.

**Returns** Integer

- For Sequential files: Returns the current byte position in the file divided by 128.
- For Random files: Returns the number of the last variable read from or written to the file.
- For Binary mode files: Returns the position of the last byte read or written.

**Tip** You can open sequential files with a buffer of a different size if you use the Len parameter in Open. However, this does not change the result of Loc, which always divides by 128 when applied to sequential files.

**Example** The following example opens a test file, asks the user how much of it to read, then reports the current position in the file:

```
Sub Start()
 Dim CountVar As Integer, Msg As String
 Dim NowLoc As Integer, TempVar, MaxNum
 Super::Start()
 ' Open file for output
 Open "Testdata.fil" For Output As #1
 ' Generate rnd values
 For CountVar = 1 To 300
 ' Put data in file
 Print #1, CountVar
 Next CountVar
 ' Close test file
 Close #1
 ' Open file just created
 Open "Testdata.fil" For Input As #1
 MaxNum = CInt(299 * Rnd + 1)
 For CountVar = 1 To MaxNum
 ' Read some data from it
 Input #1, TempVar
 Next CountVar

 ' Find location in file
 NowLoc = Loc(1)
 ' Close file
 Close #1
 Msg = MaxNum & " data elements have been read from a file of"
+ & " 300. The current location in the Testdata.fil"
+ & " file is: " & NowLoc & ". "
```

```

+ & "The sample file will now be deleted."
 ShowFactoryStatus(Msg)
 ' Delete file from diskKill "Testdata.fil"
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** EOF function  
LOF function  
Open statement

---

## Lock...Unlock statement

Prohibits access by other users or processes to all or part of an open file.

**Syntax** Lock [#]<open file number> [, {<record> | [<start>] To <end>} ]  
[<data process statements>]

Unlock [#]<open file number> [, {<record> | [<start>] To <end>} ]

**Description** Lock restricts multiuser access to a specified area of a file. When you lock part of the file or the whole file, no other user on a network can access it until you Unlock the file or file segment.

Lock and Unlock apply only to files opened with Open by Actuate Basic. They do not apply to Access databases.

The following conditions apply to Lock...Unlock:

- The parameters for Lock and Unlock in a Lock...Unlock statement must match exactly.
- If you use Lock to restrict access to a file, you must Unlock the file before you close that file or terminate your program.
- You cannot use Lock...Unlock with versions of MS-DOS earlier than 3.1.
- If you do use MS-DOS, and Share.exe is not already loaded, you must exit Actuate Basic and run Share.exe under DOS to enable locking operations before you can use Lock...Unlock.

**Parameters** <open file number>  
Numeric expression that is the file number you used to open the target file. The following conditions apply to <open file number>:

- Must be the number of a currently open file.
- The number sign (#) before <open file number> is required.

## <record>

Numeric expression that specifies the number of the record or byte to lock. The following conditions apply to <record>:

- Must be between 1 and 2,147,483,647.
- Record length cannot exceed 65,535 bytes.

## <start>

Numeric expression that specifies the number of the first record or byte to lock. The default is 1.

## To

Keyword that separates <start> from <end> in the clause that specifies a range of records or bytes to lock.

## <end>

Numeric expression that specifies the number of the last record or byte to lock.

The terms <record>, or <start> and <end> specify different things according to the mode under which the target file was opened. Table 6-31 summarizes these differences.

**Table 6-31** Differences between using <record> and using <start> and <end>

| File mode                  | <record>, or <start> and <end> refer to                                                              |
|----------------------------|------------------------------------------------------------------------------------------------------|
| Binary                     | The number of a byte relative to the beginning of the open file. The first byte in a file is byte 1. |
| Random                     | The number of a record relative to the beginning of the open file. The first record is record 1.     |
| Sequential Input or Output | The entire file, no matter what range you specify with <start> To <end>.                             |

## <data process statements>

One or more valid Actuate Basic statements that direct the operations your program performs on the open file while others are temporarily locked out. In the following example, Lock restricts other users or processes from accessing any part at all of the file previously opened as #1. When processing of the file is done, Unlock lifts those restrictions.

```
Lock #1
 [<data process statements>]
Unlock #1
```

The following Lock...Unlock statement block prohibits and then permits others' access to a single record, the 112th in the random access file Maillist.dat:

```
Open "Maillist.dat" for Random As #1 Len = 32
Lock #1, 112
[<data process statements>]
Unlock #1, 112
```

The following Lock...Unlock statement block locks and then unlocks others' access to byte positions 11 through 25, inclusive, of the binary file Testfile.dat:

```
Open "Testfile.dat" For Binary As #1
Lock #1, 11 TO 25
[<data process statements>]
Unlock #1, 11 TO 25
```

The following Lock...Unlock statement block locks and then unlocks byte positions 1 through 229, inclusive, of the binary file Testfile.dat:

```
Open "Testfile.dat" For Binary As #1
Lock #1, TO 229
[<data process statements>]
Unlock #1, TO 229
```

- Tips**
- Use Lock...Unlock in networked environments, in which several users or processes might need access to the same file.
  - Use Lock...Unlock to ensure that two users simultaneously updating a database record do not accidentally save old data on top of new.

**Example** The following example creates a sample data file and accesses a single record, RecNum. RecNum is locked to other users while the record is being updated. Access is permitted again when the update is complete. The example overrides Start() and calls a sub procedure to create the sample data file. The data file is deleted at the conclusion of the Start function. To use this example, paste the Declare statement and the procedure MakeDataFile1216 into a Actuate Basic source code (.bas) library file.

```
Declare
 Type AcctRecord
 Payer As String
 Address As String
 City As String
 State As String
 Owe As Currency
 End Type
End Declare

Sub MakeDataFile1216()
 Dim CustRecord As AcctRecord
 Open "Testfile" For Random Shared As #1 Len = 150
 ' Put information in each field of the record
 CustRecord.Payer = "Emilio Enbilliam"
 CustRecord.Address = "6 Jane Street"
```

## Lock...Unlock statement

```
CustRecord.City = "New York"
CustRecord.State = "NY"
' Initialize amount owed
CustRecord.Owe = 12
' Put record in file
Put #1, 1, CustRecord.Payer & "," & CustRecord.Address & ","
+ & CustRecord.City & "," & CustRecord.State & "," &
 CustRecord.Owe
' Close the file
Close #1
End Sub

Sub Start()
 Dim CustRecord As AcctRecord, Change As String
 Dim DataRecord As Variant
 Dim Msg As String, RecNum As Integer
 Dim commaPos1, commaPos2 as Integer
 Super::Start()
 ' Set up error handler
 On Error GoTo ErrorHandler
 ' Create sample data file
 MakeDataFile1216
 Open "Testfile" For Random Shared As #1 Len = 150
 ' There is only one record, lock the current record
 RecNum = 1
 Lock #1, RecNum
 ' Read a record
 Get #1, RecNum, DataRecord
 commaPos1 = Instr(DataRecord, ",")
 CustRecord.Payer = Mid(DataRecord, 1, commaPos1-1)
 commaPos2 = Instr(commaPos1+1, DataRecord, ",")
 CustRecord.Address = Mid(DataRecord, commaPos1+1, commaPos2-
 commaPos1-1)
 commaPos1 = commaPos2 + 1
 commaPos2 = Instr(commaPos1, DataRecord, ",")
 CustRecord.City = Mid(DataRecord, commaPos1, commaPos2-commaPos1)
 commaPos1 = commaPos2 + 1
 commaPos2 = Instr(commaPos1, DataRecord, ",")
 CustRecord.State = Mid(DataRecord, commaPos1, commaPos2-
 commaPos1)
 CustRecord.Owe = Mid(DataRecord, RevInStr(DataRecord, ",")+1)
 Msg = "Customer " & CustRecord.Payer
+ & " previously owed: "
+ & Format(CustRecord.Owe, "$#,##0.00")
 ' Show data and the change
 Change = 1000 * Rnd - 500
 If Len(Change) = 0 Then Change = 0
 CustRecord.Owe = CustRecord.Owe + Change
```

```

' Update record
Put #1, RecNum, CustRecord.Payer & "," & CustRecord.Address
+ & "," & CustRecord.City & "," & CustRecord.State & "," &
CustRecord.Owe
' Unlock the record
Unlock #1, RecNum
Msg = Msg & " The change to the amount is "
+ & Format(Change, "$#,##0.00")
+ & " The amount is now "
+ & Format(CustRecord.Owe, "$#,##0.00")
ShowFactoryStatus(Msg)
' Close the file
Close #1
Cleanup:
Msg = "Transaction complete. Now Deleting sample "
+ & "data file."
ShowFactoryStatus(Msg)
' Remove file from disk
' Kill "TESTFILE"
Exit Sub
ErrorHandler:
' Permission denied error
If Err = 70 Then
 Msg = {"Sorry, you must run Share.exe before running
this example. Exit Actuate Basic, Exit Windows,run Share.exe,
and reenter Actuate Basic torun this example. Do not shell to
DOS and run Share.exe or you might not be able to run other
programs until you reboot."}
' Some other error occurred
Else
 Msg = "Error " & Err & " occurred. " & Error$
End If
' Display error message
ShowFactoryStatus(Msg)
' Close files, flush buffers
Reset
' Do an orderly exit
Resume Cleanup
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    Get statement  
               Open statement  
               Put statement

---

## LOF function

Returns the size of an open file in bytes.

**Syntax** LOF(<open file number>)

**Parameters** <open file number>

Numeric expression that is the file number you used with Open to open the target file.

Rules for <open file number>:

- Must be the number of a currently open file.
- Must refer to a disk file.

**Example** The following example opens an existing disk file named Test.fil and then uses LOF to determine its size in bytes:

```
Open "Test.fil" For Input As #1
SizeOfFile = LOF(1)
```

**Returns** Integer

**Tip** To determine the length of a file that is not open, use FileLen.

**Example** The following example creates a test file on disk that contains some random numbers. The procedure then reopens the test file and reports its length. This example overrides Start() which calls a sub procedure to generate the test file. The test file is deleted at the end of the Start function. To use this example, paste the procedure MakeDataFile0314 after the End Function of the Start() procedure or paste it into the Actuate Basic source code (.bas) file.

```
Sub Start()
 Dim Msg As String
 Dim FileLength As Integer
 Super::Start()
 ' Create sample data file
 MakeDataFile0327
 ' Open newly created file
 Open "Test.fil" For Input As #1
 ' Get length of file
 FileLength = LOF(1)
 ' Close test file
 Close #1
 Msg = "The length of the Test.fil file just created is "
 + & FileLength & " bytes. "
 + & "The sample data file will now be deleted."
 ShowFactoryStatus(Msg)
 ' Delete test file
```



```

Kill "Test.fil"
End Sub

Sub MakeDataFile0327()
 Dim I As Integer
 ' Open file for output
 Open "Test.fil" For Output As #1
 ' Generate values 0-250
 For I = 0 To 250
 Print #1, I
 Next I
 ' Close test file
 Close #1
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** EOF function  
FileLen function  
Loc function  
Open statement

---

## Log function

Gives the natural logarithm for a number.

**Syntax** Log(<number>)

**Parameters** **<number>**  
Numeric expression or Variant of VarType 8 (String) for which you want to find the logarithm. <number> must be greater than 0.

**Returns** Double

If <number> evaluates to Null, Log returns Null.

- Tips**
- To calculate logarithms in a base other than e, use Log(<number> divided by Log(<base>)), where <base> is the number of the desired base other than e.
  - Log is the inverse of Exp.

**Example** The following example generates a number, then returns the natural logarithm for that number:

```

Sub Start()
 Super::Start()
 On Error Goto ErrorHandler

```

## LSet statement

```
Dim UserNum, Msg As String
UserNum = 1000 * Rnd
Msg = "The log (base e), or Log(" & UserNum & ") is "
+ & Log(UserNum)
ShowFactoryStatus(Msg)
Exit Sub
ErrorHandler:
ShowFactoryStatus("Error: " & Err & " -- " & Error$(Err))
ShowFactoryStatus("Please try again.")
Resume Next
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Exp function

---

## LSet statement

Left-aligns a string within the space of a string variable.

**Syntax** LSet <string variable> = <string exprs>

**Description** LSet left-aligns a string expression within a variable.

**Parameters** <string variable>  
Name of a string variable in which LSet stores the left-aligned <string exprs>.

**<string exprs>**

String expression that you want LSet to left-align within <string variable>.

The behavior of LSet depends on whether <string exprs> is shorter or longer than <string variable>, as shown in Table 6-32.

**Table 6-32** LSet behavior

| <string exprs>                 | Behavior of LSet                                                                                                                                                               |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Shorter than <string variable> | Left-aligns <string exprs> within <string variable>. Replaces any leftover characters in <string variable> with spaces.                                                        |
| Longer than <string variable>  | Places only the first characters, up to the length of the <string variable>, in <string variable>. Truncates characters beyond the length of <string variable> from the right. |

**Example** The following example left-aligns text within a 20-character string variable:

```

Sub Start()
 Dim Msg, TmpStr As String
 Super::Start()
 ' Create 20-character string
 TmpStr = String(20, "*")
 Msg = "The following two strings that have been right"
+ & "and left justified in a " & Len(TmpStr)
+ & "-character string."
 ShowFactoryStatus(TmpStr)
 ' Right justify
 RSet TmpStr = "Right->"
 ShowFactoryStatus(TmpStr)
 ' Left justify
 LSet TmpStr = "<-Left"
 ShowFactoryStatus(TmpStr)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** RSet statement

---

## LTrim, LTrim\$ functions

Returns a copy of a string expression after removing leading spaces.

**Syntax** LTrim(<string exprs>)

LTrim\$(<string exprs>)

**Parameters** <string exprs>

String from which LTrim[\$] strips leading spaces. Leading spaces are any spaces that occur before the first non-space character in a string. <string exprs> must be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a Variant that can evaluate to a String.

**Returns** LTrim: Variant

LTrim\$: String

A copy of <string exprs> with leading spaces removed.

- If there are no leading spaces, LTrim[\$] returns <string exprs>.
- If <string exprs> evaluates to Null, LTrim[\$] returns Null.

- Tips**
- To simultaneously strip both leading and trailing spaces in a string, use Trim\$.
  - To find spaces in the middle of a string, use InStr.

**Example** The following example uses LTrim\$ to strip leading spaces from a string variable and uses RTrim\$ to strip trailing spaces:

```
Sub Start()
 Dim Msg As String
 Dim CustName As String, CustName1 As String
 Super::Start()
 CustName = " Harold Painter "
 ' Strip spaces
 CustName1 = LTrim$(RTrim$(CustName))
 Msg = "The original customer name " & "'"
+ & CustName & "'" & " ...was " & Len(CustName)
+ & " characters long. There were two leading "
+ & "spaces and two trailing spaces."
 ShowFactoryStatus(Msg)
 Msg = "The name returned after stripping the spaces "
+ & "is:" & "'" & CustName1
+ & "'" & "...and it contains only "
+ & Len(CustName1) & " characters."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    Format, Format\$ functions  
              RTrim, RTrim\$ functions

---

## Mid, Mid\$ functions

Returns the specified portion of a string expression.

**Syntax**    Mid(<string exprs>, <start>[,<length>])  
              Mid\$(<string exprs>, <start>[,<length>])

**Parameters**    **<string exprs>**  
Source string from which you are copying a portion. It can be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a Variant that can evaluate to a String.

**<start>**  
Integer that specifies the character position within a <string exprs> where copy begins. <start> must be between 1 and 2,147,483,647, inclusive.

**<length>**  
Integer indicating how many characters to copy.

The following conditions apply to <length>:

- If <length> is omitted, Actuate Basic uses all characters from <start> to the end of <string exprs>.

- Must be between 0 and 2,147,483,647.

The following examples are equivalent:

```
Mid$("Widget", 4, 3)
```

```
Mid$("Widget", 4)
```

The following example returns Widget:

```
Mid$("Widget", 1, 99)
```

**Returns** Mid: Variant  
Mid\$: String

- If <start> is greater than length of <string exprs>, returns zero-length string.
- If <length> = 0, returns zero-length string.
- If <length> is greater than length of <string exprs>, returns only the characters up to the length of <string exprs>.
- If any parameter evaluates to Null, Mid[\$] returns Null.

**Tip** Use Len to find the number of characters in <string exprs>.

**Example** In the following example, Mid[\$] returns the middle word from a variable containing three words:

```
Sub Start()
 Dim MiddleWord, Msg, TestStr
 Dim SpacePos1, SpacePos2, WordLen
 Super::Start()
 ' Create text string
 TestStr = "Mid function Example"
 ' Find first space
 SpacePos1 = InStr(1, TestStr, " ")
 ' Find next space
 SpacePos2 = InStr(SpacePos1 + 1, TestStr, " ")
 ' Calc 2nd word length
 WordLen = (SpacePos2 - SpacePos1) - 1
 ' Find the middle word
 MiddleWord = Mid(TestStr, SpacePos1 + 1, WordLen)
 Msg = "The word in the middle of "" & TestStr & "" is ""
+ & MiddleWord & """"
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Left, Left\$ functions  
Len function  
Right, Right\$ functions

## Mid, Mid\$ statements

Replaces a segment of a string with another string.

**Syntax** Mid(<string variable>,<start>[,<length>]) = <string exprs>

Mid\$(<string variable>,<start>[,<length>]) = <string exprs>

**Parameters** **<string variable>**

String expression or Variant variable to modify. <string variable> cannot be a literal, function, or other expression.

**<start>**

Position in <string variable> at which replacement text begins. The position of the first character is 1. <start> must be between 1 and 2,147,483,647, inclusive.

**<length>**

Number of characters from <string exprs> to use. The default is the unchanged <string exprs>.

The following conditions apply to <length>:

- Must be between 1 and 2,147,483,647, inclusive.
- No matter how large you specify <length> to be, the resulting string is never longer than <string variable>.

**<string exprs>**

String expression that replaces segment of <string variable>. It can be a variable-length string, a literal string, a string constant, the return value of any function that returns a string, or a Variant that can evaluate to a String. <string exprs> cannot entirely replace <string variable> with a shorter <string exprs>.

**Example** The following example replaces part of the string FREUDIAN with all or part of Jung in the variable Hillman:

```
Sub Start()
 Dim Hillman As String
 Super::Start()
 Hillman = "FREUDIAN"
 ' now Hillman = "JungDIAN"
 Mid$(Hillman,1,5) = "Jung"
 ShowFactoryStatus(Hillman)
 Hillman = "FREUDIAN"
 ' same result, "JungDIAN"
 Mid(Hillman,1,4) = "Jung"
 ShowFactoryStatus(Hillman)
 Hillman = "FREUDIAN"
 ' now Hillman = "JunUDIAN"
```

```

Mid$(Hillman,1,3) = "Jung"
ShowFactoryStatus(Hillman)
Hillman = "FREUDIAN"
' now Hillman = "FREUJung"
Mid(Hillman,5) = "Jung"
ShowFactoryStatus(Hillman)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Left, Left\$ functions  
 Mid, Mid\$ functions  
 Right, Right\$ functions

---

## MidB, MidB\$ functions

Returns the specified portion of a string expression.

These functions are provided for backward compatibility with previous Actuate releases. Actuate uses UCS-2 as internal encoding, therefore passing strings consisting of characters from different code pages might produce unexpected results. For this reason, Actuate recommends you use the Mid and Mid\$ functions instead of the MidB and MidB\$ functions.

**Syntax** MidB(<string exprs>, <start>[,<length>])  
 MidB\$(<string exprs>, <start>[,<length>])

**Parameters** **<string exprs>**  
 String expression from which you are copying a byte or a series of contiguous bytes. Can be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a Variant that can evaluate to a String.

**<start>**  
 Integer that specifies the byte position within a <string exprs> where copy begins. <start> must be between 1 and 2,147,483,647, inclusive.

**<length>**  
 Integer indicating how many bytes to copy.

The following conditions apply to <length>:

- If <length> is omitted, Actuate Basic uses all characters from <start> to the end of <string exprs>.
- <length> must be between 0 and 2,147,483,647.

The following example statements are equivalent:

## MidB, MidB\$ functions

```
MidB$ ("Widget", 4, 3)
```

```
MidB$ ("Widget", 4)
```

The following statement returns "Widget":

```
MidB$ ("Widget", 1, 99)
```

**Returns** MidB: Variant  
MidB\$: String

- If <start> is greater than length of <string exprs>, the function returns zero-length string.
- If <length> = 0, the function returns zero-length string.
- If <length> is greater than length of <string exprs>, the function returns only the characters up to the length of <string exprs>.
- If any parameter evaluates to Null, MidB[\$] returns Null.

- Tips**
- Use LenB[\$] to find the number of bytes in <string exprs>.
  - Use InStrB[\$] to find the position of a specified byte in <string exprs>.

**Example** In the following example, MidB returns the middle word from a variable containing three words:

```
Sub Start()
 Dim MiddleWord, Msg, TestStr
 Dim SpacePos1, SpacePos2, WordLen
 Super::Start()
 ' Create text string
 TestStr = "MidB function Example"
 ' Find first space
 SpacePos1 = InStr(1, TestStr, " ")
 ' Find next space
 SpacePos2 = InStr(SpacePos1 + 1, TestStr, " ")
 ' Calc 2nd word length
 WordLen = (SpacePos2 - SpacePos1) - 1
 ' Find the middle word
 MiddleWord = MidB(TestStr, SpacePos1 + 1, WordLen)
 Msg = "The word in the middle of "" & TestStr & "" is ""
+ & MiddleWord & """"
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** InStrB function  
LeftB, LeftB\$ functions  
LenB function



Mid, Mid\$ functions  
 RightB, RightB\$ functions

---

## MidB, MidB\$ statements

Replaces a segment of a string with another string.

These statements are provided for backward compatibility with previous Actuate releases. Actuate uses UCS-2 as internal encoding, therefore passing strings consisting of characters from different code pages might produce unexpected results. For this reason, Actuate recommends you use the Mid and Mid\$ statements instead of the MidB and MidB\$ statements.

**Syntax** MidB(<string variable>,<start>[,<length>]) = <string exprs>

MidB\$(<string variable>,<start>[,<length>]) = <string exprs>

**Parameters** <string variable>

String expression or Variant to modify. <string variable> must be a variable, not a literal, function, or other expression.

**<start>**

Position in <string variable> at which replacement text begins. The position of the first byte is 1. <start> must be between 1 and 2,147,483,647, inclusive.

**<length>**

Number of bytes from <string exprs> to use. The default is the unchanged <string exprs>.

The following conditions apply to <length>:

- Must be between 1 and 2,147,483,647, inclusive.
- No matter how large you specify <length> to be, the resulting string is never longer than <string variable>.

**<string exprs>**

String expression that replaces segment of <string variable>. It can be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a Variant that can evaluate to a String. <string exprs> cannot entirely replace <string variable> with a shorter <string exprs>.

**Example** The following example replaces part of the string FREUDIAN with all or part of Jung in the variable Hillman:

```
Sub Start()
 Dim Hillman As String
 Super::Start()
 Hillman = "FREUDIAN"
```

## Minute function

```
' now Hillman = "JungDIAN"
MidB(Hillman,1,5) = "Jung"
ShowFactoryStatus(Hillman)
Hillman = "FREUDIAN"
' same result, "JungDIAN"
MidB(Hillman,1,4) = "Jung"
ShowFactoryStatus(Hillman)
Hillman = "FREUDIAN"
' now Hillman = "JunUDIAN"
MidB$(Hillman,1,3) = "Jung"
ShowFactoryStatus(Hillman)
Hillman = "FREUDIAN"
' now Hillman = "FREUJung"
MidB$(Hillman,5) = "Jung"
ShowFactoryStatus(Hillman)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** LeftB, LeftB\$ functions  
MidB, MidB\$ functions  
RightB, RightB\$ functions

---

## Minute function

Returns an integer from 0 to 59, inclusive, that represents the minute of the hour specified by a date expression.

**Syntax** Minute(<date exprs>)

**Parameters** <date exprs>

Date expression, or any numeric or string expression that can be interpreted as a date, a time, or both a date and a time:

- Can be a string such as November 12, 1982 8:30 PM, Nov. 12, 1982 08:30 PM, 11/12/82 8:30pm, 08:30pm, or any other string that can be interpreted as a date, a time, or both a date and a time in the valid range.
- Can be a date serial number such as 30267.854, which corresponds to November 12, 1982 at 8:30 P.M., or any other number that can be mapped to a date, a time, or both a date and a time in the valid range.
- For date serial numbers, the integer component represents the date itself while the fractional component represents the time of day on that date, where January 1, 1900 at precisely noon has the date serial number 2.5, and negative numbers represent dates prior to December 30, 1899 (0).

The default is 0.

The following conditions apply to <date exprs>:

- If <date exprs> includes a date, it must be a valid date, even though Minute does not return a date. A valid date is any date in the range January 1, 100 through December 31, 9999, expressed in one of the standard date formats.
- If <date exprs> includes a time, it must be in the range 00:00:00 (12:00:00 A.M.) through 23:59:59 (11:59:59 P.M.), in either the 12- or 24-hour format.
- If <date exprs> is a numeric expression, it must be in the range -657434.0 to +2958465.9999, inclusive.
- If <date exprs> is a variable containing a date serial number, the variable must be explicitly declared as one of the numeric types.
- <date exprs> is parsed according to the formatting rules of the current run-time locale.

For example, the following statements are equivalent. Each assigns 35 to the variable UserMinute.

```
UserMinute = Minute("6/7/64 2:35pm")
UserMinute = Minute("5:35 pm")
UserMinute = Minute("June 7, 1964 2:35 PM")
UserMinute = Minute("Jun 7, 1964") + 35
UserMinute = Minute(23535.6077)
UserMinute = Minute(0.6077)
```

#### Returns Integer

- If <date exprs> cannot be evaluated to a date, Minute returns Null. For example:  

```
Minute("This is not a date.") returns Null
```
- If <date exprs> fails to include all date components (day, month, and year), Minute returns Null. For example:  

```
Minute("Nov 12, 1982 7:11 AM")
```

returns 11, but:

```
Minute("Nov 1982 7:11 AM")
```

returns Null.
- If <date exprs> is Null, Minute returns Null.

The following assumes that the AC\_CENTURY\_BREAK property is set to the default value of 30. For information about using AC\_CENTURY\_BREAK, please see *Accessing Data using e.Report Designer Professional*.

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000.

For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).

- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

Note that a date can contain an abridged month, such as Nov. 12, 1982 as opposed to November 12, 1982.

**Tip** If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

**Example** The following example displays the number of hours, minutes, and seconds remaining until midnight:

```
Sub Start()
 Dim HrDiff As Integer, MinDiff As Integer, SecDiff As Integer
 Dim RightNow As Double, Midnight As Double
 Dim TotalDiff As Double, TotalMinDiff As Double
 Dim TotalSecDiff As Double, Msg As String
 Super::Start()
 Midnight = TimeValue("23:59:59")
 ' Get current time
 RightNow = Now
 ' Get diffs from midnight
 HrDiff = Hour(Midnight) - Hour(RightNow)
 MinDiff = Minute(Midnight) - Minute(RightNow)
 SecDiff = Second(Midnight) - Second(RightNow) + 1
 ' Restate seconds and minutes if necessary
 If SecDiff = 60 Then
 ' Add 1 to minute
 MinDiff = MinDiff + 1
 ' And set 0 seconds
 SecDiff = 0
 End If
 If MinDiff = 60 Then
 ' Add 1 to hour
 HrDiff = HrDiff + 1
 ' And set 0 minutes
 MinDiff = 0
 End If
 ' Now get totals
 TotalMinDiff = (HrDiff * 60) + MinDiff
 TotalSecDiff = (TotalMinDiff * 60) + SecDiff
 TotalDiff = TimeSerial(HrDiff, MinDiff, SecDiff)
```

```

' Prepare msg for display
Msg = "There are a total of " & Format(TotalSecDiff, "#,##0")
+ & " seconds until midnight. That translates to "
+ & HrDiff & " hours, "
+ & MinDiff & " minutes, and "
+ & SecDiff & " seconds. "
+ & "In standard time notation, it becomes "
' Remember not to use "mm" for minutes! m is for month.
Msg = Msg & Format(TotalDiff, "hh:nn:ss") & "."
ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Day function  
Hour function  
Month function  
Now function  
Second function  
Time, Time\$ functions  
Weekday function  
Year function

---

## MIRR function

Returns the modified internal rate of return for a series of periodic cash flows (payments and receipts) in an existing array.

**Syntax** MIRR(<casharray>(),<finance rate>, <reinvestment rate>)

**Parameters** **<casharray>()**  
Array of Doubles that specifies the name of an existing array of cash flow values. The <casharray> array must contain at least one positive value (receipt) and one negative value (payment).

**<finance rate>**

Numeric expression that specifies the interest rate paid as the cost of financing. <finance rate> must be a decimal value that represents a percentage.

**<reinvestment rate>**

Numeric expression that specifies the interest rate received on gains from cash reinvestment. <reinvestment rate> must be a decimal value that represents a percentage.

The following example assumes you have filled the array MyArray() with a series of cash flow values. If the interest rate you pay for financing is 12%, and the rate

your earn on income is 11.5%, what is the modified internal rate of return? The answer is assigned to the variable MIRRValue.

```
MIRRValue = MIRR(MyArray(), 0.12, 0.115)
```

### Returns Double

The modified internal rate of return is the internal rate of return (IRR) when payments and receipts are financed at different rates. MIRR takes into account both the cost of the investment (<finance rate>) and the interest rate received on the reinvestment of cash (<reinvestment rate>).

- Rules**
- You must express cash paid out (such as deposits to savings) using negative numbers, and cash received (such as dividend checks) using positive numbers.
  - <casharray>() must contain at least one negative and one positive number.
  - In cases where you have both a positive cash flow (income) and a negative one (payment) for the same period, use the net flow for that period.
  - If no cash flow or net cash flow occurs for a particular period, you must type 0 (zero) as the value for that period.

**Tip** Because MIRR uses the order of values within the array to interpret the order of payments and receipts, be sure to type payment and receipt values in the correct sequence.

**Example** The following example returns the modified internal rate of return for a series of cash flows contained in the array, CashValues(). LoanAPR represents the financing interest, and InvAPR represents the interest rate received on reinvested cash. Option Base is assumed to be set to zero.

```
Sub Start()
 ' Set up array
 Static CashValues(5) As Double
 Dim LoanAPR As Double, InvAPR As Double
 Dim Fmt As String, ReturnRate As Double, Msg As String
 Super::Start()
 ' Loan rate
 LoanAPR = .1
 ' Reinvestment rate
 InvAPR = .12
 ' Define money format
 Fmt = "#0.00%"
 ' Business start-up costs
 CashValues(0) = -80000
 ' Now set up positive cash flows for income for four years:
 CashValues(1) = 23000: CashValues(2) = 27000
 CashValues(3) = 31000: CashValues(4) = 35000
 ' Calculate internal rate
```

```

ReturnRate = MIRR(CashValues, LoanAPR, InvAPR)
Msg = "The modified internal rate of return for these cash "
+ & "flows is: " & Format(Abs(ReturnRate), Fmt) & "."
ShowFactoryStatus(Msg)
ShowFactoryStatus(CStr(CashValues(1)))
ShowFactoryStatus(CStr(CashValues(2)))
ShowFactoryStatus(CStr(CashValues(3)))
ShowFactoryStatus(CStr(CashValues(4)))
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**   IRR function  
               Rate function

---

## MkDir statement

Creates a new directory or subdirectory on the specified or current drive.

**Syntax**   MkDir <path name>

**Description**   If you do not specify the full path name, MkDir creates the new subdirectory on the current drive under the current directory.

**Parameters**   <path name>  
                   String expression that is the name of the directory to be created.

<path name> has the following syntax:

[<drive:>] [ \ ]<directory>[\<directory>]...(Windows)

[ / ]<directory>[/<directory>]...(UNIX)

The following conditions apply to <path name>:

- Must contain fewer than 259 characters.
- Cannot be the name of a directory that already exists.

**<drive:>**

Character, followed by a colon, that is the name of the drive (Windows only).

**<directory>**

String expression that is the name of the directory or subdirectory to create.

The following example creates the subdirectory Docs under the current directory on the default drive:

```
MkDir "Docs"
```

## MkDir statement

The following example creates the subdirectory Docs under the root directory of the current drive:

```
DirName$ = "\Docs"
MkDir DirName$
```

On a Windows system, the following example creates the subdirectory Docs under the root directory of drive D:

```
MkDir "D:\Docs"
```

- Tips**
- MkDir is similar to the operating system MkDir. Unlike the DOS command, however, it cannot be abbreviated.
  - If you use one or more embedded spaces in <path name> when you create a directory, use Actuate Basic's RmDir to remove the directory.
  - To determine the current directory, use CurDir.

**Example** The following example determines whether a \Tmp subdirectory exists on the current drive. If it does not, the example creates the directory.

```
Sub Start()
 Dim UserAns As Integer, ThisDrive As String
 Dim Msg As String, TempDir As String
 Super::Start()
 ' Set up error handler
 On Error Resume Next
 ' Get current drive letter
 ThisDrive = Left$(CurDir, 2)
 ' Construct full path spec
 TempDir = UCase$(ThisDrive & "\Tmperase")
 ' Make the new directory
 MkDir TempDir
 ' Does it exist?
 If Err = 41 Then
 Msg = "Sorry, " & TempDir & " directory already exists."
 Else
 Msg = TempDir & " directory was created. "
 End If
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see "Using the code examples," earlier in this chapter.

**See also** CurDir, CurDir\$ functions  
ChDir statement  
RmDir statement



---

## Month function

Returns an integer between 1 and 12, inclusive, that represents the month of the year for a specified date argument.

**Syntax**    `Month(<date exprs>)`

**Parameters**    **<date exprs>**

Date expression, or any numeric or string expression that can evaluate to a date or a date and a time:

- Can be a string such as November 12, 1982, Nov 12, 1982, 11/12/82, 11-12-82, or any other string that can be interpreted as a date in the valid range.
- Can be a date serial number such as 30267.854, which corresponds to November 12, 1982 at 8:30 P.M., or any other number that can be mapped to a date in the valid range.
- For date serial numbers, the integer component represents the date itself while the fractional component represents the time of day on that date, where January 1, 1900 at precisely noon has the date serial number 2.5, and negative numbers represent dates prior to December 30, 1899 (0).

The following conditions apply to <date exprs>:

- If <date exprs> a string expression, must specify a date in the range January 1, 100 through December 31, 9999, inclusive.
- If <date exprs> is a numeric expression, must be in the range -657434 to +2958465, inclusive.
- If <date exprs> is a variable containing a date serial number, the variable must be explicitly declared as one of the numeric types.
- <date exprs> is parsed according to the formatting rules of the current run-time locale.

For example, the following statements are equivalent. Each assigns 6 to the variable UserMonth.

```
UserMonth = Month("6/7/64")
UserMonth = Month("June 7, 1964 2:35 PM")
UserMonth = Month("Jun 7, 1964")
UserMonth = Month(23535)
UserMonth = Month(4707*5)
```

**Returns**    Integer

- If <date exprs> cannot be evaluated to a date, Month returns Null. For example, the following statement returns Null:

```
Month("This is not a date.")
```

- If <date exprs> fails to include all date components (day, month, and year), Month returns Null. For example:

```
Month("Nov 12, 1982")
```

returns 11, but:

```
Month("Nov 1982")
```

returns Null.

- If <date exprs> is Null, Month returns Null.

The following assumes that the AC\_CENTURY\_BREAK property is set to the default value of 30. For information about using AC\_CENTURY\_BREAK, please see *Accessing Data using e.Report Designer Professional*.

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000. For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).
- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

Note that a date can contain an abridged month, such as Nov. 12, 1982 as opposed to November 12, 1982.

**Tip** If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

**Example** The following example analyzes today's date. It uses various date functions to display the year, month, day, and weekday of the given date. Finally, it gives the date's serial number.

```
Sub Start()
 Dim UserEntry, UserYear As Integer, UserMonth As Integer
 Dim UserDay As Integer, UserDOW As Integer, DOWName As String
 Dim Msg As String, LeapYear As String
 Super::Start()
 ' Get date
 UserEntry = Now
 UserEntry = CDate(UserEntry)
 ' Calculate year
 UserYear = Year(UserEntry)
 ' Calculate month
 UserMonth = Month(UserEntry)
 ' Calculate day
 UserDay = Day(UserEntry)
```

```

' Calculate day of week
UserDOW = Weekday(UserEntry)
' Convert to name of day
DOWName = Format$ (UserEntry, "dddd")
' Determine if the year is a leap year or a centesimal
If UserYear Mod 4 = 0 And UserYear Mod 100 = 0 Then
' Evenly divisible by 400?
 If UserYear Mod 400 = 0 Then
 LeapYear = "is a leap year."
 ' Not evenly divisible
 Else
 LeapYear = "is a centesimal but not a leap year."
 End If
ElseIf UserYear Mod 4 = 0 Then
 LeapYear = "is a leap year."
Else
 LeapYear = "is not a leap year."
End If

' Display results for the user after the pattern:
' The given year 1982 is not a leap year. The weekday number
' for the 12th day of the 11th month in 1982 is 3, which
' means that day was a Tuesday.

' The date serial number for 11/12/82 is 30267.

Msg = "The given year, " & UserYear & ", " & LeapYear
ShowFactoryStatus(Msg)
Msg = "The weekday number for the " & UserDay
+ & Suffix(UserDay) & " day of the " & UserMonth
+ & Suffix(UserMonth) & " month in " & UserYear
+ & " is " & UserDOW & ", which means that day is a "
+ & DOWName & "." & "The date serial "
+ & "number for " & UserEntry & " is: "
+ & CDb1(DateSerial(UserYear, UserMonth, UserDay))
ShowFactoryStatus(Msg)
End Sub

' The previous procedure calls this function to tell us what
' suffix (1st, 2nd, 3rd) to use with a number.
Function Suffix (DateNum) As String
 Select Case DateNum
 Case 1, 21, 31
 Suffix = "st"
 Case 2, 22
 Suffix = "nd"
 End Select
End Function

```

## MsgBox function

```
Case 3, 23
 Suffix = "rd"
Case Else
 Suffix = "th"
End Select
End Function
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Date, Date\$ functions  
Day function  
Hour function  
Minute function  
Now function  
Second function  
Weekday function  
Year function

---

## MsgBox function

Displays a user-defined message in a window with a specified set of response buttons, waits for the user to choose a button, and returns a value indicating which button the user selected.

**Syntax** MsgBox(<message text> [, [<configuration>][, <window title>] )

**Parameters** **<message text>**  
String expression that is the message to be displayed in the dialog box. Lines break automatically at the right edge of the dialog box. If the <message text> for an application modal message box is longer than 1024 characters, the message is truncated.

**<configuration>**

Numeric expression that is the bitwise sum of up to four separate values:

- Number and type of buttons
- Icon style
- Default button
- Modality

Table 6-33 summarizes values for <configuration> and their corresponding meanings.

**Table 6-33**      <configuration> values for the MsgBox function

| Group                | Symbolic constant   | Value | Meaning                                                                                       |
|----------------------|---------------------|-------|-----------------------------------------------------------------------------------------------|
| Button group         | MB_OK               | 0     | Display OK button.                                                                            |
|                      | MB_OKCANCEL         | 1     | Display OK and Cancel buttons.                                                                |
|                      | MB_ABORTRETRYIGNORE | 2     | Display Abort, Retry, and Ignore buttons.                                                     |
|                      | MB_YESNOCANCEL      | 3     | Display Yes, No, and Cancel buttons.                                                          |
|                      | MB_YESNO            | 4     | Display Yes and No buttons.                                                                   |
|                      | MB_RETRYCANCEL      | 5     | Display Retry and Cancel buttons.                                                             |
| Icon style group     | MB_ICONSTOP         | 16    | Display Stop icon.                                                                            |
|                      | MB_ICONQUESTION     | 32    | Display Question Mark icon.                                                                   |
|                      | MB_ICONEXCLAMATION  | 48    | Display Exclamation Point icon.                                                               |
|                      | MB_ICONINFORMATION  | 64    | Display Information icon.                                                                     |
| Default button group | MB_DEFBUTTON1       | 0     | First button is default.                                                                      |
|                      | MB_DEFBUTTON2       | 256   | Second button is default.                                                                     |
|                      | MB_DEFBUTTON3       | 516   | Third button is default.                                                                      |
| Modality group       | MB_APPLMODAL        | 0     | Application modal. User must respond to message box before continuing in current application. |
|                      | MB_SYSTEMMODAL      | 4096  | System modal. User must respond to message box before continuing with any application.        |

## MsgBox function

Add these numbers or constants together to specify the corresponding attributes of the message box. The default is 0 and you can use only one number from each group.

For example, each of the following statements displays a message box with the Question Mark icon, the message "Are you sure you want to overwrite the file?", and the Yes, No, and Cancel buttons. In each case, the No button is the default. The user's response is assigned to the variable UserAns.

```
UserAns = MsgBox("Do you want to overwrite the file? ", 3+32+256)
UserAns = MsgBox("Do you want to overwrite the file? ", 291)
UserAns = MsgBox("Do you want to overwrite the file? ",
 MB_YESNOCANCEL + MB_ICONQUESTION + MB_DEFBUTTON2)
```

### <window title>

String expression that is the text displayed in the title bar of the dialog box. The default is no title in the title bar.

### Returns Integer

The value that MsgBox function returns tells you which button the user selected.

Table 6-34 summarizes possible user selections and their corresponding return values.

**Table 6-34** Symbolic constants and MsgBox return values for user selections at run time

| Selection at run time | MsgBox returns | Symbolic Constant is |
|-----------------------|----------------|----------------------|
| OK button             | 1              | IDOK                 |
| Cancel button         | 2              | IDCANCEL             |
| Abort button          | 3              | IDABORT              |
| Retry button          | 4              | IDRETRY              |
| Ignore button         | 5              | IDIGNORE             |
| Yes button            | 6              | IDYES                |
| No button             | 7              | IDNO                 |

**Tip** To set line breaks yourself, place a linefeed (ANSI character 10) before the first character of the text that is to begin each new line.

**Example** The following example displays a different message box based on whether the user selected the Yes or No button in a dialog box:

```
Sub Start()
 Dim Title As String, MsgTxt As String
 Dim DialogDef As Integer, UserResponse As Integer
```

```

Super::Start()
Title = "Demonstration of MsgBox Function"
MsgTxt = "Show the display of a critical-error message."
MsgTxt = MsgTxt & " Do you want to continue?"
DialogDef = MB_YESNO + MB_ICONSTOP + MB_DEFBUTTON2
UserResponse = MsgBox(MsgTxt, DialogDef, Title)
If UserResponse = IDYES Then
 MsgTxt = "You selected Yes."
Else
 MsgTxt = "You selected No or pressed Enter."
End If
MsgBox MsgTxt
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** InStr function  
MsgBox statement

---

## MsgBox statement

Displays a user-defined message in a window with a specified set of response buttons, and waits for the user to choose a button. MsgBox statement does not return a value indicating which button the user has clicked.

**Syntax**    `MsgBox <message text> [, [<configuration>][, <window title>] ]`

**Parameters**    **<message text>**  
String expression that is the message displayed in the dialog box. Lines break automatically at the right edge of the dialog box. For application modal message boxes, <message text> must not be longer than 1024 characters, or it is truncated.

**<configuration>**

Numeric expression that is the bitwise sum of up to four separate values:

- Number and type of buttons
- Icon style
- Default button
- Modality

Table 6-35 summarizes values for <configuration> and their corresponding meanings.

**Table 6-35**      <configuration> values for MsgBox statements

| Group                | Symbolic constant   | Value | Meaning                                                                                       |
|----------------------|---------------------|-------|-----------------------------------------------------------------------------------------------|
| Button group         | MB_OK               | 0     | Display OK button.                                                                            |
|                      | MB_OKCANCEL         | 1     | Display OK and Cancel buttons.                                                                |
|                      | MB_ABORTRETRYIGNORE | 2     | Display Abort, Retry, and Ignore buttons.                                                     |
|                      | MB_YESNOCANCEL      | 3     | Display Yes, No, and Cancel buttons.                                                          |
|                      | MB_YESNO            | 4     | Display Yes and No buttons.                                                                   |
|                      | MB_RETRYCANCEL      | 5     | Display Retry and Cancel buttons.                                                             |
| Icon style group     | MB_ICONSTOP         | 16    | Display Stop icon.                                                                            |
|                      | MB_ICONQUESTION     | 32    | Display Question Mark icon.                                                                   |
|                      | MB_ICONEXCLAMATION  | 48    | Display Exclamation Point icon.                                                               |
|                      | MB_ICONINFORMATION  | 64    | Display Information icon.                                                                     |
| Default button group | MB_DEFBUTTON1       | 0     | First button is default.                                                                      |
|                      | MB_DEFBUTTON2       | 256   | Second button is default.                                                                     |
|                      | MB_DEFBUTTON3       | 516   | Third button is default.                                                                      |
| Modality group       | MB_APPLMODAL        | 0     | Application modal. User must respond to message box before continuing in current application. |
|                      | MB_SYSTEMMODAL      | 4096  | System modal. User must respond to message box before continuing with any application.        |



Add these numbers or constants together to specify the corresponding attributes of the message box.

The default is 0 and you may use only one number from each group.

For example, each of the following displays a message box with the Exclamation Point icon, the message: Sorry, insufficient disk space, and the OK button. In each case, the No button is the default button.

```
MsgBox "Sorry, insufficient disk space", 0+48
MsgBox "Sorry, insufficient disk space", 48
MsgBox "Sorry, insufficient disk space",
+ (MB_OK + MB_ICONEXCLAMATION)
```

**<window title>**

String expression that specifies the words to appear in the title bar of the message window. The default is no title in title bar.

**Tip** To set line breaks yourself, place a linefeed (ANSI character 10) before the first character of the text that is to begin each new line. This does not apply to Microsoft Windows 3.0.

**Example** The following example displays three message boxes consecutively:

```
Sub Start()
 Super::Start()
 ' Define the dialog box
 MsgBox "The dialog box shows a Yes and a No button.",
+ MB_YESNO
 MsgBox "The dialog box shows only an OK button."
 MsgBox "The dialog box shows an OK button, a Cancel button, "
+ & "and an info icon.", MB_OKCANCEL + 64.
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter Using the code examples.

**See also** InStr function  
MsgBox function

---

## Name statement

Renames a file or directory. Also, moves a file from one directory to another.

**Syntax** Name <old name> As <new name or path>

**Description** Name is similar to the operating system’s Rename command. Name, however, can change the name of a directory as well as that of a file.

## Name statement

### Parameters **As**

Keyword that separates the name of the original file or directory from the name of the target file or directory.

#### **<old name>**

String expression that specifies an existing file or directory to rename. The default path is the current default drive and directory.

The following conditions apply to <old name>:

- Indicated file or directory must exist.
- Drive letter, if specified, must be the same as that specified in <new name or path>.
- Indicated file must not currently be open by Actuate Basic.

#### **<new name or path>**

String expression that specifies the new file or directory name. The default path is the current drive and directory.

The following conditions apply to <new name>:

- Indicated file must not already exist if its path is the same as the path in <old name>.
- Indicated path must already exist if it is not the same as the path in <old name>.
- Drive letter, if specified, must be the same as that specified in <old name>.
- Indicated file must not currently be open by Actuate Basic.

<old name> or <new name or path> can optionally specify a full path, in which case use the following syntax:

[<drive:>] [ \ ]<directory>[\<directory>][\<file name>] (Windows)

[ / ]<directory>[/<directory>][<file name>] (UNIX)

#### **<drive:>**

Character, followed by a colon, that specifies the drive on which the directory to be renamed or the file to be renamed or moved is located (Windows only). Both <old name> and <new name or path> must refer to the same drive.

#### **<directory>**

String expression that specifies the name of a directory or subdirectory in the full path specification of <old name> or of <new name or path>. You can use Name to change the name of a directory, but you cannot move directories.

The following example changes the name of the file Test1.fil in the current directory to Test2.fil:

```
Name "Test1.fil " As "Test2.fil "
```

The following example moves the file Test1.fil from the C:\Temp subdirectory to the root directory:

```
Name "C:\Temp\Test1.fil " As "C:\Test1.fil "
```

**Example** The following example moves a file from one directory to another and renames the file:

```
Sub Start()
 Dim FileName1 As String, FileName2 As String
 Dim Msg As String, TestDir As String
 Super::Start()
 ' Define filenames
 FileName1 = "Nameaaaa.dat"
 FileName2 = "Namebbbb.dat"
 ' Test directory name
 TestDir = "\Test.dir"
 ' Create test file
 Open FileName1 For Output As #1
 ' Put sample data in file
 Print #1, "This is a test."
 Close #1
 ' Make test directory.
 Mkdir TestDir
 ' Move and rename file
 Name FileName1 As TestDir & "\" & FileName2
 Msg = "A new file, " & FileName1 & " was created in "
+ & CurDir$ & ". After creation, it was moved to "
+ & TestDir & " and renamed to " & FileName2 & "."
+ & "The test data "
+ & "file and directory will now be deleted."
 ShowFactoryStatus(Msg)
 ' Delete file from disk
 Kill TestDir & "\" & FileName2
 ' Delete test directory
 Rmdir TestDir
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Kill statement

---

## NewInstance function

Dynamically creates an instance of a class given the name of that class as a String. Use NewInstance to choose at run time which class to instantiate.

**Syntax** NewInstance(<class name>)

**Parameters** **<class name>**  
String expression that specifies the fully qualified name of the class to instantiate.

Rule: The class name must be valid or a run-time error is sent.

**Returns** The reference to the new object instance.

**Example** The following example shows two methods for instantiating an object:

```
Sub Start()
 Dim Obj1 As AcLabelControl
 Dim Obj2 As AcLabelControl, Msg As String
 Super::Start()
 ' Standard instantiation
 Set Obj1 = New AcLabelControl
 ' Dynamic instantiation
 Set Obj2 = NewInstance ("AcLabelControl")
 Obj2.BackgroundColor = Red
 Msg = "The numeric value for the background color "
+ & "of Obj2 is: " & Obj2.BackgroundColor
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** IsPersistent function  
NewPersistentInstance function  
Set statement

---

## NewPersistentInstance function

Dynamically creates a persistent instance of a class given the name of that class as a String. Use NewPersistentInstance to choose at run time which class to instantiate.

**Syntax** NewPersistentInstance(<class name>, <file number>)

**Parameters** **<class name>**  
String expression that specifies the name of the class to instantiate. <class name> must be valid or a run-time error is sent.

**<file number>**  
Numeric expression that specifies the number of the open report object instance (.roi) file.

The following conditions apply to <file number>:

- If no file number is specified, the object is persistent in the current default ROI.

- If two or more ROIs are open, you must specify the file number.

**Returns** String

The reference to the new object instance.

**Example** The following example dynamically creates a persistent instance of an `AcLabelControl` object:

```
Sub Start()
 Dim Obj As AcLabelControl, Msg As String
 Super::Start()
 Set Obj = NewPersistentInstance ("AcLabelControl", 1)
 Obj.BackgroundColor = Red
 Msg = "The numeric value for the background color "
 + & "of Obj is: " & Obj.BackgroundColor
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** `IsPersistent` function  
`NewInstance` function  
`Set` statement

---

## Now function

Returns a date that represents the current date and time according to the user’s operating system.

**Syntax** Now

The following example assigns the current year to the variable `ThisYear`:

```
ThisYear = Year(Now)
```

The following example assigns the current date and time to the variable `ThisInstant`:

```
ThisInstant = Now
```

The following example assigns the full date serial number representing the present moment to the double-precision variable `FreezeFrame`:

```
FreezeFrame# = Now
```

**Returns** Date

The value that `Now` returns usually looks like a date and/or time but is stored internally as a Double-precision floating point number—a date serial number—that represents a date between midnight January 1, 1980, and December 31, 2036,

inclusive, and/or a time between 00:00:00 and 23:59:59, or 12:00:00 A.M. and 11:59:59 P.M., inclusive.

**Example** In the following example, Now returns the current date and Format displays it as a long date that includes the day and date:

```
Sub Start()
 Dim Today As Double
 Dim Msg As String
 Super::Start()
 Today = Now
 Msg = "Today is " & Format(Today, "dddd, mmmm dd, yyyy")
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Date, Date\$ functions  
 Day function  
 Hour function  
 Minute function  
 Month function  
 Second function  
 Time, Time\$ functions  
 Weekday function  
 Year function

---

## NPer function

Returns the number of periods for an annuity based on periodic, constant payments, and on an unvarying interest rate.

**Syntax** NPer(<rate per period>, <each pmt>, <present value>, <future value>, <when due>)

**Parameters** <rate per period>

Numeric expression that specifies the interest rate that accrues per period. <rate per period> must be given in the same units of measure as <each pmt>. For instance, if <each pmt> is expressed as a monthly payment, then <rate per period> must be expressed as the monthly interest rate.

<each pmt>

Numeric expression that specifies the amount of each payment. <each pmt> must be given in the same units of measure as <rate per period>. For instance, if <rate per period> is expressed in months, then <each pmt> must be expressed as a monthly payment.

**<present value>**

Numeric expression that specifies the value today of a future payment or of a stream of payments.

For example, if you put \$23.94 in the bank today and leave it there for 15 years at an interest rate of 10% compounded annually, you will end up with about \$100. In this case, the present value of \$100 is approximately \$23.94.

**<future value>**

Numeric expression that specifies the cash balance you want after you have made your final payment.

**Examples**

- You set up a savings plan with a goal of having \$75,000 in 18 years to pay for your child's education. For this plan, the future value is \$75,000.
- You take out a loan for \$11,000. The future value is \$0.00, as it is for any typical loan.

**<when due>**

Numeric expression that specifies whether each payment is made at the beginning (1), or at the end (0) of each period. The default is 0 and <when due> must be 0 or 1.

The following example assumes you are making monthly payments at the first of each month on a loan of \$20,000, at an APR of 11.5%. If each payment is \$653.26, how many payments will you have to make to finish paying off the loan? The answer (36) is assigned to the variable NumPeriods.

```
NumPeriods = NPer(.115/12, -653.26, 20000, 0, 1)
```

**Returns**

Double

An annuity is a series of cash payments, constant in value, made over a period of time. An annuity can be an investment, such as a monthly savings plan, or a loan, such as a home mortgage.

Rules:

- <rate per period> and <each pmt> must be expressed in terms of the same units (weekly/monthly/yearly, and so on).
- You must express cash paid out (such as deposits to savings) using negative numbers, and cash received (such as dividend checks) using positive numbers.

**Example**

The following example prompts the user for information about a loan. The example then returns the number of payments the user must make to pay off the loan.

```
Declare
 Global Const ENDPERIOD = 0
 ' When payments are made
 Global Const BEGINPERIOD = 1
```

## NPV function

```
End Declare

Sub Start()
 Dim FutureVal As Double, PresVal As Double, APR As Double
 Dim Payment As Double, PayWhen As Integer
 Dim TotalPmts As Integer, Msg As String
 Super::Start()

 ' Usually 0 for a loan
 FutureVal = 0
 ' Amount to borrow
 PresVal = 200000
 ' Interest rate
 APR = 0.0625
 ' Amount to pay each month
 Payment = 1500
 ' Assume pay at end of month
 PayWhen = ENDPERIOD
 ' Do computation
 TotalPmts =
+ NPer(APR / 12, -Payment, PresVal, FutureVal, PayWhen)
 If Int(TotalPmts) <> TotalPmts Then
 TotalPmts = Int(TotalPmts) + 1
 End If
 Msg = "It will take " & TotalPmts
+ & " months to pay off your loan of " & PresVal
+ & " by paying " & Payment & " each month."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** FV function  
IPmt function  
Pmt function  
PPmt function  
PV function  
Rate function

---

## NPV function

Returns the net present value of a varying series of periodic cash flows, both positive and negative, at a given interest rate.

**Syntax** NPV(<rate>,<casharray>())



|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Parameters</b> | <p><b>&lt;rate&gt;</b><br/>         Numeric expression that specifies the discount rate over the length of the period.<br/>         Rule for &lt;rate&gt;: Must be expressed as a decimal.</p> <p><b>&lt;casharray&gt;()</b><br/>         Array of Doubles that specifies the name of an existing array of cash flow values. The &lt;casharray&gt; array must contain at least one positive value (receipt) and one negative value (payment).</p> <p>The following example assumes you have filled the array MyArray with a series of cash flow values, and that the interest rate is 11%. What is the net present value? The answer is assigned to the variable NetPValue.</p> <pre>NetPValue = NPV(.11,MyArray())</pre>                                                                                                                                                                                                                                           |
| <b>Returns</b>    | <p>Double</p> <p>While PV determines the present value of a series of constant payments, NPV does the same for a series of varying payments. Net present value is the value in today's dollars of all future cash flows associated with an investment minus any initial cost. In other words, it is that lump sum of money that would return the same profit or loss as the series of cash flows in question, if the lump sum were deposited in a bank today and left untouched to accrue interest at the rate given by &lt;rate&gt; for the same period of time contemplated by the cash flow stream.</p>                                                                                                                                                                                                                                                                                                                                                          |
| <b>Rules</b>      | <ul style="list-style-type: none"> <li>■ The NPV investment begins one period before the date of the first cash flow value and ends with the last cash flow value in the array.</li> <li>■ If your first cash flow occurs at the beginning of the first period, its value must be added to the value returned by NPV and must not be included in the cash flow values of &lt;casharray&gt;().</li> <li>■ You must express cash paid out (such as deposits to savings) using negative numbers, and cash received (such as dividend checks) using positive numbers.</li> <li>■ &lt;casharray&gt;() must contain at least one negative and one positive number.</li> <li>■ In cases where you have both a positive cash flow (income) and a negative one (payment) for the same period, use the net flow for that period.</li> <li>■ If no cash flow or net cash flow occurs for a particular period, you must enter 0 (zero) as the value for that period.</li> </ul> |
| <b>Tip</b>        | <p>Because NPV uses the order of values within the array to interpret the order of payments and receipts, be sure to enter your payment and receipt values in the correct sequence.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Example</b>    | <p>The following example returns the net present value for a series of cash flows contained in an array, CashFlows(). The variable, ReturnRate, represents the fixed internal rate of return. The example assumes Option Base is set to zero.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## Oct, Oct\$ functions

```
Sub Start()
 ' Set up the array
 Static CashFlows(6) As Double
 Dim Fmt As String, ReturnRate As Double
 Dim Msg As String, NetPVal As Double
 Super::Start()
 ' Money display format
 Fmt = "$###,##0.00"
 ' Set fixed internal rate
 ReturnRate = .12
 ' Business start-up expense
 CashFlows(0) = -100000
 ' Positive cash flows for income for four successive years:
 CashFlows(1) = 20000: CashFlows(2) = 40000
 CashFlows(3) = 80000: CashFlows(4) = 0: CashFlows(5) = 10000
 ' Calc net present value
 NetPVal = NPV(ReturnRate, CashFlows)
 Msg = "The net present value of these cash flows is: "
+ & Format(NetPVal, Fmt) & ". "
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** FV function  
IRR function  
PV function

---

## Oct, Oct\$ functions

Converts a numeric expression from decimal to octal notation, and from numeric to string.

**Syntax** Oct(<numeric exprs>)  
Oct\$(<numeric exprs>)

**Parameter** <numeric exprs>  
Numeric expression to be converted from decimal to octal notation.

The following conditions apply to <numeric exprs>:

- Oct[\$] rounds <numeric exprs> to the nearest whole number before evaluating it.
- If <numeric exprs> is a String, it is parsed according to the formatting rules of the current run-time locale.

For example, the following statements are equivalent. Each returns `&O010`, which is the full form of the octal notation equivalent of decimal number 8.

```
"&O" & Oct$(8)
"&O" & Oct$(2*4)
```

In the following example, the first statement returns the decimal value 16, but the second statement generates an error because the return value of `Oct[$]` is not preceded by the octal prefix, `&O`:

```
("&O" & Oct$(8)) * 2
Oct$(8) * 2
```

**Returns** Oct: Variant  
Oct\$: String

- If `<numeric exprs>` evaluates to Null, `Oct[$]` returns Null.
- If `<numeric exprs>` is an Integer, Variant of type 2 (Integer), Variant of type 0 (Empty) or any other numeric or Variant data type, `Oct[$]` returns up to 11 octal characters.

- Tips**
- To represent an octal number directly, precede a number in the correct range with `&O`. An octal number's correct range is from 0 to `O7777777777`. For example, you can use `&O010 * 2` to return decimal value 16, because `&O010` is octal notation for 8.
  - To generate the full octal representation of `<numeric exprs>`, supply the radical prefix `&O`, because `Oct[$]` does not return that component.

**Example** The following example generates a decimal number, then uses `Oct[$]` to convert that number to octal notation:

```
Sub Start()
 Dim Msg, Num
 Super::Start()
 Num = Int(100000 * Rnd)
 Msg = Num & " in decimal notation is &O"
 + & Oct(Num) & " in octal notation."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see "Using the code examples," earlier in this chapter.

**See also** Hex, Hex\$ functions  
Val function

---

## On Error statement

Tells the program what to do if an error occurs at run time.

**Syntax** On Error { GoTo <line | line label> | Resume Next | GoTo 0 }

**Description** Unless you use On Error, any run-time error that occurs is fatal. Actuate Basic generates an error message and stops executing the program.

If another error occurs while an error handler is active, Actuate Basic passes control back through any previous calling procedure or procedures until it finds an inactive error handler, which it then activates. If it cannot find such an inactive error handler, the error is fatal.

Each time control passes back to a calling procedure, that procedure becomes the current one. Once an error handler in any procedure succeeds in handling an error, program execution resumes in the current procedure at the point designated by its own error handler's Resume statement—which may not be the error handler or the Resume you perhaps intended to execute a few levels down the calling hierarchy.

An error-handler is automatically disabled when you exit its procedure.

- Rules**
- The error handler indicated by <line> or <line label> cannot be a sub or function procedure. It must be a block of code marked by a line label or line number.
  - To prevent error-handling code from becoming part of the normal program flow even when there is no error—that is, from inadvertently executing when it should not—place an Exit Sub or Exit Function immediately before the label of the error handler.

**Parameters** **GoTo**

Clause that enables the error-handling routine that starts at <line >, or, more commonly, <line label>. Enabling the routine means that if a run-time error occurs, program control branches to <line>. The error-handler at <line> remains active until a Resume, Exit Sub, or Exit Function is executed.

**<line> or <line label>**

The line number or line label to which the program branches when a run-time error occurs. <line> must be in the same procedure as On Error.

For example, the following statement tells Actuate Basic to branch to the label ErrorTrap when an error occurs:

```
On Error GoTo ErrorTrap
```

**Resume Next**

Clause specifying that when a run-time error occurs, control passes to the statement immediately following that in which the error occurred. That is, directs Actuate Basic to continue executing code even though an error has occurred.

**GoTo 0**

Clause that disables any enabled error handler in the current procedure. <GoTo 0> cannot be used to specify line number 0 as the start of the error-handling code.

- Tips**
- An error-handling routine should be exited only by using some form of Resume.
  - You can use Err to obtain the error number of a run-time error.
  - Your error-handling routine should test or save the value of Err before any other error can occur, or before it calls any procedure that could cause an error.
  - You can use Error[\$] function to return the error message associated with any given run-time error returned by Err.

**Example** The following example generates an error, then displays the error's number and description:

```
Sub Start()
 Dim Drive As String, Msg As String
 Super::Start()
 ' Set up error handler
 On Error GoTo ErrorHandler7
 ' Attempt to open file
 Open Drive & ":\Test\X.dat" For Input As #1
 Close #1
 ' Exit before entering the error handler
 Exit Function
 ' Error handler line label
ErrorHandler7:
 Msg = "Error " & Err & " occurred, which is: " & Error$(Err)
 ShowFactoryStatus(Msg)
 ' Resume procedure
Resume Next
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Erl function  
Err function  
Error, Error\$ functions  
Resume statement

---

## Open statement

Enables reading and writing—input and output (I/O)—to a file.

**Syntax** Open <file name> [For <mode>[encoding\_name]] [Access <permissions>]  
[<lock>] As [#]<file number> [Len = <record or buffer size>]

## Open statement

**Description** You must open a file before any I/O operation can be performed on it. Open allocates a buffer to the file for I/O, and determines the mode of access used with the buffer.

In Actuate Basic there are three types of file access, Random, Sequential and Binary. The type you use in Open causes Actuate Basic to assume that <file name> has certain characteristics. These assumptions are summarized in Table 6-36.

**Table 6-36** Assumptions for <file name> based on access type

| Access     | Mode                      | Actuate Basic assumes <file name>                                                                                |
|------------|---------------------------|------------------------------------------------------------------------------------------------------------------|
| Random     | Random                    | Consists of a series of records of identical length, and all of the same data type.                              |
| Sequential | Input<br>Output<br>Append | Is a text file, or consists of a series of text characters and/or of text formatting characters such as newline. |
| Binary     | Binary                    | Can consist of data of any type, with records of any length, or even of variable lengths.                        |

The following conditions apply to the Open Statement:

- In Binary, Input, and Random modes, you do not need to first close an open file before opening it with a different <file number>.
- In Append and Output modes, you must first close an open file before opening it with a different <file number>.

**Parameters** **<file name>**

String expression, enclosed in double quotes, that is the name of the target file, as shown in the following example:

```
Open "C:\Windows\Mynotes.file" As #1
```

If the file does not exist when it is opened for Append, Binary, Output, or Random modes, it is created and then opened.

**For <mode>**

Clause that specifies the file mode. Indicates whether and how to read from or write to the file. <mode> might be Append, Binary, Input, Output, or Random, as shown in the following example:

```
Open "C:\Windows\Mynotes.fil" For Input As #1
```

**<encoding\_name>**

String expression that specifies the encoding value.

The following conditions apply to <encoding\_name>:

- If <encoding\_name> is not specified or is an invalid value, Open uses the value of the current run-time encoding.

- If <encoding\_name> is "text", Open assumes the file uses the same code page as the current system.

#### **Access <permissions>**

Clause that specifies what operations this process is permitted to perform on <file name>. Another process can be more or less restricted than this one is. The <permissions> keyword can consist of any one of the following: Read, Write, or Read Write. If another process already opened the file and made <permissions> unavailable to others, the Open operation fails and a Permission denied error occurs. For example:

```
Open "C:\Windows\Mynotes.fil" For Input Access Read As #1
```

#### **<lock>**

Keyword or set of keywords that specifies what operations other processes are permitted to perform on <file name>. In a multiuser environment or multiprocessing environment, <lock> restricts access by other processes or users. The <lock> keyword can consist of any one of the following: Shared, Lock Read, Lock Write, or Lock Read Write. For example:

```
Open "C:\Windows\Mynotes.fil" For Binary As #1 Shared
```

#### **As <file number>**

Clause that assigns a number to the open file.

#### **<file number>**

Integer that specifies the number that is associated with the file as long as it remains open. Other I/O statements can then use <file number> to refer to the file. <file number> must be between 1 and 255, inclusive.

#### **Len = <record or buffer size>**

Clause specifying how much information to take from the file into the buffer.

Table 6-37 summarizes the behavior of the Len = <record or buffer size> clause, which depends on the setting of <mode>.

**Table 6-37** Relationship of mode types and the behavior of Len = <record or buffer size> clauses

| Mode                      | Len = <record or buffer size>                                                                                      |
|---------------------------|--------------------------------------------------------------------------------------------------------------------|
| Random                    | Specifies the record length, the number of bytes in a record. Default for <record or buffer size> in bytes is 128. |
| Append<br>Input<br>Output | Specifies the number of bytes to be placed in the buffer. Default for <record or buffer size> in bytes is 512.     |
| Binary                    | Ignored.                                                                                                           |

## Open statement

### **<record or buffer size>**

Integer expression that indicates either the record length or buffer size depending on <mode>. <record or buffer size> must be positive and less than or equal to 32,767 bytes. For example:

```
Open "C:\Windows\Mynotes.fil" For Input As #1 Len = 512
```

### **Options for <mode>**

#### **Random**

Keyword that specifies random-access file mode. Instructs Actuate Basic to make three attempts to open the file with these permissions, in the following order:

- Read and write
- Write-only
- Read-only

#### **Binary**

Keyword that specifies binary file mode so you can read and write information to any byte position in the file. If you do not supply an Access clause, instructs Actuate Basic to make three attempts to open the file, following the same order as for Random files. If <file name> does not exist, it is created, then opened. Use Get and Put to write to any byte position in a Binary file.

#### **Input**

Keyword that specifies sequential input mode. <file name> must exist.

#### **Output**

Keyword that specifies sequential output mode. If <file name> does not exist, it is created, then opened.

#### **Append**

Keyword that specifies sequential output mode, and sets the file pointer to the end of the file. If <file name> does not exist it is created, then opened. Use Print or Write to append to the file. For example:

```
Open "C:\Windows\Mynotes.fil" For APPEND As #1
```

The default for <mode> is Random.

### **Options for Access**

#### **Read**

Keyword instructing Actuate Basic to open the file for a reading process only.

#### **Write**

Keyword that instructs Actuate Basic to open the file for a writing process only.

#### **Read Write**

Keyword that instructs Actuate Basic to open the file for both reading and writing processes.

Access is valid only if <mode> is Random, Binary, or Append.



**Options for  
<lock>****Shared**

Keyword indicating that any process on any machine has permission to read from or write to <file name> while this Open is in effect.

**Lock Read**

Keyword indicating that no other process has permission to read <file name> while this Open is in effect. Lock Read is applied only if no other process has a previous read access to the file.

**Lock Write**

Keyword indicating that no other process has permission to write to <file name> while this Open is in effect. Lock Write is applied only if no other process has a previous write access to the file.

**Lock Read Write**

Keyword indicating that no other process has permission to read from or write to <file name> while this Open is in effect.

Lock Read Write can only occur if:

- No other process has already been granted read or write access.
- A Lock Read or Lock Write is not already in effect.

The default for <lock> is Lock Read Write.

**Tips**

- Use Random access files when you want easy access to individual records. Do not use them when you want to conserve storage space.
- Use Sequential access files when you want to process files consisting only of text. Do not use them for other types of information.
- Use Binary access files when you want to save storage space by varying your record lengths, sizing them only as needed to fit the data they contain. Do not use them if you do not want to keep track of the differently sized records.

**Example**

The following example opens six files for sequential output, then puts test data into them:

```
Sub Start()
 Dim FileName As String, FileNum As Integer, I As Integer
 Dim UserMsg As String, SampleTxt As String

 Super::Start()
 ' Create test string
 SampleTxt = "Here is some sample text."

 For I = 1 To 6
 ' Determine file number
 FileNum = FreeFile
 FileName = "TEST" & FileNum & ".DAT"
 ' Open for sequential output
 Open FileName For Output As #FileNum
```

## Option Base statement

```
' Write test data to file
 Print #FileNum, SampleTxt
Next I

' Close all open files
Close

 UserMsg = "Six test files have been created on your disk. "
+ & "The files will now be deleted."
 ShowFactoryStatus(UserMsg)
 ' Delete the test files
Kill "TEST?.DAT"
End Sub
```

The following example opens eight files specifying the encoding for each file:

```
Sub Start() As Boolean

 Super::Start()

 Open "Korean.txt" For Input "windows-949" As #1
 Open "KoreanOut.txt" For Output "windows-949" As #2

 Open "Japanese.txt" For Input "windows-932" As #3
 Open "JapaneseOut.txt" For Output "windows-932" As #4

 Open "Chinese.txt" For Input "windows-936" As #5
 Open "ChineseOut.txt" For Output "windows-936" As #6

 Open "Unicode.txt" For Input " UCS-2" As #7
 Open "UnicodeOut.txt" For Output "UCS-2" As #8
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Close statement  
FreeFile function  
Get statement  
Print statement  
Put statement  
Write statement

---

## Option Base statement

Declares the default lower bound for array subscripts.

**Syntax** Option Base {0 | 1}

**Description** ■ Affects only arrays in the same module.

- Has no effect on arrays within user-defined types. The lower bound for all such arrays is always 0.
- Can appear only once in a module.
- Can occur only in the Declare... End Declare section.
- Must be used before you declare the dimensions of any array.

**Parameters****0**

Specifies that the lowest subscript for arrays in the current module is 0.

**1**

Specifies that the lowest subscript for arrays in the current module is 1.

Default: 0.

Rule: Must be 0 or 1.

**Example** The following statement declares that the lowest subscript for any arrays you create is 1:

```
Option Base 1
```

**Tips**

- The To clause in Dim, ReDim, and Static provides a more flexible way to control the range of an array's subscripts.
- If you do not explicitly set the lower bound with a To clause, you can use Option Base to change the default lower bound to 1.

**Example** The the following example uses Option Base to override the default base array subscript value of 0:

```
Declare
 ' Module level statement
Option Base 1
End Declare

Sub Start()
 Dim MyArray1(), Msg
 Super::Start()
 ' Create an array
 ReDim MyArray1(25)
 Msg = "The lower bound of MyArray1 array is "
+ & LBound(MyArray1) & "."
+ & "The upper bound is " & UBound(MyArray1) & "."
 ShowFactoryStatus(Msg)
End Sub
```

After you compile and run this example once, delete the Option Basic statement lines from the BAS file and compile and test the example again. The lower bound reverts to zero, the default.

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Dim statement  
LBound function  
ReDim statement  
Static statement

---

## Option Compare statement

Declares default comparison mode used when comparing string data.

**Syntax** Option Compare { Binary | Text }

**Parameters** **Binary**

String comparisons in the module are case-sensitive by default. For example, if you use Option Compare Binary, then by default McManus does not match MCMANUS or mcmanus.

**Text**

String comparisons in the module are not case-sensitive by default. If you use Option Compare Text, then by default McManus matches MCMANUS or mcmanus.

- Rules**
- Use Option Compare within a Declare... End Declare section.
  - If used, Option Compare must appear before any statements that declare variables or define constants.

**Example** The following example shows the difference between using Option Compare Text and Option Compare Binary:

```
Declare
 Option Compare Text
End Declare

Sub Start()
 Dim NameStr As String, UName As String, LName As String
 Dim Msg As String
 Super::Start()
 NameStr = "Mary Ndebele"
 UName = UCase(NameStr)
 LName = LCase(NameStr)
 If UName Like LName Then
 Msg = UName & " matches " & LName
 Else
 Msg = UName & " does NOT match " & LName
 End If
End Sub
```

```

End If
ShowFactoryStatus(Msg)
End Sub

```

When you compile your report and try the example, note that the uppercase and lowercase version of the customer's name match. Now delete the Option Compare Text statement from your Actuate Basic source code and compile the example again. This time, the uppercase and lowercase versions of the customer's name will not match because without any Option Compare statement, Option Compare Binary is in effect by default.

For information about using the code examples, see "Using the code examples," earlier in this chapter.

**See also**    Format, Format\$ functions  
               StrComp function

---

## Option Strict statement

Specifies whether declarations must be typed.

**Syntax**    Option Strict {On | Off}

**Description**    Option Strict can occur only in the Declare... End Declare section, and must be used before any other source code statements.

**Parameters**    **On**  
 Checks that all variable, function, and sub procedure argument declarations are typed. Declarations without an As <data type> clause are flagged during compilation.

**Off**  
 Specifies that no data type checking is done, and untyped variables, functions, and arguments are of type Variant.

The default is Off.

The following statement makes data typing required for all declarations, so that no variable types are set to Variant by default:

```
Option Strict On
```

**Example**    The following example uses Option Strict to enforce data typing in declarations.:

```

Declare
 ' Equivalent to Strict On
Option Strict
 Global GlobalWithNoType
End Declare

```

## ParseDate function

```
Class Strict
 Dim v
 Dim var As Variant' Explicit Variants are OK
 Static s
 Function ff(a)
 Dim fv
 Static fs
 End Function

 Sub ss(a)
 End Sub
End Class 'Strict

Function fff(a)
End Function

Sub sss(a)
End Sub
```

When you compile this example several compiler errors are generated, all having to do with missing data types. Change the Option Strict statement to Option Strict Off and compile the example again. No errors are generated and all the untyped declarations default to type Variant.

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Dim statement  
Function...End Function statement  
Global statement  
Static statement  
Sub...End Sub statement

---

## ParseDate function

Controls how dates are converted. Use when your program must be locale-independent, or when the format of date strings in your database differs from the format of the current locale. You can also specify the locale to use for date conversion.

**Syntax** ParseDate(<strDataSource>, <strFormatSpec>)  
ParseDate(<strDataSource>, <strFormatSpec>, <locale>)

**Parameters** **<strDataSource>**  
String expression. The date string to convert from. The source date string. <strDataSource> must be, or evaluate to, a valid date string. For example:

```
"2/1/2010"
"1 Feb, 2010"
```

```
"February 1, 2010"
Format$(DateSerial(2010, 2, 1)), "mm/dd/yyyy")
```

**<strFormatSpec>**

String expression. The date string to convert from. The format in which the date string currently appears. Range of valid dates is January 1, 100 through December 31, 9999, inclusive.

The following conditions apply to <strFormatSpec>:

- Must be, or evaluate to, a valid format string.
- You can use the format characters described in Table 6-38 to convert date expressions.

**Table 6-38**      Format characters for converting date expressions

| Format character | Description                                                                                                                                                               |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ?                | Indicates an optional field.                                                                                                                                              |
| d                | Specifies that the next field is a day. Must appear only once in a date expression. If you use the d format character, you must also use the m and y format characters.   |
| l                | Specifies that the date format specified in the current locale should be used. If this character is used, it must be the only format specified.                           |
| m                | Specifies that the next field is a month. Must appear only once in a date expression. If you use the m format character, you must also use the y and d format characters. |
| p                | The base year for the pivot.                                                                                                                                              |
| t                | Specifies that the next field is the time. Must appear only once in a date expression.                                                                                    |
| w                | Specifies that the next field is a (noise) word, such as the name of the day of the week.                                                                                 |
| y                | Specifies that the next field is a year. Must appear only once in a date expression. If you use the y format character, you must also use the m and d format characters.  |

- To convert a date string from the French date format, use the following format string for <strFormatSpec>:  
"dmy"
- To convert a date from the U.S. date format, use the following format string for <strFormatSpec>:  
"mdy"

## ParseDate function

- To convert a date from the ISO date format, use the following format string for <strFormatSpec>:

"ymd"

- To convert date expressions that contain a day of the week or a word, use the ParseDate( ) function with the w format character. You can also use the optional field indicator format character '?'.  
Table 6-39 shows the ParseDate( ) return values with a day of week specified.

**Table 6-39** Converting date expressions that specify a day of the week

| Format character | Date expression            | Return value |
|------------------|----------------------------|--------------|
| w?mdy            | Friday, September 28, 2001 | 2001-9-28    |
| w?mdy            | September 28, 2001         | 2001-9-28    |
| wmdy             | Friday, September 28, 2001 | 2001-9-28    |
| wmdy             | September 28, 2001         | NULL         |
| wmdy             | on September 28, 2001      | 2001-9-28    |
| mdy              | September 28, 2001         | 2001-9-28    |

The locale settings control default date parsing. The locale settings generally do not include the w or w? field. Therefore, if a date expression contains a day of week and the locale setting is not specified properly for the day of week, Actuate date and time functions, such as DateAdd( ), DateDiff( ), DatePart( ), DateValue( ), and IsDate( ) return a null date.

For more information about formatting data, see Format function.

### <locale>

String expression specifying the locale to use for date conversion. Must be in the <language>\_<location> format, for example fr\_FR for French locale.

Rule: If <locale> is Null or invalid, ParseDate uses the current run-time locale.

**Returns** Date

If the date string is invalid, ParseDate returns Null.

**Description** Actuate Basic implicitly converts strings to dates and dates to strings. This conversion is patterned after Visual Basic. If you want your applications to be Y2K-compliant, to run in multiple locales, or to work with string date data imported from another application, be aware of the limitations of the implicit date conversions.

Implicit string-to-date conversions occur when you:

- Pass a string to a function that takes a date argument
- Assign a string to a date variable



- Use the CDate or CVDDate functions

In all these cases, Actuate converts dates using the date format of the current locale or the locale specified by the <locale> parameter and Actuate's default pivot year of 30. Actuate converts a date of 2/1/99 to a date of February 1, 1999 in the U.S., and to January 2, 1999 in the UK.

Implicit date-to-string conversion occurs when you:

- Pass a date to a function that takes a string argument
- Assign a date to a string
- Use the CStr function
- Output the date using the Print statement

In all cases, Actuate performs implicit date-to-string conversion using the date format of the current locale or the locale specified by the <locale> parameter and Actuate's default pivot year of 30. If you assign the date February 1, 1999 to a string in the U.S., the result will be 2/1/1999. In the UK, however, the string will be 1/2/1999.

Like Visual Basic, Actuate Basic attempts to parse a date using a number of different formats in order, until one works or until there is nothing else to try. This means that a date that is invalid for the given locale might still be parsed using a different format. For example, in the U.S. locale, a date of 13/1/99 converts to January 1, 1999 using the European format.

The format rules, in order of use, are:

- Current locale
- U.S. format (m/d/y)
- European format (d/m/y)
- ISO format (y/m/d)

When you write data streams, ParseDate allows you to precisely control how dates are converted. Hence, if Basic's default rules do not work, you can use ParseDate to perform the conversion correctly.

- Tips**
- Use ParseDate to convert type String date input to type DateTime as early in the program run as possible.
  - Convert dates to strings as late as possible before you display or output the dates to a file. To manage this conversion, use the Format function.
  - Always explicitly declare your date variables to be of type DateTime, do not rely on using Variants.
  - To accurately convert dates of type Date or type DateTime to strings, use the Format function.

## ParseNumeric function

- To accurately convert dates of type String to dates of type DateTime, use the ParseDate function.
- To convert date expressions containing a day of week and/or a word, use ParseDate with the format character 'w'. You can also use the optional field indicator format character '?'.

**Example** The following example converts a date in French format to a date in U.S. format:

```
Sub Start()
 Dim dtSafeDate As Date
 Dim strFr_Date As String, strUS_Date As String
 Dim strMsg As String
 Super::Start()

 strFr_Date = "10/12/1959"
 dtSafeDate = ParseDate(strFr_Date, "dmy")

 strMsg = "In US format, strFr_Date is shown as: "
+ & CStr(dtSafeDate)
 ShowFactoryStatus(strMsg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** CVDate function  
Format, Format\$ functions  
VarType function

---

## ParseNumeric function

Parses the numeric expression using the specified radix and thousand separator characters.

**Syntax** ParseNumeric(<numeric expression>, <radix character>, <thousand separator>)

ParseNumeric(<numeric expression>, <radix character>, <thousand separator>, <currency symbol>)

**Parameters** **<numeric expression>**

Numeric expression of type String to be converted to a Double data type.

**<radix character>**

String expression that specifies the radix character used in the numeric expression. If <radix character> is Null or an empty string, ParseNumeric uses the currency symbol of the current run-time locale.

**<thousand separator>**

String expression that specifies the thousand separator character used in the numeric expression.

The following conditions apply to <thousand separator>:

- If <thousand separator> contains more than one character, ParseNumeric uses only the first character.
- If <thousand separator> is Null or an empty string, ParseNumeric uses the thousands separator character of the current run-time locale.

**<currency symbol>**

String expression that specifies the currency symbol used in the numeric expression.

The following conditions apply to <currency symbol>:

- If <currency symbol> contains more than one character, ParseNumeric uses only the first character.
- If <currency symbol> is Null or an empty string, ParseNumeric uses the currency symbol of the current run-time locale.

**Returns** Variant

- If <numeric expression> is Null, ParseNumeric returns Null.
- If the expression is not valid or cannot be parsed using the specified decimal or thousand separator character, ParseNumeric returns Null.

**Example** Each of the following statements returns 123456.78:

```
ParseNumeric("123,456.78", ".", ",", NULL)
ParseNumeric("123.456,78", ",", ".", NULL)
ParseNumeric("123!456*78", "*", "!", NULL)
```

The following statement returns 1500.00:

```
ParseNumeric("$1,500.00", ".", ",", "$")
```

## Pmt function

Returns the payment for an annuity, based on periodic, constant payments, and on an unvarying interest rate.

**Syntax** Pmt(<rate per period>, <number pay periods>, <present value>, <future value>, <when due>)

**Parameters** <rate per period>

Numeric expression that specifies the interest rate that accrues per period. <rate per period> must be given in the same units of measure as <number pay

periods>. For instance, if <number pay periods> is expressed in months, then <rate per period> must be expressed as a monthly rate.

**<number pay periods>**

Numeric expression that specifies the total number of payment periods in the annuity. <number pay periods> must be given in the same units of measure as <rate per period>. For instance, if <rate per period> is expressed as a monthly rate, then <number pay periods> must be expressed in months.

**<present value>**

Numeric expression that specifies the value in today's dollars of a future payment, or stream of payments.

For example, if you put \$23.94 in the bank today and leave it there for 15 years at an interest rate of 10% compounded annually, you end up with about \$100. In this case, the present value of \$100 is approximately \$23.94.

**<future value>**

Numeric expression that specifies the cash balance you want after you have made your final payment.

- You set up a savings plan with a goal of having \$75,000 in 18 years to pay for your child's education. For this plan, the future value is \$75,000.
- You take out a loan for \$11,000. The future value is \$0.00, as it is for any typical loan.

**<when due>**

Numeric expression that specifies whether each payment is made at the beginning (1), or at the end (0) of each period. The default is the end of the period (0). <when due> must be 0 or 1.

The following example assumes you are making monthly payments the first of each month on a loan of \$20,000, over 36 months, at an APR of 11.5%. How much will each of your payments be? The answer (\$653.26) is assigned to PaymentAmt.

```
PaymentAmt = Pmt(.115/12, 36, -20000, 0, 1)
```

**Returns** Double

An annuity is a series of cash payments, constant in value, made over a period of time. An annuity can be an investment, such as a monthly savings plan, or a loan, such as a home mortgage.

- Rules**
- <rate per period> and <number pay periods> must be expressed in terms of the same units (weekly/weeks, monthly/months, yearly/years).
  - You must express cash paid out (such as deposits to savings) using negative numbers, and cash received (such as dividend checks) using positive numbers.

**Example** The following example uses information about a loan to determine the amount of payments:

```

Declare
 Global Const ENDPERIOD = 0
 ' When payments are made
 Global Const BEGINPERIOD = 1
End Declare

Sub Start()
 Dim Fmt As String, FutureVal As Double, PresVal As Double
 Dim APR As Double, TotPmts As Integer, PayWhen As Integer
 Dim Period As Integer, InterestPmt As Double
 Dim PrincipPmt As Double, Payment As Double, Msg As String
 Super::Start()
 ' Specify money format
 Fmt = "$###,###,##0.00"
 ' Normally 0 for a loan
 FutureVal = 0
 PresVal = 250000
 APR = 0.07
 TotPmts = 200
 ' Assume payment at beginning of period
 PayWhen = BEGINPERIOD
 Payment =
+ Pmt(APR / 12, TotPmts, -PresVal, FutureVal, PayWhen)
 Msg = "Your payments are " & Format(Payment, Fmt) & "."
 ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** FV function  
 IPmt function  
 NPer function  
 PPmt function  
 PV function  
 Rate function

---

## PPmt function

Returns the principal payment for a given period of an annuity, based on periodic, constant payments, and on an unvarying interest rate.

**Syntax** PPmt(<rate per period>,<single period>, <number pay periods>, <present value>, <future value>, <when due>)

**Parameters** <rate per period>  
 Numeric expression that specifies the interest rate that accrues per period.

Rule for <rate per period>: Must be given in the same units of measure as <number pay periods>. For instance, if <number pay periods> is expressed in months, then <rate per period> must be expressed as a monthly rate.

**<single period>**

Numeric expression that specifies the particular period for which you want to determine how much of the payment for that period represents interest. <single period> must be in the range 1 through <number pay periods>.

**<number pay periods>**

Numeric expression that specifies the total number of payment periods in the annuity. <number pay periods> must be given in the same units of measure as <rate per period>. For instance, if <rate per period> is expressed as a monthly rate, then <number pay periods> must be expressed in months.

**<present value>**

Numeric expression that specifies the value today of a future payment, or stream of payments.

For example, if you put \$23.94 in the bank today and leave it there for 15 years at an interest rate of 10% compounded annually, you end up with about \$100. In this case, the present value of \$100 is approximately \$23.94.

**<future value>**

Numeric expression that specifies the cash balance you want after you have made your final payment.

- You set up a savings plan with a goal of having \$75,000 in 18 years to pay for your child's education. For this plan, the future value is \$75,000.
- You take out a loan for \$11,000. The future value is \$0.00, as it is for any typical loan.

**<when due>**

Numeric expression that specifies whether each payment is made at the beginning (1), or at the end (0) of each period. The default is 0 and <when due> must be 0 or 1.

The following example assumes you are making monthly payments at the first of each month on a loan of \$20,000, over 36 months, at an APR of 11.5%. How much of your 5th payment represents principal? The answer (\$481.43) is assigned to Principal5.

```
Principal5 = PPmt(.115/12, 5, 36, -20000, 0, 1)
```

**Returns** Double

An annuity is a series of cash payments, constant in value, made over a period of time. An annuity can be an investment, such as a monthly savings plan, or a loan, such as a home mortgage.

Each payment in an annuity consists of two components: principal and interest. PPmt returns the principal component of the payment.

- Rules**
- <rate per period> and <number pay periods> must be expressed in terms of the same units such as weeks, months or years.
  - You must express cash paid out (such as deposits to savings) using negative numbers, and cash received (such as dividend checks) using positive numbers.

**Example** The following example uses various particulars about a loan. It then returns, for a single payment period the user specifies, the portions of that payment that are interest and principal.

```
Declare
 Global Const ENDPERIOD = 0
 ' When payments are made
 Global Const BEGINPERIOD = 1
End Declare

Sub Start()
 Dim Fmt As String, FutureVal As Double, PresVal As Double
 Dim APR As Double, TotPmts As Integer, PayWhen As Integer
 Dim Period As Integer, IntPmt As Double, PrinPmt As Double
 Dim Payment As Double, Msg As String
 Super::Start()

 ' Specify money format
 Fmt = "$###,###,##0.00"
 ' Normally 0 for a loan
 FutureVal = 0
 PresVal = 450000
 APR = 0.0725
 TotPmts = 180
 ' Assume end period payment
 PayWhen = ENDPERIOD

 Period = Int(180 * Rnd + 1)
 IntPmt = IPmt(APR / 12, Period, TotPmts, -PresVal,
+ FutureVal, PayWhen)
 PrinPmt = PPmt(APR / 12, Period, TotPmts, -PresVal,
+ FutureVal, PayWhen)
 Payment = Pmt(APR / 12, TotPmts, -PresVal, FutureVal,
+ PayWhen)
 Msg = "At period " & Period & " you will pay a total "
+ & " of " & Format(Payment, Fmt) & ", representing "
+ & Format(PrinPmt, Fmt) & " principal and "
+ & Format(IntPmt, Fmt) & " interest. "
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** FV function  
IPmt function  
NPer function  
Pmt function  
PV function  
Rate function

---

## PreciseTimer function

**Example** Returns a value in seconds. The absolute value returned is not defined, but comparing values from two calls gives the time between those calls. This function is supported on Windows systems only, and may not work on some Windows systems due to hardware limitations. If the function is called on the wrong operating system or is not supported by the hardware, it returns Null. This function is intended only for use as a development and debugging aid in e.Report Designer Professional, and is not supported for production use.

**Syntax** PreciseTimer

**Returns** Double value in seconds.

**Example** The following example retrieves time information twice, and computes the amount of time required between the two calls. Create variables timeOne, timeTwo, and timeUsed of type Double on the class.

```
Sub Start()
 ' Retrieve the first time
 timeOne = PreciseTimer
End Sub
Sub Finish()
 ' Retrieve second time
 timeTwo = PreciseTimer
 ' Compute time required
 timeUsed = timeTwo - timeOne
 ShowFactoryStatus("Time used between two calls: " & timeUsed)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

---

## Print statement

Writes unformatted data to a sequential file.



**Syntax** Print #<file number>, [ [{ Spc(<number of blanks>) | Tab(<tab column>) } ] [ <expression list> ] [ { ; | , } ]... ]

**Description** Print usually writes Variant data to a file the same way it writes any other Actuate Basic data type. Table 6-40 lists exceptions to this behavior.

**Table 6-40** Exceptions to how Print writes Variant data to a file

| Data type                                                                               | Print writes this to the file                                              |
|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Variant of VarType 0 (Empty)                                                            | Nothing at all                                                             |
| Variant of VarType 1 (Null)                                                             | The literal value Null                                                     |
| Variant of VarType 7 (Date)                                                             | The date, using whatever Short Date format is defined in the Control Panel |
| Variant of VarType 7 (Date), but with either the date or time component missing or zero | Only the part of the date provided                                         |

The following conditions apply to the Print statement:

- <file number> must match the number of a currently open file.
- The file corresponding to <file number> must be open under either the Output or Append mode.
- You must have write access to the open file. That is, the file must not have been opened using a Lock Write or Lock Read Write clause.
- The data cannot be an object variable, user-defined data type structure, handle to a class, or CPointer.

**Parameters** **<file number>**

Numeric expression that is the file number used to Open a sequential file to which Print writes data.

The following example writes Hello, world! to the file opened under file number 1, and appends a carriage-return-linefeed character-pair (CRLF) to the file, so that whatever is next written to the file appears on the next line:

```
Print #1, "Hello, world!"
```

The following example shows three statements that work together, although they can be separated from one another by any number of lines of code. The first statement opens a file called Mynotes.fil, the second one writes to that file, and the third, by closing it, turns the file over to the operating system to complete the process of writing it to the disk.

```
Open "C:\Myfiles\Mynotes.fil" For Output As #2
Print #2, "This datum.", "This datum, too. "
Close #2
```

**Spc(<number of blanks>)**

Clause that inserts spaces into the output. May be repeated; separated by commas or semicolons.

**<number of blanks>**

Numeric expression that specifies the number of spaces Spc inserts. For example:

```
Print #2, "This datum.", Spc(10), "This datum, too.", Spc(5),
+ "And this."
```

**Tab(<tab column>)**

Clause that tabs to the specified column before the program prints <expression list>. May be repeated; separated by commas or semicolons.

**<tab column>**

Numeric expression that specifies the column to which the program jumps before it prints the <expression list>. For example:

```
Print #2, "This datum."; Tab(5); "This datum, too."; Tab(7);
+ "And this."
```

**<expression list>**

Numeric or string expressions that specify the data that Print writes to the file. There can be any number of these. The default is a blank line, if comma is used.

**;(semicolon)**

Character (semicolon) that determines the position of the next character printed. Instructs Actuate Basic to print the next character immediately after the last one.

**, (comma)**

Character (comma) that determines the position of the next character printed. Instructs Actuate Basic to print the next character at the start of the next print zone. Print zones begin every 14 columns.

The default position for the next character is the next line.

The following example writes the number 250, and the content of P\$ to the file. The comma after the number 250 causes P\$ to be written at the next print zone. The semicolon after P\$ causes Actuate Basic to suppress the printing of the carriage-return-linefeed character-pair, so that whatever is next written to the file occurs immediately after the text in P\$.

```
Print #1, 250, P$;
```

- Tips**
- To ensure integrity of separate data fields, use Write instead of Print. Write delimits data properly and ensures that the data can be read correctly in any locale.
  - Use Print with ASCII text files.
  - Spacing of data displayed on a text screen with monospaced characters may not work well when the data is redisplayed in a graphical environment using proportionally spaced characters.

**Example** The following example creates a file, Testifle.txt, writes some data to it, then closes it. Then, the example reopens the file to read the data just written. Finally, after displaying a message, it closes the file and deletes it.

```
Sub Start()
 Dim TestData As String, UserMsg As String
 Super::Start()
 ' Open to write file
 Open "Testifle.txt" For Output As #1
 Print #1, "Test of the Print statement."
 ' Print extra blank line to file
 Print #1,
 ' Print in two print zones
 Print #1, "Zone 1", "Zone 2"
 ' Print two strings together
 Print #1, "With no space between"; "these"
 Close #1
 ' Open to read file
 Open "Testifle.txt" For Input As #1
 ' Read entire file
 Do While Not EOF(1)
 ' Read a line
 Line Input #1, TestData
 ' Construct message
 UserMsg = UserMsg & TestData
 ShowFactoryStatus(UserMsg)
 Loop
 Close #1
 ' Delete file from disk
 Kill "Testifle.txt"
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Open statement  
Write statement

---

## Put statement

Writes data from a variable to a disk file.

**Syntax** Put [#] <open file number>, [<record number>], <variable to write>

**Description** For files opened in Random mode:

- If the length of the data you write is less than the length specified in the Len clause of the Open statement, Put still writes subsequent records on record-

length boundaries. The space between the end of one record and the beginning of the next is padded with the existing contents of the file buffer.

In the following example, the first Put writes the 4 bytes of the variable HoldingVar1 to the disk file Myfile.txt at byte positions 1-4. Any data that was there is overwritten. The second Put, however, does not pick up where the last one left off but instead skips to the record-length boundary (20) and starts counting from there, which means it writes the 5 bytes of HoldingVar2 to byte positions 21-25. The intervening bytes (5-20) remain what they were, but now represent padding between records.

```
Dim HoldingVar1 As String * 4
Dim HoldingVar2 As String * 5
Open "Myfile.txt" For Random As #1 Len = 20
HoldingVar1 = "1234"
HoldingVar2 = "12345"
Put #1, , HoldingVar1
Put #1, , HoldingVar2
```

- Table 6-41 summarizes how Put behaves, depending on the data type of <variable to write>. Open refers to the particular statement that opened the file in question.

**Table 6-41** Relationships of <variable to write> data types to Put behavior

| <variable to write>                 | Put writes, in this order                                                                                                 | Rules                                                                                                                    |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Variable-length string              | <b>1</b> 2-byte descriptor containing string length<br><b>2</b> Data in the variable                                      | Record length specified in the Len clause of Open must be at least 2 bytes greater than the actual length of the string. |
| Numeric Variant (Variant Types 0-7) | <b>1</b> 2-byte descriptor that identifies the type of the Variant<br><b>2</b> Data in the variable                       | Len clause length must be at least 2 bytes greater than the actual number of bytes required to store the variable.       |
| String Variant (Variant Type 8)     | <b>1</b> 2-byte Variant Type descriptor<br><b>2</b> 2 bytes indicating the string length<br><b>3</b> Data in the variable | Len clause length must be at least 4 bytes greater than the actual length of the string.                                 |
| Any other type of variable          | <b>1</b> Data in the variable                                                                                             | Len clause length must be greater than or equal to the length of the data.                                               |

For files opened in Binary mode:

All the Random descriptions and rules above apply except that the Len clause in Open has no effect. Put writes all variables to disk contiguously, that is, with no padding between records.

In the following example, the first Put writes the 4 bytes of the variable HoldingVar1 to the disk file Myfile.txt at byte positions 1-4. The second Put writes the 5 bytes of HoldingVar2 to byte positions 5-10. No data shows between them as padding.

```
Dim HoldingVar1 As String * 4
Dim HoldingVar2 As String * 5
Open "Myfile.txt" For Binary As #1 Len = 20
HoldingVar1 = "1234"
HoldingVar2 = "12345"
Put #1, , HoldingVar1
Put #1, , HoldingVar2
```

For variable-length strings, Put does not write a 2-byte descriptor; it writes the number of bytes equal to the number of characters already in the string.

The following example writes 12 bytes to file number 1:

```
VariLen$ = String$(12, "*")
Put #1, , VariLen$
```

#### Parameters

##### <open file number>

Numeric expression that specifies the number you used in the previously issued Open that opened the file to which you now want to write using Put.

##### <record number>

Numeric expression:

- For files opened in Random mode, <record number> is the number of the record to be written.
- For files opened in Binary mode, it is the byte position at which writing starts, where the first byte in a file is at position 1, the second byte at position 2, and so on.

The default is the next record or byte—that is, the one following the last Get or Put statement, or the one pointed to by the last Seek2 function.

The following conditions apply to <record number>:

- If you omit <record number> you must still include the delimiting commas that would have been on either side of it had you included it. For example:  

```
Put #1, , HoldingVar1
```
- Must be between 1 and 2,147,483,647.

##### <variable to write>

String expression that specifies the variable to write to the open file.

## Put statement

The following conditions apply to <variable to write>:

- Cannot be an object variable, user-defined data type structure, handle to a class, or CPointer.
- Cannot be an array variable that refers to an entire array, although you can use one that describes a single element of an array.

**Tip** To avoid corrupting or misreading data, be sure your record lengths and/or variable lengths match the lengths of the data you want to read or write.

**Example** The following example prompts the user for three customer names, then writes each name to a test file and reads the names:

```
Sub Start()
 Dim CustName As String, Msg As String
 Dim Indx As Integer, Max As Integer
 Super::Start()
 CustName = String(20, " ")
 ' Create a sample random-access file using PUT:
 Open "testfil3.txt" For Random As #1 Len = 50
 ' Put records into file on disk
 Put #1, 1, "Customer 1"
 Put #1, 2, "Customer Two"
 Put #1, 3, "Third Customer"
 ' Read the sample random-access file using GET:
 Max = Loc(1)
 ' Check if records exist
 If Max = 0 Then
 Msg = "Sorry, your file contains no names."
 Else
 Msg = "Your file contains the following names:"
 End If
 ShowFactoryStatus(Msg)
 For Indx = 1 To Max
 ' Read from test file
 Get #1, Indx, CustName
 ShowFactoryStatus(CustName)
 Next Indx
 ' Close file
 Close #1
 Msg = "The test file will now be deleted."
 ShowFactoryStatus(Msg)
 ' Delete test file
 Kill "testfil3.txt"
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Get statement  
Open statement  
Type...End Type statement

---

## PV function

Returns the present value of an annuity based on periodic, constant payments to be paid in the future, and on an unvarying interest rate.

**Syntax** PV(<rate per period>,<number pay periods>,<each pmt>, <future value>,<when due>)

**Parameters** **<rate per period>**  
Numeric expression that specifies the interest rate that accrues per period. <rate per period> must be given in the same units of measure as <number pay periods>. For instance, if <number pay periods> is expressed in months, then <rate per period> must be expressed as a monthly rate.

**<number pay periods>**  
Numeric expression that specifies the total number of payment periods in the annuity. <number pay periods> must be given in the same units of measure as <rate per period>. For instance, if <rate per period> is expressed as a monthly rate, then <number pay periods> must be expressed in months.

**<each pmt>**  
Numeric expression that specifies the amount of each payment. <each pmt> must be given in the same units of measure as <rate per period>. For instance, if <rate per period> is expressed in months, then <each pmt> must be expressed as a monthly payment.

**<future value>**  
Numeric expression. Specifies the cash balance you want after you have made your final payment.

- You set up a savings plan with a goal of having \$75,000 in 18 years to pay for your child's education. For this plan, the future value is \$75,000.
- You take out a loan for \$11,000. The future value is \$0.00, as it is for any typical loan.

**<when due>**  
Numeric expression that specifies whether each payment is made at the beginning (1), or at the end (0) of each period. The default is 0 and <when due> must be 0 or 1.

The following example assumes you are considering the purchase of a corporate bond with a \$1000 face value. The bond pays an annual coupon of \$100, matures in 15 years, and the next coupon is paid at the end of one year. The yield to

maturity on similar bonds is 12.5%. What is a fair price for this bond (its present value)? The answer, \$834.18, is assigned to the variable PresentValue.

```
PresentValue = PV(.125, 15, 100, 1000, 0)
```

The following examples assumes you have won the lottery. The jackpot is \$10 million, which you receive in yearly installments of \$500,000 per year for 20 years, beginning one year from today. If the interest rate is 9.5% compounded annually, how much is the lottery worth today? The answer, \$4,406,191.06, is assigned to PresentValue.

```
PresentValue = PV(.095, 20, 50000, 10000000, 0)
```

The following example assumes you want to save \$11,000 over the course of 3 years. If the APR is 10.5% and you plan to save \$325 monthly, and if you make your payments at the beginning of each month, how much would you need to start off with in your account to achieve your goal? The answer, \$2,048.06, is assigned to StartValue. Note that <each pmt> is expressed as a negative number because it represents cash paid out.

```
StartValue = PV(.105/12, 3*12, -325, 11000, 1)
```

### Returns Double

An annuity is a series of cash payments, constant in value, made over a period of time. An annuity can be an investment, such as a monthly savings plan, or a loan, such as a home mortgage. The present value is the value today of a future payment, or of a stream of payments structured as an annuity.

For example, if you put \$23.94 in the bank today and leave it there for 15 years at an interest rate of 10% compounded annually, you end up with about \$100. So, the present value of \$100 is approximately \$23.94.

- Rules**
- <rate per period> and <number pay periods> must be expressed in terms of the same units (if weekly / then weeks, monthly / months, yearly / years, and so on).
  - You must express cash paid out (such as deposits to savings) using negative numbers, and cash received (such as dividend checks) using positive numbers.

**Example** The following example prompts the user for the amount to save or invest each month, the annual percentage rate (APR) of the interest, the total number of payments, a target amount, and when during the month payments are made. Then, it interprets the present value as the amount the user would have to start with to achieve the goal.

```
Declare
 Global Const ENDPERIOD = 0
 Global Const BEGINPERIOD = 1
End Declare
```



```

Sub Start()
 Dim EachPmt As Double, APR As Double, Fmt As String
 Dim Msg As String, TotalPmts As Single, PayWhen As Integer
 Dim PresentVal As Double, FutureVal As Double
 Super::Start()
 ' Specify money format
 Fmt = "$#,##0.00"
 EachPmt = 500 ' Amount to save each month
 APR = 0.0275 ' Annual percentage rate for the interest
 TotalPmts = 60 ' Number of months to save
 ' Assume end period payment
 PayWhen = ENDPERIOD
 FutureVal = 50000 ' The goal amount
 PresentVal = PV(APR / 12, TotalPmts, -EachPmt, FutureVal,
+ PayWhen)
 Msg = "Starting with " & Format(-PresentVal, Fmt)
+ & " and saving " & Format(EachPmt, Fmt)
+ & " every month at an interest rate of "
+ & Format(APR, "#0.00%") & " for a period of "
+ & TotalPmts & " months brings you to your goal of "
+ & Format(FutureVal, Fmt) & "."
 ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** FV function  
 IPmt function  
 NPer function  
 Pmt function  
 PPmt function  
 Rate function

---

## QBColor function

Translates the numeric representations for colors from older BASIC languages such as Quick Basic to those used by Actuate Basic.

**Syntax** QBColor(<number to translate>)

**Parameters** <number to translate>  
 Integer that specifies the number of a color, specifically one of the 16 standard Windows colors.

## Randomize statement

Rules:

- Must be between 00 and 15, inclusive.
- If <number to translate> evaluates to Null, QBColor returns Null.

**Returns** Long

**Tips** There are at least four ways to represent a color in Actuate Basic:

- Specify the relative mix of red, green, and blue in a color by using RGB with decimal numbers.
- Directly specify, without using RGB or any function, the relative mix using hexadecimal numbers in a certain format.
- Use one of the 16 standard Windows colors by supplying the appropriate integer to QBColor.
- Use one of the appropriate color name constants from Header.bas.

**Example** The following example displays a variety of color shades on a component:

```
Sub Start ()
 Dim UserAns, Msg
 Super::Start ()
 UserAns = CInt(Rnd * 15)
 Msg = "The hexadecimal code for " & UserAns &
+ " is: " & Hex(QBColor(UserAns))
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** RGB function

---

## Randomize statement

Initializes the random number generator so it can generate a new sequence of apparently random numbers.

**Syntax** Randomize [<seed number>]

**Description** Actuate Basic supplies you with Randomize and Rnd as tools for generating random numbers.

Randomize generates a sequence of pseudo-random numbers by starting with a seed value. The randomizing function then takes that initial seed value and uses it to generate the first number in the pseudo-random sequence. Then it uses that number in turn to produce the second one, and so on. The result is a series of

numbers that vary well enough to seem to have no pattern, or in other words, to be random.

- If you do not use Randomize, Rnd returns the same sequence of numbers every time the program is run.
- Use Randomize before Rnd, or it has no effect.

**Parameters** <seed number>

Numeric expression that specifies the number that initializes the random number generator by supplying it with a new seed value. <seed number> must be between -2,147,483,648 and 2,147,483,647.

For example:

```
Randomize
Randomize 34
```

- Tips**
- To generate numbers that seem truly random, use Randomize—with no argument—at the beginning of your program. In that case, Actuate Basic uses a randomizing seed based on the current running system time, which is almost certain to vary randomly whenever you run the program.
  - Although, you can use Randomize several times throughout a program, it works best if you use it only once, at the beginning.
  - To help you debug certain programs, use Randomize with a specific <seed number>. That way, the same random numbers repeat every time you run the program.

**Example** The following example simulates rolling a die twice by generating random values between 1 and 6 for each roll:

```
Sub Start()
 Dim DieRoll1, DieRoll2, UserMsg
 Super::Start()
 ' Seed random num generator
 Randomize
 ' First roll
 DieRoll1 = Int(6 * Rnd + 1)
 ' Second roll
 DieRoll2 = Int(6 * Rnd + 1)
 UserMsg = "You rolled a " & DieRoll1
 + " & " and a " & DieRoll2
 + " & " giving a total of "
 + " & (DieRoll1 + DieRoll2) & "."
 ShowFactoryStatus(UserMsg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Rnd function

---

## Rate function

Returns the interest rate per period for an annuity.

**Syntax**    `Rate(<number pay periods>, <each pmt>, <present value>, <future value>, <when due>, <starting guess>)`

**Parameters**    **<number pay periods>**  
Numeric expression that specifies the total number of payment periods in the annuity. <number pay periods> must be given in the same units of measure as <each pmt>. For instance, if <each pmt> is expressed as a monthly payment, then <number pay periods> must be expressed in months.

**<each pmt>**  
Numeric expression that specifies the amount of each payment. <each pmt> must be given in the same units of measure as <number pay periods>. For instance, if <number pay periods> is expressed in months, then <each pmt> must be expressed as a monthly payment.

**<present value>**  
Numeric expression that specifies the value today of a future payment, or of a stream of payments.

For example, if you put \$23.94 in the bank today and leave it there for 15 years at an interest rate of 10% compounded annually, you will end up with about \$100. So in this case, the present value of \$100 is approximately \$23.94.

**<future value>**  
Numeric expression that specifies the cash balance you want after you have made your final payment.

- You set up a savings plan with a goal of having \$75,000 in 18 years to pay for your child's education. For this plan, the future value is \$75,000.
- You take out a loan for \$11,000. The future value is \$0.00, as it is for any typical loan.

**<when due>**  
Numeric expression that specifies whether each payment is made at the beginning (1), or at the end (0) of each period. The default is 0 and <when due> must be 0 or 1.

**<starting guess>**  
Numeric expression that specifies the value you estimate Rate will return. In most cases, this is 0.1 (10 percent).

The following example assumes you have taken out a loan for \$20,000, that you are paying off over the course of 3 years. If your payments are \$653.26 per month, and you make them at the beginning of each month, what interest rate (APR) are you paying? The answer, .115 or 11.5%, is assigned to the variable InterestRate.

Note that the return value of Rate must be multiplied by 12 to yield an annual rate.

```
InterestRate = Rate(3*12, -653.26, 20000, 0, 1, .1) * 12
```

### Returns Double

An annuity is a series of cash payments, constant in value, made over a period of time. An annuity can be an investment, such as a monthly savings plan, or a loan, such as a home mortgage.

Rate calculates the interest rate on an annuity iteratively. Starting with the value of <starting guess>, it repeats the calculation until the result is accurate to within 0.00001 percent. If it cannot determine a result after 20 iterations, the function fails.

Rules:

- <number pay periods>, and <each pmt> must be expressed in terms of the same units (weekly/weeks, monthly/months, yearly/years, and so on).
- You must express cash paid out, such as deposits to savings, using negative numbers and cash received, such as dividend checks, using positive numbers.

- Tips**
- Because Rate uses the order of values within the array to interpret the order of payments and receipts, be sure to enter your payment and receipt values in the correct sequence.
  - If Rate fails, try a different value for <starting guess>.

**Example** The following example prompts the user for particulars about a loan, then returns the interest rate. To use this example, paste the first portion at or near the beginning of your Actuate Basic source code (.bas) file.

```
Declare
 Global Const ENDPERIOD = 0
 ' When payments are made
 Global Const BEGINPERIOD = 1
End Declare

Sub Start()
 Dim Fmt As String, FutVal As Double, Guess As Double
 Dim PresVal As Double, Pymt As Double, TotalPmts As Integer
 Dim PayWhen As Integer, APR As Double
 Dim Msg As String
 Super::Start()
 ' Define percentage format
 Fmt = "#0.00%"
 ' Usually 0 for a loan
 FutVal = 0
```

## ReDim statement

```
' Guess of 10 percent
Guess = 0.1
PresVal = 20000 ' The loan amount
Pymt = 600 ' The monthly payment
TotalPmts = 36 ' The number of monthly payments
' Assume end period payment
PayWhen = ENDPERIOD

APR = (Rate(TotalPmts, -Pymt, PresVal, FutVal, PayWhen,
+ Guess) * 12)
Msg = "Your interest rate is " & Format(APR, Fmt) & "."
ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** FV function  
IPmt function  
NPer function  
Pmt function  
PPmt function  
PV function

---

## ReDim statement

Changes the size of an existing dynamic array variable, and reallocates memory if needed.

**Syntax** ReDim [Preserve] <array variable name>(<subscripts>) [As <type>], <array variable name>(<subscripts>) [As <type>]. . .

**Parameters** **Preserve**  
Retains the data in an array when you resize the last dimension. With Preserve, if you decrease the size of any dimension, you will lose some of the data in that dimension although the data in the others will be retained.

**<array variable name>**

Name of the array. Can be a variable name or expression, for example myArray or my.Array. An expression cannot contain parentheses, for example my.Array(1).

**<subscripts>**

Each <subscripts> argument specifies the number of elements in a dimension. The number of <subscripts> arguments specifies the number of dimensions in the array.

Array dimensions using the following syntax:

[<lower> **To**]<upper>[, [<lower> **To**]<upper>]...

The following conditions apply to <subscripts>:

- <lower> and <upper> can range from -2,147,483,647 to 2,147,483,647 inclusive.
- <lower> must always be less than <upper>.
- Each ReDim can specify up to 60 dimensions.
- You cannot add dimensions. That is, the number of <subscripts> arguments must not exceed the number given when the array was originally declared.
- You cannot add dimensions. The number of [<lower>To] <upper> pairs must not exceed the number given when the array was originally declared.

In the following example, the statements are equivalent if you do not use Option Base:

```
ReDim P(7,5)
ReDim P(0 TO 7, 0 TO 5)
ReDim P(7, 0 TO 5)
```

### **As <type>**

Specifies a data type or class for the variable. If you specify a class, the variable can hold a reference to an instance of that class or descendant classes. You must use As <type> to declare the variable that you use to specify the dimensions of an array. If you do not specify a data type in Actuate Basic, the data type for a variable defaults to the Variant data type, which cannot be used as a parameter for sizing an array with the ReDim statement.

Rules:

- Declare an array with the Dim statement before using ReDim.
- Use ReDim only at the procedure level.
- Use ReDim to change the number of elements in an array, not the number of dimensions.
- You cannot use ReDim to resize a fixed-size array.
- You cannot change the data type of an array.
- The Erase statement recovers the memory previously allocated to a dynamic array.

- Tips**
- To work with large arrays, use ReDim, which dynamically allocates memory as needed.
  - To clear the values in an array, use ReDim without Preserve.

- To avoid debugging problems, note that variables declared with Dim are automatically initialized as shown in Table 6-42.

**Table 6-42** Initialization of the variables that are declared with Dim

| Type                    | Initialized As       |
|-------------------------|----------------------|
| Numeric                 | 0                    |
| Variant                 | Empty                |
| Variable-length strings | Empty string("")     |
| User-defined type       | Separate variables   |
| Object or class         | Nothing (before Set) |
| CPointer                | Null                 |

**Example** The following example dynamically resizes an array while a procedure is running:

```
Sub Start()
 Dim Customer1 As Integer, Customer2 As Integer
 Dim I As Integer, MyArray() As Integer

 Super::Start()
 Customer1 = 5
 Customer2 = 10

 ReDim MyArray(Customer1)
 For I = 1 To Customer1
 MyArray(I) = I ^ 2
 ShowFactoryStatus(I & ": " & MyArray(I))
 Next I

 ReDim MyArray(Customer2)
 For I = 1 To Customer2
 MyArray(I) = I ^ 2

 ShowFactoryStatus(I & ": " & MyArray(I))
 Next I
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Dim statement  
Erase statement



## Rem statement

Inserts comments or explanatory remarks in a program.

**Syntax** {Rem | :Rem | ' }<comment>

**Parameters** <comment>

Any characters or numbers, including spaces or punctuation. <comment> is a remark that explains what is happening in the program.

- Description**
- All text to the right of Rem is ignored by the compiler.
  - <comment> appears exactly as you entered it when the program is listed.
  - If you branch from a GoTo statement to a line that contains Rem, program execution continues with the first executable statement that follows Rem.

To place a comment on the same line as a code instruction, precede the comment either with the apostrophe identifier or with :Rem.

```
For A = 1 To 20 'This code steps through the 20 items
For A = 1 To 20 : REM This code steps through the 20 items
```

To place a comment on a line by itself, precede the comment with any one of the three identifiers.

```
Rem The 3rd line after this steps through 20 items of an array.
: Rem The 2nd line after this steps through 20 items of array.
' The next line steps through the 20 items of the array.
For A = 1 To 20
```

- Tips**
- Use comments liberally throughout your program to explain how the code works.
  - To disable a line of code when debugging, precede it with one of the three Rem identifiers. Temporarily commenting out the line, lets you see what happens when that line is left out of the program.

**Example** The following example shows the various ways of using Rem:

```
Sub Start()
 Dim Message1, Message2, Message3, AllMessages

 Super::Start()
 Rem The compiler will ignore this entire line.
 ' This line will also be ignored.
 Message1 = "First message line." :Rem Colon before REM here
 Message2 = " Second message line." ' This one needs no colon
 : Rem This line has a colon, but really does not need it.
 Message3 = " This example shows different ways to use REM."
```

## Reset statement

```
AllMessages = Message1 & Message2 & Message3
ShowFactoryStatus(AllMessages)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    Format, Format\$ functions  
              Str, Str\$ functions

---

## Reset statement

Writes all data in open file buffers to the appropriate disk files, then closes all open disk files.

**Syntax**    Reset

**Description**    Performs the same task as Close with no parameters.

**Example**    The following example creates and opens two test files, closes them using Reset, then reopens them and reads back the data. Finally, it deletes the test files.

```
Sub Start()
 Dim FirstVar, SecondVar
 Super::Start()
 Open "testalpha.fil" for Output As #1
 Open "testbeta.fil" for Output As #2
 Print #1, "This line is in the first test file."
 Print #2, "This line is in the second test file."
 Reset

 Open "testalpha.fil" for Input As #1
 Open "testbeta.fil" for Input As #2
 Line Input #1, FirstVar
 Line Input #2, SecondVar
 Reset
 ShowFactoryStatus(FirstVar & " " & SecondVar)
 Reset
 ShowFactoryStatus("The test files will now be deleted.")
 Kill "testalpha.fil"
 Kill "testbeta.fil"
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    Close statement  
              End statement

# Resume statement

Releases control from an error-handling routine and resumes program execution at a specified place.

**Syntax**    Resume { [0] | Next | <line> | <line label> }

**Parameters**    **[0]**  
Keyword (an optional zero) indicating that Actuate Basic is to resume program execution with the statement that caused the error, or with the statement that last called out of the procedure containing the error handler.

For example, the following two statements are equivalent:

```
Resume
Resume 0
```

**Next**  
Keyword indicating that Actuate Basic is to resume program execution with the statement following the one that caused the error, or with the statement following the one that last called out of the procedure containing the error handler. For example:

```
Resume Next
```

**<line> or <line label>**  
Keyword indicating the line number or line label at which Actuate Basic is to resume execution. This must be in the same procedure as the error handler. For example, the following example instructs Actuate Basic to continue execution at the label Continuation:

```
Resume Continuation
```

**Description**    Where Actuate Basic resumes execution depends on the location of the error handler in the which the error is trapped, not necessarily on the location of the error itself. Table 6-43 summarizes where a program resumes execution when either the Resume [0] or Resume Next statement is used.

**Table 6-43**        Where a program resumes when using Resume [0] or Resume Next

| Error occurred                                   | Resume [0]                                                                        | Resume Next                                                                                     |
|--------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| In the same procedure as the error handler.      | The statement that caused the error.                                              | The statement after the one that caused the error.                                              |
| In a different procedure from the error handler. | The statement that last called out of the procedure containing the error handler. | The statement after the one that last called out of the procedure containing the error handler. |

- Rules**
- You can only use Resume in an error-handling routine.
  - You can only exit an error-handling routine by using Resume, not by using End Sub or End Function.

**Example** The following example generates two errors in succession. In the first case, the error routine displays the error number and description, then uses Resume to resume execution of the code at the line following the line that caused the error. In the second case, the error routine displays a simple message and uses Resume to branch to a specified routine. This branch causes the flow of program execution to skip the line following the one that caused the error.

```
Sub Start()
 Super::Start()
 On Error GoTo ErrorHandler
 Dim Zilch, Zero, DivisionByZero
 Zilch = 0
 Zero = 0
 DivisionByZero = Zilch/Zero
 ShowFactoryStatus("The line after the divide-by-zero error.")
 Open "z:\zzzzzz.zzz" for Input As #1
 ShowFactoryStatus("Theis line is after the error. Skipped.")
Badfile:
 ShowFactoryStatus("This line is in the Badfile routine.")
 Exit Sub
ErrorHandler:
 If Err = 8 Then
 ShowFactoryStatus("Error: " & Err & " occurred: " &
+ Error$(Err))
 Resume Next
 Else
 ShowFactoryStatus("File error. Going to badfile label.")
 Resume Badfile
 End If
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** On Error statement

---

## RevInStr function

Returns the starting position of the last occurrence of one string within another. RevInStr is used to extract a filename like Myhouse.txt from a long or fully qualified string like C:/Country/State/City/Street/Myhouse.txt.

**Syntax** RevInStr(<string being searched>, <string to find>)

RevInStr(<end>, <string being searched>, <string to find>)

**Description** RevInStr is like InStr, except that where InStr returns the position of the first character of the first occurrence of a string, RevInStr returns the position of the first character of the last occurrence of a string.

In cases where <string to find> occurs only once within <string being searched>, first and last occurrences coincide, and both InStr and RevInStr return the same value.

In the following examples, InStr and RevInStr return different values:

```
RevInStr("C:/Country/State/City/Myfile.txt", "/") = 22
RevInStr(21, "C:/Country/State/City/Myfile.txt", "/") = 17
RevInStr("C:/Country/State/State2/City/Myfile.txt", "/State")
 = 17
```

In the following examples, both InStr and RevInStr return the same value:

```
RevInStr("C:/Country/State/City/Myfile.txt", "/State") = 11
RevInStr("C:/Country/State/State2/City/Myfile.txt", "Etats/")
 = 0
```

**Parameters** **<string being searched>**  
String you are inspecting in order to locate the last occurrence of <string to find>.

<string being searched> must be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a variant that can evaluate to a string.

**<string to find>**

String in which last occurrence you are seeking is within <string being searched>.

<string to find> must be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a variant that can evaluate to a string.

**<end>** (optional)

The position within <string being searched> at which to end searching. The first character occupies position 1.

- If you supply <end>, Actuate Basic searches for the last occurrence of <string to find> that appears before the character at position <end>.
- If you do not supply <end>, Actuate Basic searches to the last character of <string being searched>.
- Must be a number or numeric expression.
- Must be between 1 and 2,147,483,647, inclusive.

**Returns** Integer

- If <string to find> is found within <string being searched>, RevInStr returns the position of the first character at which the last match was found.

## RGB function

- If <string to find> is not found within <string being searched>, RevInStr returns 0.
- If <string being searched> is zero-length, RevInStr returns 0.
- If <end> is greater than the length of <string being searched>, RevInStr returns 0.

**Example** The following example shows how to use RevInStr to find the filename portion of a fully qualified path that contains slashes.

Because RevInStr returns the position of the last occurrence of a slash, the following code displays Johnsmith.fil regardless of the number of slashes in the file's full name or path:

```
Sub Start()
 Dim baseName, fileName As String
 Dim posn As Integer
 Super::Start()
 fileName =
+ "C:/USA/Massachusetts/Springfield/Zip01109/Johnsmith.fil"
 posn = RevInStr(fileName, "/")
 If posn = 0 Then
 baseName = fileName
 Else
 baseName = Mid$(fileName, posn + 1)
 End If
 ShowFactoryStatus(baseName)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Format, Format\$ functions  
Left, Left\$ functions  
Len function  
Mid, Mid\$ functions  
Right, Right\$ functions

---

## RGB function

Returns a number representing the RGB color value for a given mix of red, green and blue values.

**Syntax** RGB(<red>, <green>, <blue>)

**Parameters** <red>  
Integer indicating the red value of the color.

- If <red> is greater than 255, <red> defaults to 255.

- If <red> is empty, <red> defaults to 0.
- <red> must be greater than 0.
- <red> must not be Null.

**<green>**

Integer indicating the green value of the color.

- If <green> is greater than 255, <green> defaults to 255.
- If <green> is empty, <green> defaults to 0.
- <green> must be greater than 0.
- <green> must not be Null.

**<blue>**

Integer indicating the blue value of the color.

- If <blue> is greater than 255, <blue> defaults to 255.
- If <blue> is empty, <blue> defaults to 0.
- <blue> must be greater than 0.
- <blue> must not be Null.

**Returns** Long

- Returns a number between 0 and 16,777,215, inclusive. This single number represents the relative intensities of red, green, and blue that make up a particular color.
- Table 6-44 shows some standard colors. For each color, you see the decimal values returned by RGB, the hexadecimal equivalent, the corresponding QBColor number, and the mix of red, green and blue decimal values that make up the color.

**Table 6-44** Colors and the corresponding RGB values

| Color   | RGB Value<br>(Dec) | RGB Value<br>(Hex) | QBColor | Red<br>Value | Green<br>Value | Blue<br>Value |
|---------|--------------------|--------------------|---------|--------------|----------------|---------------|
| Black   | 0                  | &H00               | 0       | 0            | 0              | 0             |
| Blue    | 16711680           | &HFF0000           | 1       | 0            | 0              | 255           |
| Green   | 65280              | &HFF00             | 2       | 0            | 255            | 0             |
| Cyan    | 16776960           | &HFFFF00           | 3       | 0            | 255            | 255           |
| Red     | 255                | &HFF               | 4       | 255          | 0              | 0             |
| Magenta | 16711935           | &HFF00FF           | 5       | 255          | 0              | 255           |
| Yellow  | 65535              | &HFFFF             | 6       | 255          | 255            | 0             |

(continues)

**Table 6-44** Colors and the corresponding RGB values (continued)

| Color | RGB Value<br>(Dec) | RGB Value<br>(Hex) | QBColor | Red<br>Value | Green<br>Value | Blue<br>Value |
|-------|--------------------|--------------------|---------|--------------|----------------|---------------|
| White | 16777215           | &HFFFFFF           | 15      | 255          | 255            | 255           |
| Gray  | 8421504            | &H808080           | 8       | 128          | 128            | 128           |

**Tips** There are four ways in which you can precisely represent a color in Actuate Basic:

- Specify the relative mix of red, green and blue in a color by using RGB with decimal numbers, as described here.
- Directly specify, without using RGB or any function, the relative mix using hexadecimal numbers in a certain format.
- Use one of the 16 standard Windows colors by supplying the appropriate integer to QBColor.
- Use one of the built-in color constant names, such as BLUE.

**Example** The following example returns the RGB value for a random mix of red, green, and blue values:

```
Sub Start()
 Dim RedPart As Integer, GreenPart As Integer
 Dim BluePart As Integer
 Dim HexVersion, Msg As String, RGBNumber

 Super::Start()
 RedPart = CInt(Rnd * 255)
 GreenPart = CInt(Rnd * 255)
 BluePart = CInt(Rnd * 255)
 RGBNumber = RGB(RedPart, GreenPart, BluePart)
 HexVersion = Hex(RGBNumber)
 Msg = "Red component: " & RedPart
+ & " Green component: " & GreenPart
+ & " Blue component: " & BluePart
+ & " The decimal representation of that mix of "
+ & "red, green, and blue is: "
+ & RGBNumber & ". "
+ & "The hexadecimal representation of it is: "
+ & HexVersion
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** QBColor function



## Right, Right\$ functions

Returns a segment of a Variant or String, starting at the last character and working toward the beginning.

**Syntax** Right(<string exprs>, <length>)  
Right\$(<string exprs>, <length>)

**Parameters** <string exprs>

Source string from which you are copying the last portion. Can be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a Variant that can evaluate to a String.

<length>

Long that specifies how many characters to copy from the right of <string exprs>.

- <length> must be an Integer or expression between 0 and 2,147,483,647.
- In the following example, the statements are equivalent. Both return Widget:

```
Right$("Widget", 6)
Right$("Widget", 99)
```

**Returns** Right: Variant  
Right\$: String

- If <length> = 0, returns zero-length string.
- If <length> is greater than or equal to the length of <string exprs>, returns an exact copy of <string exprs>.
- If any parameter evaluates to Null, Right[\$] returns Null.

- Tip**
- Use Len to find the number of characters in <string exprs>.
  - Use InStr to find the position of a specified character in <string exprs>.

**Example** The following example parses a string for a customer's first and last names:

```
Sub Start()
 Dim FName As String, Msg As String, LName As String
 Dim SpacePos As Integer, Customer As String
 Super::Start()
 Customer = "Manuel Barajas"
 ' Find the space
```

```
SpacePos = InStr(1, Customer, " ")
If SpacePos Then
 ' Get first and last name
 FName = Left$(Customer, SpacePos - 1)
 LName = Right$(Customer, Len(Customer) - SpacePos)
 Msg = "The first name is "" & FName & "." & """"
+ & " The last name is """"
+ & LName & "." & """"
Else
 Msg = Customer & " does not have a first and last name!"
End If
' Display the message
ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    Format, Format\$ functions  
              Left, Left\$ functions  
              Len function  
              Mid, Mid\$ functions

---

## RightB, RightB\$ functions

Returns a segment of a Variant or String, starting at the last byte and working toward the beginning.

These functions are provided for backward compatibility with previous Actuate releases. Actuate uses UCS-2 as internal encoding, therefore passing strings consisting of characters from different code pages might produce unexpected results. For this reason, Actuate recommends you use the Right and Right\$ functions instead of the RightB and RightB\$ functions.

**Syntax**    RightB(<string exprs>, <length>)  
              RightB\$(<string exprs>, <length>)

**Parameters**    **<string exprs>**  
Source string from which you are copying the last portion. It can be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a Variant that can evaluate to a String.

**<length>**  
Long that specifies how many bytes to copy from the right of <string exprs>.

Rule: Must be an Integer or expression between 0 and 2,147,483,647.

**Example** The following statements are equivalent. Both return Widget:

```
RightB$ ("Widget", 6)
RightB$ ("Widget", 99)
```

**Returns** RightB: Variant  
RightB\$: String

- If <length> = 0, the function returns zero-length string.
- If <length> is greater than or equal to the length of <string exprs>, the function returns an exact copy of <string exprs>.
- If any parameter evaluates to Null, RightB[\$] returns Null.

- Tips**
- Use LenB to find the number of bytes in <string exprs>.
  - Use InStrB to find the position of a specified bytes in <string exprs>.

**See also** InStrB function  
LeftB, LeftB\$ functions  
LenB function  
MidB, MidB\$ functions  
Right, Right\$ functions

---

## Rmdir statement

Removes a subdirectory from a disk.

**Syntax** Rmdir <directory name>

**Parameters** <directory name>

String expression that is the name of the directory or subdirectory to be deleted. The default is the current drive and directory.

The following conditions apply to <directory name>:

- Must specify a valid directory.
- Target directory must contain no child subdirectories.
- Target directory must be empty.

<directory name> has the following syntax.

[<drive:>] [ \ ]<directory>[\<directory>]...(Windows)

[ / ]<directory>[/<directory>]...(UNIX)

**<drive:>**

Character, followed by a colon, that specifies the drive (Windows only).

## RmDir statement

### <directory>

String expression that is the name of the directory or subdirectory to remove.

For example, the following statement removes the subdirectory Test under the current directory on the current drive:

```
RmDir "Test"
```

The following removes the subdirectory Test under the root directory of the current drive:

```
RmDir "\Test"
```

The following removes the subdirectory Test under the root directory of drive D:

```
RmDir "D:\Test"
```

**Description** RmDir works like the DOS command of the same name. Unlike the DOS command it cannot be abbreviated.

- Tips**
- If a directory name contains embedded spaces, you cannot use the DOS RmDir command to remove it. Instead, use Rmdir.
  - To determine the current directory, use CurDir.

**Example** The following example determines whether a \Tmpzzz subdirectory exists on the current drive. If the subdirectory does not exist, the example creates the subdirectory, prompts the user to retain or remove the subdirectory, and responds accordingly.

```
Sub Start()
 Dim UserAns As Integer, ThisDrive As String
 Dim Msg As String, TempDir As String
 Super::Start()
 ' Set up error handler
 On Error Resume Next
 ' Get current drive letter
 ThisDrive = Left$(CurDir, 2)
 ' Construct full path spec
 TempDir = UCase$(ThisDrive + "\Tmpzzz")
 ' Make the new directory
 MkDir TempDir
 ' Does it exist?
 If Err = 41 Then
 Msg = "Sorry, " & TempDir & " directory already exists. "
 Else
 Msg = TempDir & " directory was just created. "
 ShowFactoryStatus(Msg)
 ShowFactoryStatus("The directory will now be deleted.")
 Rmdir TempDir
 End If
End Sub
```

```
End If
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** CurDir, CurDir\$ functions  
MkDir statement

---

## Rnd function

Returns a random number.

**Syntax** Rnd[(**<sequencing code>**)]

**Parameters** **<sequencing code>**

Numeric expression for the code number that identifies the value to return from the pseudo-random sequence. The pseudo-random sequence is the fixed sequence of numbers you generate if you have not used Randomize and you call Rnd repeatedly without any argument.

If **<sequencing code>** is omitted, Actuate Basic moves to the next number in the pseudo-random sequence.

Table 6-45 shows the possible values of **<sequencing code>** and the corresponding values Rnd returns from the pseudo-random sequence.

**Table 6-45** Possible values of **<sequencing code>** and the corresponding values that Rnd returns

| <b>&lt;sequencing code&gt;</b> | <b>Rnd returns</b>                                                                                      |
|--------------------------------|---------------------------------------------------------------------------------------------------------|
| Less than 0                    | The same number every time. The specific value varies as a function of <b>&lt;sequencing code&gt;</b> . |
| Greater than 0                 | The next random number in the pseudo-random sequence.                                                   |
| Equal to 0                     | The number most recently generated.                                                                     |

For example, the following expressions are all true, but only if you evaluate them in the order shown and do not use a Randomize statement before them.

If you use a Randomize statement, the last of these expressions is always different.

```
Rnd(-5) = 0.298564536496997
Rnd(0) = .298564536496997
Rnd(1) = .223996873013675
Rnd = .0928899832069874
```

**Returns** Single

- Rnd returns a value less than 1 but greater than or equal to 0.
- Unless you use Randomize beforehand, Rnd generates the same random-number sequence every time the program is run.
- As long as <sequencing code> is omitted or is greater than zero, each successive call to Rnd uses the previous random number as the seed for the next one.

**Tips** ■ To generate a more apparently random sequence every time the program is run, use Randomize without an argument before you use Rnd.

- To produce random integers in a given range, use the following formula:

`Int((<high number> - <low number> + 1) * Rnd + <low number>)`

In this formula, <high number> represents the highest number in the range, and <low number> the lowest.

**Example** The following example simulates rolling a die twice by generating random values between 1 and 6 for each roll:

```
Sub Start()
 Dim DieRoll1, DieRoll2, UserMsg
 Super::Start()
 ' Seed random num generator
 Randomize
 ' First roll
 DieRoll1 = Int(6 * Rnd + 1)
 ' Second roll
 DieRoll2 = Int(6 * Rnd + 1)
 UserMsg = "You rolled a " & DieRoll1
+ & " and a " & DieRoll2
+ & " giving a total of "
+ & (DieRoll1 + DieRoll2) & "."
 ShowFactoryStatus(UserMsg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Randomize statement  
Time, Time\$ functions

---

## RSet statement

Right-aligns a string within the space of a string variable.

**Syntax** RSet <string variable> = <string exprs>

**Parameters**    **<string variable>**  
Name of a string variable in which RSet stores the right-aligned <string exprs>.

**<string exprs>**  
String expression that you want RSet to right-align within <string variable>.

Table 6-46 shows the settings for <string exprs> and the corresponding RSet behaviors.

**Table 6-46**        Settings for string expressions and corresponding RSet behavior

| <string exprs>                    | Behavior of RSet                                                                                                                                                                   |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Shorter than<br><string variable> | Right-aligns <string exprs> within <string variable>. Replaces any leftover characters in <string variable> with spaces.                                                           |
| Longer than<br><string variable>  | Places only the right most characters, up to the length of the <string variable>, in <string variable>. Truncates characters beyond the length of <string variable> from the left. |

**Example**    The following example right-aligns text within a 20-character String variable:

```
Sub Start()
 Dim Msg, TmpStr As String
 Super::Start()
 ' Create 20-character string
 TmpStr = String(20, "*")
 Msg = "The following two strings that have been right"
+ & "and left justified in a " & Len(TmpStr)
+ & "-character string."
 ShowFactoryStatus(TmpStr)
 ' Right justify
 RSet TmpStr = "Right->"
 ShowFactoryStatus(TmpStr)
 ' Left justify
 LSet TmpStr = "<-Left"
 ShowFactoryStatus(TmpStr)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    LSet statement

---

## RTrim, RTrim\$ functions

Returns a copy of a string after removing the trailing spaces.

**Syntax**    RTrim(<string exprs>)

RTrim\$(<string exprs>)

**Parameters** <string exprs>

String expression from which RTrim\$ strips trailing spaces. Trailing spaces are any spaces that occur after the last non-space character in a string. The <string exprs> must be a variable string, a literal string, a string constant, the return value of any function that returns a string, or a Variant that can evaluate to a String.

**Returns** RTrim: Variant

RTrim\$: String

- If there are no trailing spaces, RTrim[\$] returns the original <string exprs>.
- If <string exprs> evaluates to Null, RTrim[\$] returns Null.

- Tips**
- To simultaneously strip both leading and trailing spaces in a string, use Trim[\$].
  - To find other spaces in the middle of a string, use InStr.

**Example** The following example strips trailing spaces from a string variable, while LTrim[\$] strips leading spaces:

```
Sub Start()
 Dim Msg As String, NL As String
 Dim CustName As String, CustName1 As String
 Super::Start()
 CustName = " Harold Pinter "
 ' Strip left and right spaces
 CustName1 = LTRIM$(RTRIM$(CustName))
 Msg = "The original client name " & "'" & CustName
+ & "' was " & Len(CustName) & " characters long. "
+ & "There were two leading spaces "
+ & "and two trailing spaces. "
+ & "The name returned after stripping the spaces "
+ & "is: " & "'" & CustName1 & "'"
+ & "...and it contains only "
+ & Len(CustName1) & " characters."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Format, Format\$ functions

LTrim, LTrim\$ functions

Trim, Trim\$ functions



---

## SafeDivide function

Divides two given numbers, but prevents division by zero. Returns a specified value if division by zero might otherwise have occurred.

**Syntax** SafeDivide(<num> As Variant, <denom> As Variant, <ifZero> As Variant) As Variant

**Parameters**

**<num>**  
Any number, or valid numeric expression. The numerator of a fraction or ratio.

**<denom>**  
Any number, or valid numeric expression. The denominator of a fraction or ratio.

**<ifZero>**  
Value to return when <denom> is zero.

**Returns** Variant

If <denom> = 0, SafeDivide returns <ifZero>. Otherwise, SafeDivide returns <num>/<denom>.

**Example** The following example averages amounts in a number of records. If no records exist, the example does not generate a division-by-zero error and returns zero.

```
AverageAmtVar = SafeDivide(Sum(Amount)), Count(), 0)
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Err function  
Error, Error\$ functions  
On Error statement

---

## Second function

Returns an Integer from 0 to 59, inclusive, that represents the second of the minute specified by a date expression.

**Syntax** Second(<date expression>)

**Parameters**

**<date expression>**  
Date expression, or any numeric or string expression that can be interpreted as a date, a time, or both a date and a time:

- Can be a string such as November 12, 1982 8:30 PM, Nov 12, 1982 08:30 PM, 11/12/82 8:30pm, or 08:30pm, or any other string that can be interpreted as a date, a time, or both a date and a time in the valid range.

## Second function

- Can be a date serial number such as 30267.854, which corresponds to November 12, 1982 at 8:30 P.M., or any other number that can be mapped to a date, a time, or both a date and a time in the valid range.
- For date serial numbers, the integer component represents the date itself while the decimal component represents the time of day on that date, where January 1, 1900, at noon has the date serial number 2.5, and negative numbers represent dates prior to December 30, 1899 (0).

The default if no time specified is 0.

The following conditions apply to <date expression>:

- If <date expression> includes a date, it must be a valid date, even though Second does not return a date. A valid date is any date in the range January 1, 100, through December 31, 9999, expressed in one of the standard date formats.
- If <date expression> includes a time, it must be in the range 00:00:00 (12:00:00 A.M.) through 23:59:59 (11:59:59 P.M.), in either 12- or 24-hour format.
- If <date expression> is a numeric expression, it must be in the range -657434.0 to +2958465.9999, inclusive.
- If <date expression> is a variable containing a date serial number, the variable must have been explicitly declared as one of the numeric types.
- <date expression> is parsed according to the formatting rules of the current run-time locale.

For example, the following statements are equivalent. Each assigns 22 to the variable UserSecond.

```
UserSecond = Second("6/7/64 2:35:22pm")
UserSecond = Second("5:35:22 pm")
UserSecond = Second("June 7, 1964 2:35:22 PM")
UserSecond = Second("Jun 7, 1964") + 22
UserSecond = Second(23535.60789)
UserSecond = Second(0.60789)
```

### Returns Integer

- If <date expression> cannot be evaluated to a date, Second returns Null. For example:  
`Second("This is not a date.")` returns Null
- If <date expression> fails to include all date components (day, month, and year), Second returns Null. For example:  
`Second("Nov 12, 1982 7:11:22 AM")` returns 22, but  
`Second("Nov, 1982 7:11:22 AM")` returns Null
- If <date expression> is Null, Second returns Null.

The following assumes that the AC\_CENTURY\_BREAK property is set to the default value of 30. For information about using AC\_CENTURY\_BREAK, please see *Accessing Data using e.Report Designer Professional*:

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000. For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).
- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

**Tip** If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, “1/2/2005” means January 2nd, 2005; but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

**Example** The following example displays the number of hours, minutes, and seconds remaining until midnight:

```
Sub Start ()
 Dim HrDiff As Integer, MinDiff As Integer, SecDiff As Integer
 Dim RightNow As Double, Midnight As Double
 Dim TotalDiff As Double, TotalMinDiff As Double
 Dim TotalSecDiff As Double, Msg As String
 Super::Start ()
 Midnight = TimeValue("23:59:59")
 ' Get current time
 RightNow = Now
 ' Get diffs from midnight
 HrDiff = Hour(Midnight) - Hour(RightNow)
 MinDiff = Minute(Midnight) - Minute(RightNow)
 SecDiff = Second(Midnight) - Second(RightNow) + 1

 ' Restate seconds and minutes if necessary
 If SecDiff = 60 Then
 ' Add 1 to minute
 MinDiff = MinDiff + 1
 ' And set 0 seconds
 SecDiff = 0
 End If
 If MinDiff = 60 Then
 ' Add 1 to hour
 HrDiff = HrDiff + 1
 ' And set 0 minutes
 MinDiff = 0
 End If
```

## Seek statement

```
End If
' Now get totals
TotalMinDiff = (HrDiff * 60) + MinDiff
TotalSecDiff = (TotalMinDiff * 60) + SecDiff
TotalDiff = TimeSerial(HrDiff, MinDiff, SecDiff)

' Prepare msg for display
Msg = "There are a total of "
+ & Format(TotalSecDiff, "#,##0")
+ & " seconds until midnight. That translates to "
+ & HrDiff & " hours, "
+ & MinDiff & " minutes, and "
+ & SecDiff & " seconds. "
+ & "In standard time notation, it becomes "

' Remember not to use "mm" for minutes! m is for month.
Msg = Msg & Format(TotalDiff, "hh:nn:ss") & "."
ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Day function  
Hour function  
Minute function  
Month function  
Now function  
Time, Time\$ functions  
Weekday function  
Year function

---

## Seek statement

Sets the position in a file for the next read or write. The Seek statement should not be confused with the Seek2 function.

**Syntax** Seek #<open file number>, <next position>

**Parameters** <open file number>  
Numeric expression is the file number for a file that is Open.

- Must be the number of a currently open file.
- The pound sign (#) preceding the file number is required.

**<next position>**

Numeric expression that specifies the number that indicates where in <open file number> the next read or write should occur. <next position> must be in the range 1 to 2,147,483,647, inclusive.

<next position> means, or refers to, different things, depending on the mode under which the file corresponding to <open file number> is open. Table 6-47 summarizes these different meanings.

**Table 6-47** Interpretations of <next position> in different modes

| Mode                                | <next position> refers to...                                                       |
|-------------------------------------|------------------------------------------------------------------------------------|
| Random                              | The number of a record in the open file. The first record is record 1.             |
| Binary<br>Input<br>Output<br>Append | The byte position relative to the beginning of the file. The first byte is byte 1. |

For example, in the following code fragment, we open a file called Test.dat for random access and use Get to read record number 52 from it; this action positions the pointer at record 53. Then we use the Seek2 function to save this new position to the variable CurrentRec. Finally, we use the Seek statement to reposition the file pointer to record number 100.

```
Open "Test.dat" For Random As #1 Len = 32
Get #1, 52, TestRecord
CurrentRec = Seek2(1)
Seek #1, 100
```

- Rule**
- If <next position> is beyond the end of a file, Seek extends the file.
  - Record numbers in Get and Put override Seek file positioning.

**Example** The following example defines three customer names. It writes each name to a test file and then reads the names back.

```
Sub Start()
Dim CustName As String
Dim I As Integer, Max As Integer, Msg As String
Super::Start()
' Create a sample data file
Open "Testfile.dat" For Random As #1 Len = 50
' Put records into file on disk
Put #1, 1, "Customer 1"
Put #1, 2, "Customer Two"
Put #1, 3, "Third Customer"
Close #1
```

## Seek2 function

```
' Close the file and open again for reading
Open "Testfile.dat" For Random As #1 Len = 50
' Calc total # of records
Max = LOF(1) \ 50 + 1
' Read file backwards
For I = Max To 1 Step -1
 ' Seek statement used
 Seek #1, I
 ' Get record at that position
 Get #1, , CustName
 Msg = "Record #" & (Seek2(1) - 1) & " contains: "
 Msg = Msg & CustName
 ShowFactoryStatus(Msg)
Next I
' Close test file
Close #1
Msg = "The test file will now be deleted."
ShowFactoryStatus(Msg)
' Delete file from disk
Kill "Testfile.dat"
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Get statement  
Open statement  
Put statement  
Seek2 function

---

## Seek2 function

Returns the current position in an open file. This function should not be confused with the Seek statement.

**Syntax** Seek2(<open file number>)

**Parameters** <open file number>

Numeric expression that represents the file number of a file that is Open. This must be the number of a currently open file.

For example, in the following code fragments, we open a file called Test.dat for random access and use Get to read record number 52 from it; this action positions the pointer at record 53. Then we use the Seek2 function to save this new position to the variable CurrentRec. Finally, we use the Seek statement to reposition the file pointer to record number 100.

```
Open "Test.dat" For Random As #1 Len = 32
Get #1, 52, TestRecord
CurrentRec = Seek2(1)
Seek #1, 100
```

**Returns** Integer

- Returns a value between 1 and 2,147,483,647.
- The value Seek2 returns means, or refers to, different things, depending on the mode under which the file corresponding to <open file number> is open. Table 6-48 summarizes these different meanings.

**Table 6-48** Interpretations of Seek2 in different modes

| Mode                                | Seek2 refers to...                                              |
|-------------------------------------|-----------------------------------------------------------------|
| Random                              | The number of the next record to be read or written to.         |
| Binary<br>Input<br>Output<br>Append | The byte position at which the next operation is to take place. |

**Example** The following example prompts the user for three customer names.

After writing the names to a test file, the Seek statement repositions the pointer three times successively, then displays the names in reverse order. The Seek2 function identifies the record numbers.

```
Sub Start()
Dim CustName As String
Dim I As Integer, Max As Integer, Msg As String
Super::Start()
' Create a sample data file
Open "Testfile.dat" For Random As #1 Len = 50
' Put records into file on disk
Put #1, 1, "Customer 1"
Put #1, 2, "Customer Two"
Put #1, 3, "Third Customer"
Close #1
' Close the file and open again for reading
Open "Testfile.dat" For Random As #1 Len = 50
' Calc total # of records
Max = LOF(1) \ 50 + 1
' Read file backwards
For I = Max To 1 Step -1
' Seek statement used
Seek #1, I
' Get record at that position
Get #1, , CustName
```

## Select Case statement

```
Msg = "Record #" & (Seek2(1) - 1) & " contains: "
Msg = Msg & CustName
ShowFactoryStatus(Msg)
Next I
' Close test file
Close #1
Msg = "The test file will now be deleted."
ShowFactoryStatus(Msg)
' Delete file from disk
Kill "Testfile.dat"
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Get statement  
Open statement  
Put statement  
Seek statement

---

## Select Case statement

Executes the first of several blocks of instructions for which an associated expression matches a given one.

**Syntax** Select Case <compare to this>

[Case <value to compare> [, <value to compare>]...

[<statement block 1>]]

[Case <value to compare> [, <value to compare>]...

[<statement block 2>]]

...

[Case Else

[<statement block n>]]

End Select

**Description** For the purposes of this discussion, one expression is said to match a second expression when they are equivalent, or when the first falls within a range specified by the second.



Actuate Basic compares <compare to this> against each <value to compare> until it finds a match. For the first—and only the first—of these matches, if there is one, Actuate Basic:

- Executes the instructions in the <statement block> that immediately follows the matching <value to compare>.
- Skips any other intervening lines.
- Passes control to the statement that follows End Select.

If no <value to compare> at all matches <compare to this>, Actuate Basic looks for a Case Else clause. If it finds one, it:

- Executes any statements that immediately follow it.
- Passes control to the statement immediately following End Select.

If it does not find a Case Else clause, it passes control to the statement immediately following End Select.

#### Parameters

##### <compare to this>

A valid expression of any data type that can be evaluated. <compare to this> is compared to <value to compare> and that determines whether to execute the associated case.

##### Case

Keyword that begins a statement block of a Select Case statement. Case is always followed by a value to compare, and a statement to execute if <value to compare> is the same as <compare to this>. Case may be repeated.

##### <value to compare>

A valid expression of any data type. In addition to the form previously shown in the Syntax section, <value to compare> can also take either of the following forms, or it can take any combination of all three forms.

### Range Form

<lower value > **To** <higher value >

For <value to compare>, specifies a range of values between <lower value> and <higher value>, inclusively. If <compare to this> falls within the range, the case evaluates as True.

##### To

Keyword used to specify a range of values.

##### <lower value>, <higher value>

Numeric or string expressions.

The lower value must always precede the higher one. For example:

## Select Case statement

```
Case 65, 19 To 25, 34 To 49
Case "ZACHARY", "ADAMS" To "JEFFERSON"
```

### Comparison Operator Form

[Is] <comparison operator> <value to compare>

#### Is

An optional keyword preceding <comparison operator> <value to compare>.

#### <comparison operator>

Any valid comparison operator except Like. For example:

```
Case Is <= 25 , 34 To 49, Is = 65
```

#### Case Else

Keyword indicating the statement block Actuate Basic executes if it finds no match between <compare to this> and any of the <value to compare> expressions. If there is more than one Case Else clause, only the first is executed.

- Tips**
- To handle any unforeseen <compare to this> values, always use a Case Else clause in your Select Case statements.
  - The Is comparison operator is different from the Is keyword in this statement.
  - To be sure that string data the user supplies always matches <value to compare> strings consistently, use UCase\$ on the user data before you use Select Case.
  - To specify whether string comparisons are or are not case-sensitive, use Option Compare.
  - It is good programming practice to evaluate Boolean variables by using the keywords True or False instead of by inspecting their content for a nonzero (True) or zero (False) numeric value.

**Example** The following example uses logical operators with a Select Case statement:

```
Sub Start()
 Dim IVal As Integer, Tester As Integer, Msg As String
 Super::Start()
 IVal = CInt (Rnd * 200)
 'Set Tester to True, just to get started
 Tester = 1
 Select Case IVal
 Case 100 To 199
 Msg = IVal & " is between 100 and 199"
 Case 10, 20, 30, 40, 50, 60, 70, 80, 90
 Msg = IVal & " is divisible by 10."
 Case Else
 'The following nested Select Case structure helps sort out
 'numeric input in cases where the user typed a number
```

```

Select Case IVal
 Case 1 To 9
 Msg = IVal & " is a number from 1 to 9."
 Case Is < 100
 Msg = IVal & " is a number greater than 9."
 Case Else
 Msg = IVal & " is either 0 or 200"
End Select
End Select
ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** GoTo statement  
If...Then...Else statement  
Option Compare statement

---

## Set statement

Assigns an object reference to a variable.

**Syntax** Set <object variable> = {<object reference> | New <class> | Nothing}

**Description** When you use Set to assign an object reference to a variable, Actuate Basic generally creates not a copy of the object but a reference to it. More than one object variable can refer to the same object. Because these variables are references and not copies, as the object changes, so do they.

When you use the New reserved word with Set, you create a new instance of the referenced type.

**Parameters** **<object variable>**  
Expression that specifies the name of the variable to which you are assigning an object reference.

- Must be of a class consistent with that of <object reference>.
- Must have been explicitly declared unless declared for you by Actuate Basic.

**<object reference>**

Expression that specifies the name of an object, of another declared variable of the same class, or of a function or method that returns an object.

**New**

Reserved word used to create a new instance of a specific class. New cannot be used to create new variables of any of the fundamental data types.

## SetAttr statement

### **<class>**

The name of a specific class.

### **Nothing**

Reserved word that discontinues association of <object variable> with any specific object. Assigning Nothing to <object variable> releases all resources associated with the previously referenced object, as long as no other variable refers to it.

**Example** The following example uses the Set statement with New to create a new instance of AcLabelControl:

```
Sub Start()
 Dim MyLabel As AcLabelControl, Msg As String
 Super::Start()
 Set MyLabel = New AcLabelControl
 If IsKindOf(MyLabel, "AcLabelControl") Then
 Msg = "Yes, MyLabel is an AcLabelControl. "
+ & "We will now set its background color to red."
 ShowFactoryStatus(Msg)
 MyLabel.BackgroundColor = Red
 End If
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Dim statement  
NewInstance function  
NewPersistentInstance function  
ReDim statement  
Static statement

---

## SetAttr statement

Sets attribute information for files.

**Syntax** SetAttr(<file name>, <attributes>)

**Description** The operating system assigns one or more attributes to each file. These attributes indicate whether the file is a normal, read-only, hidden, or system file; whether it has been modified since the last backup; or whether some combination of these is the case. SetAttr lets you modify these attributes.

**Parameters** **<file name>**  
String expression that specifies the file for which to set one or more attributes. The default path is the current drive and current directory. <file name> cannot include wildcard characters and must refer to a valid file.

<file name> can be open for read-only access, but must not be opened for write access.

#### <attributes>

Numeric expression that specifies the sum of one or more of the values in Table 6-49, which shows what attribute each value indicates along with its Header.bas constant name. The return values not supported under UNIX are 0.

**Table 6-49** Return values for <attribute> with the corresponding constant names and file types

| Return value | Constant name | File type                 | Operating system |
|--------------|---------------|---------------------------|------------------|
| 0            | ATTR_NORMAL   | Normal                    | Windows, UNIX    |
| 1            | ATTR_READONLY | Read-only                 | Windows, UNIX    |
| 2 or 0       | ATTR_HIDDEN   | Hidden                    | Windows          |
| 4 or 0       | ATTR_SYSTEM   | System file               | Windows          |
| 32 or 0      | ATTR_ARCHIVE  | Changed since last backup | Windows          |

<file name> can optionally specify a full path, in which case it has the following syntax:

[[<drive:>] [ \ ]<directory>[\<directory>]...<file name> (Windows)

[ /]<directory>[/<directory>]...<file name> (UNIX)

#### <drive:>

Character, followed by a colon, that specifies the drive (Windows only).

#### <directory>

String expression that specifies the name of a directory or subdirectory. For example, the following statement sets the System and Read-only (4 + 1) attributes for a file in the current directory called Testfile.dat:

```
SetAttr("Testfile.dat", 5)
```

- Tips**
- To determine whether, or in what mode, a file is open, use FileAttr.
  - To determine what attributes of a file, directory, or volume have already been set, use GetAttr.

**Example** In the following example, if the Archive attribute for the specified file is set, the example displays a message. Otherwise, it sets the Archive attribute:

```
Sub Start()
 Dim FileName As String, Msg As String
 Super::Start()
 On Error GoTo ErrorHandler
```

## SetBinding function

```
FileName = "C:\Program Files\Actuate11\readme.rtf"
'Check for Archive attribute
If GetAttr(FileName) BAnd ATTR_ARCHIVE Then
 Msg = FileName & " already has the Archive attribute."
 ShowFactoryStatus(Msg)
Else
 ' Set Archive attribute
 SetAttr FileName, ATTR_ARCHIVE
 Msg = FileName & " now has the Archive attribute."
 ShowFactoryStatus(Msg)
End If
Exit Function
ErrorHandler:
 Msg = {"Sorry! An error occurred. Please
change the file name or path in this method code and
try again."}
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** FileAttr function  
GetAttr function

---

## SetBinding function

Establishes an alias for an instance variable of a class. SetBinding is used primarily to set up a mapping from database column names to the names of variables in a data row class.

**Syntax** SetBinding(<instance handle>, <column name>, <variable name>)

**Parameters** **<instance handle>**  
The instance handle to one instance of the class for which to set up the binding.

**<column name>**  
The name, usually a column name, to map to a variable.

**<variable name>**  
The name of the variable or constant to associate with the column name.

**Tip** The column name mapped to the column name within a class lets you access variables through their column aliases using GetValue.

SetBinding is called automatically for data rows created through the Actuate Query Builder, and you can call SetBinding through custom code for data rows you create manually. For any class for which you want to set up bindings, you must call SetBinding at the beginning of your code.

**See also** GetValue function

## SetClipboardText function

Places a string expression in the operating environment Clipboard using the specified Clipboard format.

**Syntax** SetClipboardText(<data>[, <format>])

**Parameters** **<data>**  
String data to be placed on the Clipboard.

**<format>**

One of the Clipboard formats in Table 6-50. If <format> is omitted, CF\_TEXT is assumed.

**Table 6-50** Clipboard formats

| Symbolic constant | Value  | Clipboard format             |
|-------------------|--------|------------------------------|
| CF_LINK           | &HBF00 | DDE conversation information |
| CF_TEXT           | 1      | Text                         |

The symbolic constants and their values should be declared in your Actuate Basic code module (.bas file).

**Returns** Integer

- Returns 1 (True) if Clipboard text is successfully set.
- Returns 0 (False) if Clipboard text cannot be set.

**Example** The following example places the current date on the Clipboard, then displays the contents of the Clipboard:

```
Sub Start()
 Dim Msg As String
 Super::Start()
 On Error Resume Next
 Msg = "The Clipboard contains: " & GetClipboardText
 ShowFactoryStatus(Msg)
 Msg = "Placing today's date on the clipboard."
 ShowFactoryStatus(Msg)
 ClearClipboard
 SetClipboardText(Format$(Date, "dddd, mm/dd/yyyy"))
 Msg = GetClipboardText
 ShowFactoryStatus("The Clipboard now contains: " & Msg)
End Function
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** ClearClipboard function  
GetClipboardText function

---

## SetDefaultPOSMFile function

Determines which open report object instance (.roi) file is used as the default when you call New Persistent to instantiate an object.

**Syntax** SetDefaultPOSMFile(<intFileID>)

**Description** Use SetDefaultPOSMFile in connection with advanced report bursting. For example, you are creating two ROIs simultaneously. Your report scans a set of rows and, depending on the values in a given row, adds the row to one or the other ROI. Use SetDefaultPOSMFile to switch the default back and forth between the two ROIs. This function must be called on open report files.

**Parameters** <intFileID>  
Integer. Specifies an open ROI.

**Returns** Boolean

- True, if all arguments are correct.
- False, if any of the arguments are invalid.

**Example** The first line of the following example sets the default POSM file to the currently open ROI with the file ID 1. The second line instantiates an object, abc, in ROI #1.

```
SetDefaultPOSMFile(1)
Set abc = New Persistent className
```

**See also** SetStructuredFileExpiration function

---

## SetHeadline statement

Sets to a given value the headline associated with the completed request for a report.

**Syntax** SetHeadline(<newHeadline>)

**Description** Headlines are associated with the completed request for a report. By default, the headline is set to the value of the Headline parameter that appears in the Output Options section of the Requester. Use SetHeadline to programmatically change the headline to contain some other text. Note that:

To change the headline, do not change the Headline parameter itself. Instead, use SetHeadline.



**Parameters** **<newHeadline>**

String expression. The text you want the headline to display.

**Tip** To determine the current headline setting, use `GetHeadline`.

**Example** The following example displays the current headline, sets a new headline, then displays the new headline:

```
Sub Start()
 Super::Start()
 ' Getting the current headline.
 ShowFactoryStatus("Original headline is: " & GetHeadline())
 ' Setting and displaying the new headline
 SetHeadline("New Headline")
 ShowFactoryStatus("New headline is: " & GetHeadline())
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** `GetFontAverageCharWidth` function

---

## SetStructuredFileExpiration function

Sets the object aging rules on a report object web (.row) file.

**Syntax** `SetStructuredFileExpiration(<intFileID>, <intAgingOptions>, <intMaxVers>, | [ { [Null, <intExpAge>] | [<datExpDate>, Null] } ] )`

**Parameters** **<intFileID>**

Integer. Specifies an open ROW file.

**<intAgingOptions>**

Integer. Specifies the aging policy. The aging policy is expressed by using the constants shown in Table 6-51 together with a BOR operator.

**Table 6-51** Global constant names and values for aging policies

| Global constant name    | Value | Meaning                                                                                                           |
|-------------------------|-------|-------------------------------------------------------------------------------------------------------------------|
| Age_NoOptions           | &H00  | No object aging options are to be used.                                                                           |
| Age_ArchiveBeforeDelete | &H01  | Archives the file before deletion.<br>Combine this constant with either a version, date, or age-based expiration. |

*(continues)*

**Table 6-51** Global constant names and values for aging policies (continued)

| Global constant name   | Value | Meaning                                                                                                                                                     |
|------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Age_DeleteDependencies | &H02  | Deletes dependents for the file. Note that ROWs usually do not have dependents. Combine this constant with either a version, date, or age-based expiration. |

For example, to create a policy that deletes dependencies and archives before deletion, use code such as the following:

```
Dim policy As Integer
policy = Age_DeleteDependencies BOR Age_ArchiveBeforeDelete
```

**<intMaxVers>**

Specifies the maximum number of versions to keep. Set this to Null or 0 if no version limit is to be set.

**<intExpAge>**

Integer. Specifies the age, in minutes, after which to expire the object. Set this to Null or 0 if no expiration age is to be set.

**<datExpDate>**

Date. Specifies the date after which to expire the object. Set this to Null if no expiration date is to be set.

- <datExpDate> and <intExpAge> are optional, but if <intExpAge> is provided, <datExpDate> must also be provided, even though it is Null.
- Only one of <datExpDate> or <intExpAge> should be non-Null. If both are non-Null, only <intExpAge> is used.
- It is legal for <intMaxVers>, <datExpDate>, and <intExpAge> to be Null. If all three are Null, no aging policy is set for the file, as shown in the following example:

```
SetStructuredFileExpiration(fileID, Age_NoOptions, Null,
+ Null, Null)
```

**Returns** Boolean

- True, if all arguments are correct.
- False, if any of the arguments are invalid.

**Description** You customize object aging settings for a file as follows:

- Set the values of the object's aging properties. For example, if you want a report to never archive more than ten versions, set <intMaxVers> to 10.
- To ensure that a report expires no later than a week after creation, set the age variable, <intExpAge>, or the date expiration variable, <datExpDate>, accordingly.

Rule: This function must be called on the open report file.

**Example** The following example specifies that an ROW is to be archived and deleted after thirty minutes:

```
SetStructuredFileExpiration(fileID, Age_ArchiveBeforeDelete,
+ Null, Null, 30)
```

**See also** SetDefaultPOSMFile function

---

## SetValue function

Sets the value of a variable in an object dynamically at run time.

**Syntax** SetValue(<object reference>, <variable name>|<index>, <value>)

**Description** You typically use SetValue in conjunction with GetVariableCount, GetVariableName, GetValue, and GetValueType to work with variables in objects whose types you do not know in advance.

**Parameters** **<object reference>**

AnyClass expression that specifies an object which has a variable whose value you want to set.

**<variable name>**

String expression that specifies the name of the variable whose value you want to set.

**<index>**

Integer expression that specifies the index of the variable whose value you want to set.

Indexing starts at 1. The index order puts all superclass variables before those defined in a subclass.

Within a given class, the index order of variables is the order in which the variables are defined in the Actuate Basic source. If e.Report Designer Professional generates the Basic source for a class, it lists the variables in alphabetical order.

**<value>**

Variant. The value to assign.

**Returns** True if the specified variable exists.

False if the specified variable does not exist. It is not an error if the variable does not exist.

**Example** The following example shows how to use GetVariableCount, GetVariableName, GetValueType, GetValue, and SetValue together:

## Sgn function

```
' Simulate the behavior of the CopyInstance statement,
' but only copy integers > 0 whose names begin "Z_"
Dim vCount As Integer
Dim vName As String
Dim vType As Integer
Dim vValue As Variant
Dim i As Integer
vCount = GetVariableCount(fromObject)
For i = 1 To vCount
 vName = GetVariableName(fromObject, i)
 vType = GetValueType(fromObject, vName)
 If (Left(vName, 2) = "Z_") And (vType = V_INTEGER) Then
 vValue = GetValue(fromObject, vName)
 If (vValue > 0) Then
 SetValue(toObject, vName, vValue)
 End If
 End If
Next i
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** GetValue function  
GetValueType function  
GetVariableCount function  
GetVariableName function

---

## Sgn function

Indicates whether a number is positive, negative, or zero.

**Syntax** Sgn(<number>)

**Parameters** **<number>**  
Number, numeric expression, or Variant of VarType 8 (String) that specifies the number for which you want to determine the sign.

**Returns** Same data type as <number>. If <number> is a Variant of type 8 (String), returns Variant of type 5 (Double). Returns one of the numbers in Table 6-52, indicating whether <number> is positive, negative, or zero.

**Table 6-52** Return values for Sgn functions

| Return Values | Description     |
|---------------|-----------------|
| 1             | Positive number |
| -1            | Negative number |
| 0             | Zero            |

**Example** The following example generates a number, then shows whether that number is positive, negative, or zero:

```
Sub Start()
 Dim Number As Double, Msg As String
 Super::Start()
 Number = CInt(Rnd * 10) - 5
 Select Case Sgn(Number)
 Case 0
 Msg = Number & " is zero."
 Case 1
 Msg = Number & " is a positive number."
 Case -1
 Msg = Number & " is a negative number."
 End Select
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Abs function

---

## Shell function

Runs a specified executable program.

**Syntax** Shell(<program name and parameters> [, <window style>] )

**Parameters** **<program name and parameters>**

String expression containing a valid executable name. Name of the program to execute, with its required arguments or command line switches, if there are any.

Default file extension under Windows: .exe.

- Must have an extension of .exe, .com, .bat, or .pif (Windows).
- Must have execute permission set (UNIX).
- Must be enclosed within quotes.
- If the executable is not located in the default directory:
  - Program name must include the full path.
  - Program must be located in a directory specified in the PATH environment variable.

Each of the following examples runs the Windows calculator, then immediately executes the next statement in the program, regardless of whether Calc.exe has terminated:

## Shell function

```
DummyVar = Shell("Calc.exe")
X = Shell("C:\Windows\Calc.exe")
```

The following example opens Excel and the file Extract.csv at the same time:

```
Shell("D:\Program Files\Microsoft Office\Office\Excel.exe
+ C:\Temp\Extract.csv")
```

### <window style>

Ignored on UNIX systems. Integer that specifies the number for the style of the window to use for the new program, and whether or not to give it the focus. Table 6-53 identifies each possible value for <window style> and the resulting style and focus of the window.

**Table 6-53** Values for <window style>

| Value   | Window style | Focus                   |
|---------|--------------|-------------------------|
| 1, 5, 9 | Normal       | New program receives    |
| 2       | Minimized    | New program receives    |
| 3       | Maximized    | New program receives    |
| 4, 8    | Normal       | Current program retains |
| 6, 7    | Minimized    | Current program retains |

If omitted, the default is 2.

The following example calls Word for Windows, maximizes its window, and gives it focus:

```
Z = Shell("C:\Word\Winword.exe", 3)
```

### Returns Integer

- Shell loads an executable file into the Windows environment, and returns the unique task ID number that Windows assigns to each running program as its identifier (Windows).
- Shell runs programs asynchronously. You cannot be certain whether or not a program you start with Shell will finish executing before the code following the Shell function in your Actuate Basic application is executed.
- If Shell cannot start the named program, it generates an error.

**Tip** To shell to DOS—in other words, to run the DOS command processor—specify the program name Command.com with Shell (Windows).

**Example** In the following Windows example, Shell runs the Windows Calculator. The next statement in the program is then executed immediately, regardless of whether Calc.exe has terminated.

```

Sub Start()
 Dim DummyVar
 Super::Start()
 DummyVar = Shell("C:\Windows\System32\Calc.exe", 1)
 ShowFactoryStatus("Calculator opened.")
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

---

## ShowFactoryStatus statement

Displays a message in the Factory output and records the message in the job status file when you generate a report. Recording these messages in the job status file requires additional hard drive space.

**Syntax** ShowFactoryStatus(<StatusMsg>)

**Parameters** <StatusMsg>

String you want to display in the Factory output window or job status file, as shown in the following example:

```
ShowFactoryStatus("Preparing the statement.")
```

---

## Sin function

Gives the sine of an angle.

**Syntax** Sin(<angle>)

**Parameters** <angle>

Number, numeric expression, or Variant of type 8 (String) that specifies, in radians, the angle for which you want to find the sine. If <angle> is a String, it is parsed according to the formatting rules of the current run-time locale.

**Returns** Double

If <number> evaluates to Null, Sin returns Null.

**Example** The following example generates an angle expressed in radians and returns the sine of the angle:

```

Sub Start()
 Dim Angle As Double, Pi As Double
 Super::Start()
 Pi = 3.14159265358979
 Angle = Pi * Rnd
 ShowFactoryStatus("Sine of " & Angle & " is: " & Sin(Angle))
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**   Acos function  
              Asin function  
              Atn function  
              Cos function  
              Tan function

---

## Sleep statement

Temporarily suspends report execution.

**Syntax**   Sleep(<seconds>)

**Parameters**   **<seconds>**  
Double expression that specifies the number of seconds to suspend report execution. The value must be in the range 0–600. The value can be a fraction, for example 0.5.

**Description**   You can use Sleep to suspend execution while waiting for an external event, for example a file being created. The timing accuracy of Sleep is dependent on the underlying operating system.

**Tip**   Shell commands run asynchronously. This means that a report continues to execute as soon as a Shell command is started. To wait for the result of a Shell command, make the Shell command create a file when it is done, then loop around checking whether that file exists. Use Sleep inside the loop to avoid extra processor cycles.

**Example**   The following example shows how to use Sleep to temporarily suspend report execution:

```
' Run a script and wait for it to create a file
' Remove previous file, if any
If FileExists("myfile.txt") Then
 Kill "myfile.txt"
End If

' Run the script
Shell("myscript.bat")

' Wait for the file to appear
Dim startTime As Date
startTime = Now()

Do
```



```

' Check for file
If FileExists("myfile.txt") Then
 Exit Do
End If

' Timeout after 60 seconds
If (DateDiff("s", startTime, Now()) > 60) Then
 Error 9999, "Time out!"
End If
' Wait a while and try again
Sleep(2.5)
Loop

' Now we can use the file

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Shell function

---

## SLN function

Returns the straight-line depreciation of an asset for a single period.

**Syntax** SLN(<initial cost>, <salvage value>, <asset lifespan>)

**Parameters** **<initial cost>**  
Numeric expression that specifies the initial cost of the asset.

**<salvage value>**  
Numeric expression that specifies the value of the asset at the end of its useful life. You can type a salvage value to view the straight line depreciation offset by the salvage value, or return straight line depreciation without salvage value by entering 0 in salvage value.

**<asset lifespan>**  
Numeric expression that specifies the length of the useful life of the asset. <asset lifespan> must be given in the same units of measure you want the function to return. For example, if you want SLN to determine the annual depreciation of the asset, <asset lifespan> must be given in years.

The following example calculates the depreciation under the straight-line method for a new machine purchased at \$1400, with a salvage value of \$200, and a useful life estimated at 10 years. The result (\$120 annually) is assigned to AnnualDeprec.

```
AnnualDeprec = SLN(1400, 200, 10)
```

**Returns** Double

Straight-line depreciation is the oldest and simplest method of depreciating a fixed asset. It uses the book value of the asset less its estimated residual value,

and allocates the difference equally to each period of the asset's life. Such procedures are used to arrive at a uniform annual depreciation expense that is charged against income before calculating income taxes.

Rule: All arguments must be positive numbers.

**Example** The following example provides various particulars about an asset, then returns the asset's straight-line depreciation for any single period:

```
Declare
 ' Number of months in a year
 Global Const YEARMONTHS = 12
End Declare

Sub Start()
 Dim Fmt As String, InitCost As Double, SalvageVal As Double
 Dim MonthLife As Double, LifeSpan As Double
 Dim PerDepr As Double
 Dim Msg As String
 Super::Start()
 ' Define money format
 Fmt = "$#,##0.00"
 InitCost = 12500 ' The initial cost of the asset
 SalvageVal = 1500 ' The asset's value at useful life end
 MonthLife = 30 ' The asset's useful life in months
 ' Convert months to years
 LifeSpan = MonthLife / YEARMONTHS
 If LifeSpan <> Int(MonthLife / YEARMONTHS) Then
 ' Round up to nearest year
 LifeSpan = Int(LifeSpan + 1)
 End If
 PerDepr = SLN(InitCost, SalvageVal, LifeSpan)
 Msg = "The depreciation is " & Format(PerDepr, Fmt)
+ & " per year."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** DDB function  
SYD function

---

## Space, Space\$ functions

Returns a string consisting of the specified number of spaces.

**Syntax** Space(<number of spaces>)

Space\$(<number of spaces>)

**Parameters** <number of spaces>

Numeric expression indicating the length of the returned string of spaces.

- Must be between 0 and 2,147,483,647 or memory limit.
- The <number of spaces> is rounded to Long regardless of its numeric data type.

**Returns** Space: Variant  
Space\$: String

If <number of spaces> evaluates to Null, Space[\$] returns Null.

**Tip** To generate a string of characters other than spaces, use String[\$].

**Example** The following example creates a variable containing 10 spaces:

```
Sub Start()
 Dim Msg, Pad, UserFname, UserLname As String
 Super::Start()

 UserFname = "Alain"
 UserLname = "Colline"
 ' Create 10-space pad
 Pad = Space(10)
 Msg = "Notice the 10-space pad between the first "
+ & "and last names. "
 ShowFactoryStatus(Msg)
 Msg = UserFname & Pad & UserLname
 ShowFactoryStatus(Msg)
End sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** String, String\$ functions

## Sqr function

Gives the square root of a number.

**Syntax** Sqr(<number>)

**Parameters** <number>

Number, numeric expression, or Variant of type 8 (String) indicating the number for which you want to determine the square root. If <number> is a String, it is parsed according to the formatting rules of the current run-time locale.

**Returns** Double

## Static statement

If <number> evaluates to Null, Sqr returns Null.

**Example** The following example generates a number and returns the square root of that number:

```
Sub Start()
 Super::Start()
 On Error GoTo ErrorHandler
 Dim UserTyped, Msg
 UserTyped = CInt(Rnd * 100 - 25)
 ShowFactoryStatus ("The square root of " & UserTyped &
+ " is: " & Sqr(UserTyped))
 Exit Sub

ErrorHandler:
 Msg = "Sorry! An error occurred. "
+ & UserTyped & " is negative. Please try again."
 ShowFactoryStatus(Msg)
 Resume Next
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

---

## Static statement

Declares a static variable or static procedure.

**Syntax** Static <variable name> [[(<subscripts>)] [As <type>] [, <variable name> [[(<subscripts>)] [As <type>]]...

Static <procedure name>

**Description** Static variables retain their values as long as the program is running, unlike local variables, which are cleared when the procedure ends. This does not mean, however, that you can access them from outside the procedure. Every time you execute the procedure in which the static variables are declared, the procedure can make use of and update the most recent values of those variables. Whatever changes it makes are preserved until the next time you call the procedure.

- To declare a fixed-size array in a nonstatic procedure, you must use Static.
- Use Static at the procedure level.

**Parameters** <variable name>  
Name you create for the new variable.

**<procedure name>**

Name you create for the new procedure. When you use the syntax Static <procedure name>, all the variables in <procedure name> are declared to be static.

**<subscripts>**

The dimensions of an array variable.

**Subscript syntax**

[<lower> **To**] <upper>[, [<lower> **To**] <upper>]...

Rule: <lower> and <upper> can range from -2,147,483,648 to 2,147,483,647, inclusive.

For example, the following two statements have the same effect. Both declare a two-dimensional array that contains 11 elements in its first dimension, and 6 elements in its second.

```
Static MEM(10, 5)
Static MEM(0 TO 10, 0 TO 5)
```

**As <type>**

Clause in which you specify a data type for the new variable.

The default is Variant or the data type specified by the type declaration character appended to <variable name>, if there is one.

- Tips**
- To avoid assigning incorrect variable types, use the As clause to declare variable types.
  - Use the Option Strict statement to enforce variable typing.
  - To retain the values of all the variables in a procedure, you do not have to declare each one individually as Static, or list each one on a Static declaration line. Instead, use Static <procedure name> to declare the procedure itself.
- Example:

```
Static Sub MyProcedure
```

**Example** In the following example, the value of the variable Accumulate is preserved between calls to the Sub procedure. Each time the procedure is called, the example generates a number to add to the Accumulate variable, then displays that value.

```
Sub Start()
 Static Accumulate As Integer
 Dim AddTo As Integer
```

## Stop statement

```
Super::Start()
AddTo = CInt(Rnd * 100 - 25)
Accumulate = Accumulate + AddTo
ShowFactoryStatus("The static variable has changed by "
+ & AddTo & ". It now has the following value: " &
+ Accumulate)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Dim statement  
Function...End Function statement  
Option Strict statement  
Sub...End Sub statement

---

## Stop statement

Suspends execution of the running Actuate Basic code.

**Syntax** Stop

**Description** ■ Unlike End, Stop does not close files or clear variables.  
■ To continue a program suspended by Stop, choose Debug→Continue, or press F5.

**Tip** You can place Stop anywhere in procedures to suspend program execution. It is useful as a debugging aid.

**Example** In the following example, for each step through the For...Next loop, Stop suspends execution. To resume program execution, choose Debug→Continue.

```
Sub Start()
 Dim I As Integer
 Super::Start()
 ' Begin For...Next loop
 For I = 1 To 10
 ' Show I
 ShowFactoryStatus (CStr(I))
 ' Stop each time through loop
 Stop
 Next I
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** End statement

## Str, Str\$ functions

Converts a numeric expression to a String.

**Syntax** Str(<numeric expression>)

Str\$(<numeric expression>)

**Parameters** <numeric expression>

Numeric expression to be converted to a String. <numeric expression> is parsed according to the formatting rules of the current run-time locale. For example, the following statements are equivalent. Each returns Customer 55.

```
"Customer" & Str$(55)
```

```
"Customer" & Str$(110/2)
```

**Returns** Str: Variant

Str\$: String

- If <numeric expression> is positive, Str[\$] precedes the string representation of the number with a leading space.
- If <numeric expression> is negative, Str[\$] precedes the string representation of the number with a minus sign instead of a leading space.

- Tips**
- To put the results of a calculation into a message for the user and avoid generating a Data Type Mismatch error, use Str[\$].
  - To convert numeric values you want rendered in currency, date, time, or user-defined formats, use Format[\$] instead of Str[\$].
  - To convert a String to a number, use Val.

**Example** The following example returns a string representation of the values contained in two variables. Because the numbers are positive, a space precedes the first string character in each case.

```
Sub Start()
 Dim Dice1, Dice2, Msg
 Super::Start()
 ' Generate first value
 Dice1 = Int(6 * Rnd + 1)
 ' Generate second value
 Dice2 = Int(6 * Rnd + 1)
 Msg = "You first rolled a " & Str$(Dice1)
 + & " and then a " & Str$(Dice2)
 + & " for a total of "
 + & Str$(Dice1 + Dice2) & "."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    Format, Format\$ functions  
              Val function

---

# StrComp function

Compares two strings and returns a Variant indicating the result.

**Syntax**    StrComp(<string exprs 1>, <string exprs 2>[,<compare method>])

**Parameters**    **<string exprs 1>, <string exprs 2>**  
Any string expression. Whether the underlying data type is Variant or String, each expression is first converted to a Variant before the arguments are compared.

**<compare method>**  
Numeric expression that indicates whether <compare method> is case-sensitive or -insensitive as shown in Table 6-54.

**Table 6-54**      Case-sensitivity indicators for <compare method>

| Value | String comparison | Similar to            |
|-------|-------------------|-----------------------|
| 0     | Case-sensitive    | Option Compare Binary |
| 1     | Case-insensitive  | Option Compare Text   |

<compare method> must be 0 or 1. The default is 0, unless you used Option Compare Text in the module.

- When <compare method> is case-sensitive (0), McManus does not match MCMANUS or McMANUS.
- When <compare method> is case-insensitive (1) McManus matches MCMANUS or McMANUS.

**Returns**    Variant

StrComp returns a Variant that reports the relationship between the two string expressions. Table 6-55 shows each return value and the relationship or condition that value signifies.

**Table 6-55**      StrComp return values and the corresponding relationships or conditions

| Return value | Relationship or condition                      |
|--------------|------------------------------------------------|
| -1           | <string exprs 1> is less than <string exprs 2> |
| 0            | <string exprs 1> = <string exprs 2>            |



**Table 6-55** StrComp return values and the corresponding relationships or conditions

| Return value | Relationship or condition                          |
|--------------|----------------------------------------------------|
| 1            | <string exprs 1> is greater than <string exprs 2>  |
| Null         | <string exprs 1> = Null or <string exprs 2> = Null |

**Example** The following example prompts the user for the comparison method to use when comparing two strings. Then, it returns the result of the comparison along with a short explanation.

```
Sub Start()
 Dim Comp, CompMethod, Msg As String
 Dim String1 As String, String2 As String, Desc As String
 Super::Start()

 String1 = "Starlight"
 String2 = "STARLIGHT"
 ' Assume case sensitive. Set CompMethod to 1 for
 ' NOT case sensitive.
 CompMethod = 0
 Desc = "case sensitive."

 Comp = StrComp(String1, String2, CompMethod)
 Select Case Comp
 Case -1
 Msg = String1 & " is less than " & String2
+ & " for compare method " & CompMethod
+ & ", which is " & Desc
 Case 0
 Msg = String1 & " is equal to " & String2
+ & " for compare method " & CompMethod
+ & ", which is " & Desc
 Case 1
 Msg = String1 & " is greater than " & String2
+ & " for compare method " & CompMethod
+ & ", which is " & Desc
 End Select
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Option Compare statement

## String, String\$ functions

Returns a string consisting of a specified character repeated a specified number of times.

**Syntax** String(<number of characters>,<char to repeat>)

String\$(<number of characters>,<character code number>)

**Parameters** <number of characters>

Numeric expression that specifies the number of times the character is to be repeated. The number of times must be between 0 and 65536.

<char to repeat>

String expression that specifies the character to repeat.

- <char to repeat> must be at least one character long.
- If <char to repeat> is longer than one character, only the first character is repeated.
- If <char to repeat> is a Variant of any numeric type, String[\$] interprets the numeric value as the ANSI code for the repeated character.

<character code number>

Numeric expression that specifies the ANSI code for the repeated character.

- <character code number> must not be Null.
- <character code number> must be between 0 and 65535.
- <character code number> is interpreted as a value in the code page corresponding to the current run-time encoding.
- If < character code number> is a Variant of any numeric type, String[\$] interprets the numeric value as the ANSI code for the repeated character.

The following examples show the effect of <character code number>:

String\$(5, 64) ' Returns AAAAA

String\$(5,227) ' Returns ΨΨΨ on a Greek locale

String\$(5, 227) ' Returns ääää on an English locale

**Returns** String: Variant

String\$: String

- If any parameter evaluates to Null, String[\$] returns Null.

**Tips**

- To generate a string of spaces, use Space[\$].
- If the run-time encoding is UCS-2, String behaves in the same way as StringW.

**Example** The following example returns a string consisting of 12 number signs (#) followed by a sample check amount. The ANSI code of the number sign character is 35.

```
Sub Start()
 Dim Msg As String
 Super::Start()
 Msg = "This generates two strings of 12 number signs, "
+ & "followed by a sample check amount. "
+ & "Both forms of String$ syntax are shown."
+ & "First Form: " & String$(12, "#")
+ & "$100.00"
+ & "Second Form: " & String$(12, 35) & "$100.00"
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Space, Space\$ functions  
StringW, StringW\$ functions

---

## StringW, StringW\$ functions

Returns a string consisting of a specified character in UCS-2 character set repeated a specified number of times.

**Syntax** StringW(<number of characters>,<char to repeat>)

StringW\$(<number of characters>,<character code number>)

**Parameters** **<number of characters>**

Numeric expression that specifies the number of times the character is to be repeated. <number of characters> must be between 0 and 65536.

**<char to repeat>**

String expression that specifies the character to repeat.

- If <char to repeat> is longer than one character, only the first character is repeated.
- If <char to repeat> is a Variant of any numeric type, String[\$] interprets the numeric value as the ANSI code for the repeated character.

**<character code number>**

Numeric expression that specifies the UCS-2 code for the repeated character.

- <character code number> must not be Null.
- <character code number> must be between 0 and 65535.

- If <character code number> is a Variant of any numeric type, String[\$] interprets the numeric value as the UCS-2 code for the repeated character.

The following example statement returns #####:

```
StringW$(10, "#")
```

The following statement returns *mmmmmm*:

```
StringW$(10, 947)
```

**Returns** String

If any parameter evaluates to Null, StringW[\$] returns Null.

**Example** The following example returns a string consisting of 12 number signs (#) followed by a sample check amount. The ANSI code of the number sign character is 35.

```
Sub Start()
 Dim Msg As String
 Super::Start()
 Msg = "This generates two strings of 12 number signs, "
+ & "followed by a sample check amount."
+ & "Both forms of StringW$ syntax are shown."
+ & " First Form: " & StringW$(12, "#")
+ & "$100.00"
+ & " Second Form: " & StringW$(12, 35) & "$100.00"
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

---

## StrSubst function

Replaces part of a string with a different substring and returns the result.

**Syntax** StrSubst(<strTarget>, <strToFind>, <strNew>)

**Parameters** <strTarget>

String expression. The string within which you want to locate <strToFind>.

<strToFind>

String expression. The string you want to locate within <strTarget> so you can replace it with <strNew>.

<strNew>

String expression. The new substring within <strTarget> that you want in place of <strToFind>.

**Returns** String

<strTarget>, but with substring <strNew> in place of <strToFind>.

If <strToFind> does not exist within <strTarget>, Actuate returns <strTarget> unchanged.

**Example** The following example substitutes a subsection of a string with another string:

```
Sub Start()
 Dim strTarget As String, strToFind As String, strNew As String,
 Msg As String
 ' Set string, value to find, and new value
 strTarget = "ABCDEFGHJKLMNOPQRSTUVWXYZ"
 strToFind = "LMN"
 strNew = "123"
 ' Display original string
 Msg = "Original target string: " & strTarget
 ShowFactoryStatus(Msg)
 ' Change the string, and display a message containing new
 string

 strTarget = StrSubst(strTarget, strToFind, strNew)
 Msg = "The string " & strTarget &
+ " used to contain " & strToFind &
+ " and now contains " & strNew
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Format, Format\$ functions  
Mid, Mid\$ statements

---

## Sub...End Sub statement

Declares and defines the name, code, and any arguments that constitute an Actuate Basic Sub procedure.

**Syntax** [Static] Sub <name of procedure> [( <list of arguments> )]

[<statements>]

[Exit Sub]

[<statements>]

End Sub

**Description** Like a Function procedure, a Sub procedure can take arguments, execute a series of statements, and change the values of its arguments. However, unlike a

Function procedure, a Sub procedure does not return a value directly and cannot be used in an expression.

You can use the same name for two or more different procedures, as long as you make sure the procedures take a different number of arguments, or that the arguments are of different data types. For example, you can write two different square root functions—one that operates on integers, and another that operates on doubles. Their respective first lines might look like the following:

```
Function SquareRoot(intParam As Integer) As Integer
Function SquareRoot(dblParam As Double) As Double
```

Actuate Basic knows which procedure you mean by the type of value you pass when you call the procedure. For instance, if you write a call to SquareRoot(5), the compiler chooses the first SquareRoot function. But if you call SquareRoot(5.1234567), or SquareRoot(5.000), it executes the second one.

- You cannot define a Sub procedure from within another Sub procedure.
- You cannot use a Sub procedure in an expression, as you can a Function procedure.
- You cannot use GoTo to enter or exit a Sub procedure.

#### Parameters

##### **Static**

Keyword that instructs Actuate Basic to preserve the values of the procedure's local variables between calls.

- Cannot use Static to affect variables declared outside the procedure.
- Avoid using Static in recursive Sub procedures.

##### **<name of procedure>**

The name you assign to the procedure.

The following conditions apply to <name of procedure>:

- Subject to the same constraints as variable names, as well as to the following additional constraints:
  - Cannot include a type declaration character.
  - Cannot be the same as any other globally recognized name like that of:
    - Procedure in a declared dynamic-link library (DLL).
    - Any Global variable.
    - Any Global constant.
- Can be overloaded. That is, you can define another function and/or procedure that has the same name, as long as the respective arguments are unique. For example, the following are both permissible in the same program:

```

Sub Potato(intTomato As Integer)
...
End Sub
Sub Potato(dblTomato As Double, strEggplant As String)
...
End Sub

```

**<list of arguments>**

The list of variables that Actuate Basic passes as arguments from the calling procedure to the Sub procedure.

**<statements>**

One or more valid Actuate Basic statements. These statements constitute the body of the Sub procedure.

**Exit Sub**

Statement that signals Actuate Basic to terminate the Sub procedure and transfer control to the statement following the one that called the procedure. You may use as many Exit Sub statements as you wish, anywhere in a Sub procedure.

<list of arguments> has the following syntax:

**[ByVal]** <variable name>[()] **[As <data type>]** [, **[ByVal]** <variable name>[()] **[As <data type>]**...

**ByVal**

Keyword that instructs Actuate Basic to pass the argument to the procedure by value rather than by reference. This means that the changes the Sub makes to the argument variable have no effect on its value in the calling procedure.

ByVal cannot be used with a variable of user-defined type, class, or with an array variable.

**<variable name>**

Name of the variable to pass as an argument.

If the Sub procedure changes the value of <variable name> internally, then it also changes its value externally—that is, in the procedure that called the Sub.

- You must use the ByVal keyword if you do not want the Sub's changes to an argument variable to affect the variable's value in the calling procedure.
- For array variables, use the parentheses but omit the number of dimensions.

For example, the following statement calls a Sub procedure named SalesTax and passes to it as its argument an array variable previously declared as MyArray(50,72):

```
SalesTax MyArray()
```

## Sub...End Sub statement

### As <data type>

Clause that declares the data type of <variable name>. <data type> can specify any valid Actuate Basic or user-defined data type except a fixed-length string. For example:

```
SalesTax Customer As String, Amount As Currency
```

- Tips**
- Sub procedures can be recursive. Actuate Basic sets a run-time stack limit of 200. A report using recursion with a large number of iterations might exceed this limit.
  - To evaluate a certain condition and then determine whether or not the Sub procedure should continue, use Exit Sub within a conditional structure such as If Then.
  - See Call for further information on how to call Sub procedures.

**Example** The following example declares a Sub procedure. This example overrides Start() to generate the data, then calls the new procedure.

```
Sub Start()
 Dim PassThisArg1 As Double, PassThisArg2 As Double
 Super::Start()
 ' Amount of the sale
 PassThisArg1 = Rnd * 1500 + 100
 ' Sales tax rate, expressed as a decimal
 PassThisArg2 = Rnd * 0.1
 SalesTax(PassThisArg1, PassThisArg2)
End Sub

Sub SalesTax (Arg1, Arg2)
 Dim LocalVar As Double, Fmt As String, Msg As String
 ' Define money format
 Fmt = "$#,##0.00"
 LocalVar = Arg1 * Arg2
 Msg = "The sales tax on " & Format$(Arg1, Fmt)
 + " at " & Format$(Arg2, "%.00%") &
 + " is: " & Format$(LocalVar, Fmt)
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Call statement  
Dim statement  
Function...End Function statement  
Static statement



## SVGAttr function

Returns a string for setting attributes in SVG code. The string provides the non-locale dependent format that SVG requires.

**Syntax** SVGAttr(<attribute name>, <attribute value>)

**Parameters** <attribute name>

String expression that specifies the name of the attribute.

<attribute value>

Numeric or string expression that specifies the value of the attribute.

**Returns** String

**Example** In the following example, a chart's DrawOnChart() method has been overridden to draw a filled rectangle with rounded corners behind the chart drawing plane:

```
Sub DrawOnChart(baseLayer As AcChartLayer,
+ overlayLayer As AcChartLayer, studyLayers() As AcChartLayer)
+ ' Get the size of the drawing in points
+ Dim w As Double
+ w = Size.Width / OnePoint
+ Dim h As Double
+ h = Size.Height / OnePoint

+ Dim svg As String
+ svg = "<svg version='1.1'"
+ ' Standard SVG 1.1 namespaces
+ & " xmlns='http://www.w3.org/2000/svg'"
+ & " xmlns:xlink='http://www.w3.org/1999/xlink'"
+ ' Do not collapse whitespace in text
+ & " xml:space='preserve'"
+ ' Scale the SVG to use points as the default units
+ & " viewBox='0 0 " & SVGDb1(w) & " " & SVGDb1(h) & "'>"
+ ' Draw the background rectangle
+ svg = svg
+ & "<rect"
+ & SVGColorAttr("fill", RGB(255, 255, 204))
+ & SVGColorAttr("stroke", Black)
+ & SVGAttr("stroke-width", 3.0)
+ & SVGAttr("x", 1.5)
+ & SVGAttr("y", 1.5)
+ & SVGAttr("width", w - 3.0)
+ & SVGAttr("height", h - 3.0)
+ & SVGAttr("rx", 9.0)
+ & "/>"
```

## SVGColorAttr function

```
+ & "</svg>"
' Insert the background rectangle behind the chart
Dim svgPlane As AcDrawingSVGPlane
Set svgPlane = InsertDrawingPlane(1, DrawingPlaneTypeSVG)
svgPlane.SetSVG(svg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** SVGColorAttr function  
SVGDbf function  
SVGFontStyle function  
SVGStr function  
SVGStyle function

---

## SVGColorAttr function

Returns a string for setting color attributes in SVG code. The string provides the non-locale dependent format that SVG requires.

**Syntax** SVGColorAttr(<color attribute>, <color value>)

**Parameters** **<color attribute>**  
String expression that specifies the name of the color attribute.

**<color value>**  
Numeric expression that specifies the value of the color.

**Returns** String

**Example** In the following example, a chart’s DrawOnChart() method has been overridden to draw a filled rectangle with rounded corners behind the chart drawing plane:

```
Sub DrawOnChart(baseLayer As AcChartLayer,
+ overlayLayer As AcChartLayer, studyLayers() As AcChartLayer)
' Get the size of the drawing in points
Dim w As Double
w = Size.Width / OnePoint
Dim h As Double
h = Size.Height / OnePoint
Dim svg As String
svg = "<svg version='1.1'"
+ ' Standard SVG 1.1 namespaces
+ & " xmlns='http://www.w3.org/2000/svg'"
+ & " xmlns:xlink='http://www.w3.org/1999/xlink'"
+ ' Do not collapse whitespace in text
+ & " xml:space='preserve'"

```

```

+ ' Scale the SVG to use points as the default units
+ & " viewBox='0 0 " & SVGDbI(w) & " " & SVGDbI(h) & "'>"
+ ' Draw the background rectangle
+ svg = svg
+ & "<rect"
+ & SVGColorAttr("fill", RGB(255, 255, 204))
+ & SVGColorAttr("stroke", Black)
+ & SVGAttr("stroke-width", 3.0)
+ & SVGAttr("x", 1.5)
+ & SVGAttr("y", 1.5)
+ & SVGAttr("width", w - 3.0)
+ & SVGAttr("height", h - 3.0)
+ & SVGAttr("rx", 9.0)
+ & "/>"
+ & "</svg>"
+ ' Insert the background rectangle behind the chart
+ Dim svgPlane As AcDrawingSVGPlane
+ Set svgPlane = InsertDrawingPlane(1, DrawingPlaneTypeSVG)
+ svgPlane.SetSVG(svg)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** SVGAttr function  
 SVGDbI function  
 SVGFontStyle function  
 SVGStr function  
 SVGStyle function

---

## SVGDbI function

Returns a string for setting a numeric value in SVG code. The string provides the non-locale dependent format that SVG requires.

**Syntax** SVGDbI(<numeric value>)

**Parameters** **<numeric value>**  
 Numeric expression that specifies the value of the attribute.

**Returns** String

**Example** In the following example, a chart’s DrawOnChart() method has been overridden to draw a filled rectangle with rounded corners behind the chart drawing plane:

```

Sub DrawOnChart(baseLayer As AcChartLayer,
+ overlayLayer As AcChartLayer, studyLayers() As AcChartLayer)

```

## SVGFontStyle function

```
' Get the size of the drawing in points
Dim w As Double
w = Size.Width / OnePoint
Dim h As Double
h = Size.Height / OnePoint
Dim svg As String
svg = "<svg version='1.1'"
+ ' Standard SVG 1.1 namespaces
+ & " xmlns='http://www.w3.org/2000/svg'"
+ & " xmlns:xlink='http://www.w3.org/1999/xlink'"
+ ' Do not collapse whitespace in text
+ & " xml:space='preserve'"
+ ' Scale the SVG to use points as the default units
+ & " viewBox='0 0 " & SVGDBl(w) & " " & SVGDBl(h) & "'>"
' Draw the background rectangle
svg = svg
+ & "<rect"
+ & SVGColorAttr("fill", RGB(255, 255, 204))
+ & SVGColorAttr("stroke", Black)
+ & SVGAttr("stroke-width", 3.0)
+ & SVGAttr("x", 1.5)
+ & SVGAttr("y", 1.5)
+ & SVGAttr("width", w - 3.0)
+ & SVGAttr("height", h - 3.0)
+ & SVGAttr("rx", 9.0)
+ & "/>"
+ & "</svg>"
' Insert the background rectangle behind the chart
Dim svgPlane As AcDrawingSVGPlane
Set svgPlane = InsertDrawingPlane(1, DrawingPlaneTypeSVG)
svgPlane.SetSVG(svg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** SVGAttr function  
SVGColorAttr function  
SVGFontStyle function  
SVGStr function  
SVGStyle function

---

## SVGFontStyle function

Returns a string for setting font values in SVG code. The string provides the non-locale dependent format that SVG requires.

- Syntax** SVGColorAttr(<font style name>, <font params>[,<style overrides>] )
- Parameters** **<font style name>**  
String expression that specifies the name of the font style.
- <font params>**  
AcFont object that specifies font parameters.
- <style overrides>**  
Optional string expression that specifies font style overrides.
- Returns** String
- Example** In the following example, a chart's DrawOnChart() method has been overridden to replace the chart with the words "No Data!" if the chart has no data points:

```
Sub DrawOnChart(baseLayer As AcChartLayer,
+ overlayLayer As AcChartLayer, studyLayers() As AcChartLayer)
 ' Check for empty chart
 Dim hasData As Boolean
 Dim numberOfSeries As Integer
 numberOfSeries = baseLayer.GetNumberOfSeries()
 Dim seriesIndex As Integer
 For seriesIndex = 1 To numberOfSeries
 Dim series As AcChartSeries
 Set series = baseLayer.GetSeries(seriesIndex)
 If Series.GetNumberOfPoints() > 0 Then
 hasData = True
 Exit For
 End If
 Next seriesIndex
 If hasData Then
 Exit Sub
 End If
 ' Hide empty chart
 GetChartDrawingPlane().SetHidden(True)

 ' Get the size of the drawing in points
 Dim w As Double
 w = Size.Width / OnePoint
 Dim h As Double
 h = Size.Height / OnePoint
 Dim svg As String
 svg = "<svg version='1.1'"
+ ' Standard SVG 1.1 namespaces
+ & " xmlns='http://www.w3.org/2000/svg'"
+ & " xmlns:xlink='http://www.w3.org/1999/xlink'"
+ ' Do not collapse whitespace in text
```

## SVGStr function

```
+ & " xml:space='preserve'"
+ ' Scale the SVG to use points as the default units
+ & " viewBox='0 0 " & SVGDBl(w) & " " & SVGDBl(h) & "'>"
' Define the font style
Dim messageFont As AcFont
messageFont.Bold = True
messageFont.Color = Red
messageFont.FaceName = "Arial"
' Font size is 25% of chart height
messageFont.Size = h * 0.25
svg = svg
+ & "<defs>"
+ & SVGFontStyle("Message", messageFont, "text-anchor:middle;")
+ & "</defs>"

' Draw the text
svg = svg
+ & "<text class='Message'"
+ ' Center text horizontally and vertically
+ & SVGAttr("x", w * 0.5)
+ & SVGAttr("y", (h * 0.5) + (messageFont.Size * 0.35))
+ & ">"
+ & SVGStr("No Data!")
+ & "</text>"
+ & "</svg>"

' Add the text in front of the chart
Dim svgPlane As AcDrawingSVGPlane
Set svgPlane = AddDrawingPlane(DrawingPlaneTypeSVG)
svgPlane.SetSVG(svg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** SVGAttr function  
SVGColorAttr function  
SVGDBl function  
SVGStr function  
SVGStyle function

---

## SVGStr function

Returns a string with escaped characters for those characters that have special meaning to SVG.

**Syntax** SVGStr(<string value>)

**Parameters** <string value>

String expression that specifies the value of the string attribute.

**Returns** String

**Example** In the following example a chart's DrawOnChart( ) method has been overridden to add some translucent text in front of the chart:

```
Sub DrawOnChart(baseLayer As AcChartLayer,
+ overlayLayer As AcChartLayer, studyLayers() As AcChartLayer)
 ' Get the size of the drawing in points
 Dim w As Double
 w = Size.Width / OnePoint
 Dim h As Double
 h = Size.Height / OnePoint
 ' Create SVG to draw some translucent text
 Dim svg As String
 svg = "<svg version='1.1'"
+ ' Standard SVG 1.1 namespaces
+ & " xmlns='http://www.w3.org/2000/svg'"
+ & " xmlns:xlink='http://www.w3.org/1999/xlink'"
+ ' Do not collapse whitespace in text
+ & " xml:space='preserve'"
+ ' Scale the SVG to use points as the default units
+ & " viewBox='0 0 " & SVGDb1(w) & " " & SVGDb1(h) & "'>"
 ' Define the font style
 Dim sampleFont As AcFont
 sampleFont.Bold = True
 sampleFont.Color = Red
 sampleFont.FaceName = "Arial"
 sampleFont.Size = 80
 svg = svg
+ & "<defs>"
+ & SVGFontStyle("Sample", sampleFont)
+ & "</defs>"
 ' Draw the text
 svg = svg
+ & "<text class='Sample'"
+ & " transform='translate(60,250) rotate(-30)'"
+ & " fill-opacity='0.35'"
+ & SVGStr("SAMPLE")
+ & "</text>"
+ & "</svg>"
 ' Add the text in front of the chart
 Dim svgPlane As AcDrawingSVGPlane
 Set svgPlane = AddDrawingPlane(DrawingPlaneTypeSVG)
 svgPlane.SetSVG(svg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** SVGAttr function  
 SVGColorAttr function  
 SVGDbf function  
 SVGFontStyle function  
 SVGStyle function

---

## SVGStyle function

Returns a string for setting a CSS style in SVG code. The string provides the non-locale dependent format that SVG requires.

**Syntax** SVGStyle(<styleclass>, <attributes>)

**Parameters** **<styleclass>**  
 String expression that specifies the name of a CSS style class.

**<attributes>**  
 String expression that specifies the attributes for the CSS style.

**Returns** String

**Example** In the following example, a chart’s DrawOnChart() method has been overridden to replace the chart with the words “No Data!” if the chart has no data points:

```
Sub DrawOnChart(baseLayer As AcChartLayer, overlayLayer As
 AcChartLayer, studyLayers() As AcChartLayer)
 Super::DrawOnChart(baseLayer, overlayLayer, studyLayers)
 ' Check for empty chart
 Dim hasData As Boolean
 Dim numberOfSeries As Integer
 numberOfSeries = baseLayer.GetNumberOfSeries()
 Dim seriesIndex As Integer
 For seriesIndex = 1 To numberOfSeries
 Dim series As AcChartSeries
 Set series = baseLayer.GetSeries(seriesIndex)
 If Series.GetNumberOfPoints() > 0 Then
 hasData = True
 Exit For
 End If
 Next seriesIndex
 If hasData Then
 Exit Sub
 End If
 ' Hide empty chart
 GetChartDrawingPlane().SetHidden(True)
```



```

' Get the size of the drawing in points
 Dim w As Double
 w = Size.Width / OnePoint
 Dim h As Double
 h = Size.Height / OnePoint
 Dim svg As String
 svg = "<svg version='1.1'"
+ ' Standard SVG 1.1 namespaces
+ & " xmlns='http://www.w3.org/2000/svg'"
+ & " xmlns:xlink='http://www.w3.org/1999/xlink'"
+ ' Do not collapse whitespace in text
+ & " xml:space='preserve'"
+ ' Scale the SVG to use points as the default units
+ & " viewBox='0 0 " & SVGDBl(w) & " " & SVGDBl(h) & "'>"
 ' Define the font style
 Dim messageFont As AcFont
 messageFont.Bold = True
 messageFont.Color = Red
 messageFont.FaceName = "Arial"
 ' Font size is 25% of chart height
 messageFont.Size = h * 0.25
 svg = svg
+ & "<defs>"
+ & SVGStyle("Message",
+ "font-family:" & messageFont.FaceName & ";"
+ & "font-size:" & SVGDBl(messageFont.Size) & "px;"
+ & "font-weight:" & IIf(messageFont.Bold, "bold", "normal") &
+ ";"
+ & "font-style:" & IIf(messageFont.Italic, "italic", "normal")
+ & ";"
+ & "text-decoration:" & "none" & ";"
+ & "fill:" & SVGColor(messageFont.Color) & ";"
+ & "stroke:none;"
+ & "text-anchor:middle;")
+ & "</defs>"
' Draw the text
 svg = svg
+ & "<text class='Message'"
+ ' Center text horizontally and vertically
+ & SVGAttr("x", w * 0.5)
+ & SVGAttr("y", (h * 0.5) + (messageFont.Size * 0.35))
+ & ">"
+ & SVGStr("No Data!")
+ & "</text>"
+ & "</svg>"

```

```
' Add the text in front of the chart
 Dim svgPlane As AcDrawingSVGPlane
 Set svgPlane = AddDrawingPlane(DrawingPlaneTypeSVG)
 svgPlane.SetSVG(svg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** SVGAttr function  
 SVGColorAttr function  
 SVGDBl function  
 SVGStr function  
 SVGFontStyle function

---

## SYD function

Returns sum-of-years'-digits depreciation of an asset for a specified period.

**Syntax** SYD(<initial cost>, <salvage value>, <asset lifespan>, <single period>)

**Parameters** **<initial cost>**  
 Numeric expression that specifies the initial cost of the asset.

**<salvage value>**  
 Numeric expression that specifies the value of the asset at the end of its useful life.

**<asset lifespan>**  
 Numeric expression that specifies the length of the useful life of the asset.

<asset lifespan> must be given in the same units of measure as <single period>. For example, if <single period> represents a month, then <asset lifespan> must be expressed in months.

**<single period>**  
 Numeric expression that specifies the period for which you want SYD to calculate the depreciation.

<single period> must be given in the same units of measure as <asset lifespan>. For example, if <asset lifespan> is expressed in months, then <single period> must represent a period of one month.

The following example calculates the depreciation for the first year under the sum-of-years'-digits method for a new machine purchased at \$1400, with a salvage value of \$200, and a useful life estimated at 10 years. The result, \$218.18, is assigned to Year1Deprec. You may wish to note (a) that this result is equivalent to  $10/55 * \$1,200$ ; (b) that  $55 = 10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1$ ; and (c) that 10 is the 1st (Year 1) term in this series of digits.

```
Year1Deprec = SYD(1400, 200, 10, 1)
```

The following example calculates the depreciation of the same asset for the second year of its useful life. The result, \$196.36, is assigned to Year2Deprec. You may wish to note (a) that this result is equivalent to  $9/55 * \$1,200$ ; (b) that  $55 = 10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1$ ; and (c) that 9 is the 2nd (Year 2) term in this series of digits.

```
Year2Deprec = SYD(1400, 200, 10, 2)
```

### Returns Double

Sum-of-years'-digits is an accelerated method of depreciation that results in higher depreciation charges and greater tax savings in the earlier years of the useful life of a fixed asset than are given by the straight-line depreciation method (SLN), where charges are uniform throughout.

The method bases depreciation on an inverted scale of the total of digits for the years of useful life. For instance, if the asset's useful life is 4 years, the digits 4, 3, 2, and 1 are added together to produce 10. SYD for the first year then becomes 4/10ths of the depreciable cost of the asset (cost less salvage value). The rate for the second year becomes 3/10ths, and so on.

Rules:

- <asset lifespan> and <single period> must both be expressed in terms of the same units of time.
- All arguments must be positive numbers.

**Example** The following example prompts the user for various particulars about an asset, then returns the asset's sum-of-years'-digits depreciation for any single period:

```
Declare
 ' Number of months in a year
Global Const YEARMONTHS = 12
End Declare

Sub Start()
 Dim Fmt As String, InitCost As Double, SalvageVal As Double
 Dim MonthLife As Double, LifeSpan As Double
 Dim PeriodDepr As Double, DepYear As Integer, Msg As String
 Super::Start()
 ' Define money format
 Fmt = "$#,##0.00"
 ' Initial cost of the asset
 InitCost = Rnd * 5000 + 2000
 ' Asset's value at the end of its life
 SalvageVal = InitCost * 0.2
 ' The asset's useful life in months
 MonthLife = Rnd * 48 + 24
```

## Tab function

```
' Convert months to years
LifeSpan = MonthLife / YEARMONTHS
If LifeSpan <> Int(MonthLife / YEARMONTHS) Then
 ' Round up to nearest year
 LifeSpan = Int(LifeSpan + 1)
End If
' The year for which to show depreciation
DepYear = CInt(Rnd * LifeSpan + 1)
Do While DepYear > LifeSpan
 DepYear = CInt(Rnd * LifeSpan + 1)
Loop
PeriodDepr = SYD(InitCost, SalvageVal, LifeSpan, DepYear)
Msg = "The depreciation on " & Format(InitCost, Fmt)
+ & " with an end of life value of "
+ & Format(SalvageVal, Fmt) & " for year " & DepYear
+ & " is " & Format(PeriodDepr, Fmt) & "."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** DDB function  
SLN function

---

## Tab function

Specifies the columnar position at which the next character is to print.

**Syntax** Tab(<column>)

**Description** The first print position on an output line is always 1. When you use Print to print to files, the last print position is the current width of the output file, which you can set using Width. When you use Tabs without separators, the semicolon (;) separator is assumed by default. There is no simple correlation between the number of characters printed and the number of fixed-width columns they occupy. For example, the uppercase letter W occupies more than one fixed-width column.

Table 6-56 describes Tab behavior.

**Table 6-56** Tab behavior

| If...                                                                    | Tab...                                                                  |
|--------------------------------------------------------------------------|-------------------------------------------------------------------------|
| The current print position on the current line is greater than <column>. | Skips to <column> on the next output line and continues printing there. |

**Table 6-56**      Tab behavior

| If...                                                                     | Tab...                                                                             |
|---------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <column> is greater than the output-line width (set by Width).            | Calculates <print position> = <column> Mod <width>.                                |
| <column> is less than the current print position.                         | Continues printing on the next line at the calculated print position.              |
| <column> is less than 1.                                                  | Moves the print position to column 1.                                              |
| The calculated print position is greater than the current print position. | Continues printing at the calculated print position on the same line, as expected. |

You can use Tab only with the Print statement.

**Parameters**

**<column>**  
Integer expression. Specifies the column at which printing is to continue.  
  
For example, the following statements open a file and use Tab to move the print position to column 40 in an output data file:

```
Open "Test.fil" For Output As #1
Print #1, "Here is a test of the "; Tab(40); "Tab function."
Close #1
```

**Tips**

- To accommodate wider letters, make sure your tabular columns are wide enough.
- To set the width of the output file, use Width.

**Example**

The following example uses the Tab function to move the print position to column 40 in an output data file:

```
Sub Start()
 Dim Msg
 Super::Start()
 'Create sample file
 Open "Test.fil" For Output As #1
 Print #1, "This is a test of the "; Tab(40); "Tab function."
 'Close file
 Close #1
 'Reopen test file for input
 Open "Test.fil" For Input As #1
 'Read test data
 Input #1, Msg
 'Close file
 Close #1
 ShowFactoryStatus(Msg)
```

## Tan function

```
'Delete test file
Kill "Test.fil"
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Print statement

---

## Tan function

Returns the tangent of an angle.

**Syntax** Tan(<angle>)

**Parameters** <angle>

Number, numeric expression, or Variant of type 8 (String) that specifies, in radians, the angle for which you want to find the tangent.

If <angle> is a String, it is parsed according to the formatting rules of the current run-time locale.

**Returns** Double

- Tips**
- If <angle> evaluates to Null, Tan returns Null.
  - To find the cotangent of an angle, use: Cotangent = 1/Tan.
  - To convert between radians and degrees, use: radians = degrees \* Pi/180.

**Example** The following example prompts the user for an angle expressed in radians and returns the tangent of the angle:

```
Sub Start()
 Dim Angle As Double, Pi As Double
 Super::Start()
 Pi = 3.14159265358979
 ' The angle in radians
 Angle = Pi * Rnd
 ShowFactoryStatus("The tangent of " & Angle & " is: "
+ & Tan(Angle))
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Acos function  
Asin function  
Atn function  
Cos function  
Sin function

## Time, Time\$ functions

Returns the current system time.

**Syntax** Time

Time\$

The following statement assigns the current system time to a variable:

```
CurrTime = Time
```

**Returns** Time: Variant

Time\$: String

- Time returns a Variant of type 7 (Date) that contains a time stored internally as the fractional part of a double-precision number.
- Time\$ returns an 8-character string of the form hh:nn:ss, where hh represents the hour (00-23), nn the minute (00-59), and ss the second (00-59). The function uses a 24-hour clock, so 8:00 P.M. appears as 20:00:00.
- The return value of Time\$ is equivalent to that of the following statement:

```
Format$(Now, "hh:nn:ss")
```

**Example** The following example selects a lucky number for the user based on the exact time the user calls the routine. This number ranges from 1 to 48.

```
Sub Start()
 Dim CurrTime, Msg, UserUniv, PowerUp, Choice
 Super::Start()
 CurrTime = Time
 UserUniv = 48
 PowerUp = CurrTime * 10000000
 Choice = (PowerUp Mod UserUniv) + 1
 Msg = "Your lucky number, based on the "
 + & "exact time of day is: " & Choice
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** CVDate function  
Date, Date\$ functions  
Format, Format\$ functions  
Now function

---

## Timer function

Returns the number of seconds that elapsed since midnight of the current day.

**Syntax**    Timer

The following statements use the Timer function to determine how long the procedure, TestRoutine takes to execute:

```
StartTime = Timer
Call TestRoutine
EndTime = Timer
TimeElapsed = EndTime - StartTime
```

**Returns**    Double

- Tips**
- Timer is automatically used with Randomize to generate a seed for the Rnd (random-number) function.
  - You can also use Timer to time programs or parts of programs.

**Example**    The following example generates a number. The computer then counts up to that number using a simple For...Next loop. Actuate Basic times this counting process and reports the total number of elapsed seconds.

```
Sub Start()
 Dim UserNum, StartTime, I, EndTime, TimeElapsed, Msg
 ' The number to count up to
 UserNum = CInt(Rnd * 50) * 100000 + 1000000
 StartTime = Timer
 For I = 1 To UserNum
 Next I
 EndTime = Timer
 TimeElapsed = EndTime - StartTime
 Msg = "The time it took your computer to count to "
+ & UserNum & " was: " & TimeElapsed
+ & " seconds."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    Randomize statement

---

## TimeSerial function

Returns a date variant based on supplied integer hour, minute, and second arguments.



|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>     | TimeSerial(<hour>, <minute>, <second>)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Parameters</b> | <p><b>&lt;hour&gt;</b><br/>           Numeric expression that specifies a particular hour of the day. &lt;hour&gt; must be in the range 0 (12:00 A.M.) through 23 (11:00 P.M.), inclusive.</p> <p><b>&lt;minute&gt;</b><br/>           Numeric expression that specifies a particular minute after &lt;hour&gt;. &lt;minute&gt; must be in the range 0 through 59, inclusive.</p> <p><b>&lt;second&gt;</b><br/>           Numeric expression that specifies a particular second. &lt;second&gt; must be in the range 0 through 59, inclusive.</p> <p>For example, the following statements are equivalent. Each stores 05:03:46 to the variable TimeVar.</p> <pre>TimeVar = TimeSerial(05, 03, 46) TimeVar = TimeSerial(5, 3, 46)</pre> <p>Each of the following statements stores the underlying serial number for 05:03:46, which is about .210949, to the double-precision variable TimeVar#:</p> <pre>TimeVar# = CDBl(TimeSerial(5, 3, 46)) TimeVar# = TimeSerial(5, 3, 46) * 1</pre> |
| <b>Returns</b>    | <p>Date</p> <p>The value TimeSerial returns usually looks like a time but is stored internally as a double-precision fractional number between 0 and .99999. This number represents a time between 00:00:00 and 23:59:59, or 12:00:00 A.M. and 11:59:59 P.M., inclusive.</p> <p>In other contexts, this fractional number becomes part of what is known as a date serial number—a number that represents a date and/or time from midnight January 1, 100, through December 31, 9999, inclusive.</p> <p>The integer component of any date serial number represents the date (day, month, and year) while the decimal or fractional component represents the time of day on that date as a proportion of a whole day—where January 1, 1900, at noon has the date serial number 2.5, and where negative numbers represent dates prior to December 30, 1899 (0).</p>                                                                                                                          |
| <b>Tip</b>        | <p>TimeSerial can return a new time based on calculations done on a given time. In the following example, TimeSerial returns a time that is thirty minutes before 11:45:00 A.M. and assigns it to the variable T:</p> <pre>T = TimeSerial(11, 45, 00) - ((30/60)/24)</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Example</b>    | <p>The following example displays the number of hours, minutes, and seconds remaining until midnight:</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## TimeSerial function

```
Sub Start()
 Dim HrDiff As Integer, MinDiff As Integer, SecDiff As Integer
 Dim RightNow As Double, Midnight As Double
 Dim TotalDiff As Double, TotalMinDiff As Double
 Dim TotalSecDiff As Double, Msg As String
 Super::Start()
 Midnight = TimeValue("23:59:59")
 ' Get current time
 RightNow = Now
 ' Get diffs from midnight
 HrDiff = Hour(Midnight) - Hour(RightNow)
 MinDiff = Minute(Midnight) - Minute(RightNow)
 SecDiff = Second(Midnight) - Second(RightNow) + 1

 ' Restate seconds and minutes if necessary
 If SecDiff = 60 Then
 ' Add 1 to minute
 MinDiff = MinDiff + 1
 ' And set 0 seconds
 SecDiff = 0
 End If

 If MinDiff = 60 Then
 ' Add 1 to hour
 HrDiff = HrDiff + 1
 ' And set 0 minutes
 MinDiff = 0
 End If

 ' Now get totals
 TotalMinDiff = (HrDiff * 60) + MinDiff
 TotalSecDiff = (TotalMinDiff * 60) + SecDiff
 TotalDiff = TimeSerial(HrDiff, MinDiff, SecDiff)

 ' Prepare msg for display
 Msg = "There are a total of " & Format(TotalSecDiff, "#,##0")
+ & " seconds until midnight. That translates to "
+ & HrDiff & " hours, "
+ & MinDiff & " minutes, and "
+ & SecDiff & " seconds. "
+ & "In standard time notation, it becomes "

 ' Remember not to use "mm" for minutes! m is for month.
 Msg = Msg & Format(TotalDiff, "hh:nn:ss") & "."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** DateSerial function  
 DateValue function  
 Hour function  
 Now function  
 Second function  
 TimeValue function

---

## TimeValue function

Returns a Date variant representing a time of day based on a specified string.

**Syntax** TimeValue(<time string>)

**Parameters** <time string>

String expression that specifies a time. Can be any string that can be interpreted as a time of day. You can enter valid times using a 12- or 24-hour clock.

- <time string> must be in the range 00:00:00 (12:00:00 A.M.) through 23:59:59 (11:59:59 P.M.).
- If <time string> includes a date, it must be a valid one, even though TimeValue does not return a date.
- <time string> is parsed according to the formatting rules of the current run-time locale.

For examples, the following statements are equivalent. Each stores 1:25:00 P.M. to the variable TimeVar.

```
TimeVar = TimeValue("1:25PM")
TimeVar = TimeValue("1:25 PM")
TimeVar = TimeValue("01:25 pm")
TimeVar = TimeValue("13:25")
```

Each of the following statements stores the underlying serial number for 1:25:00 P.M., which is about .559028, to the double-precision variable TimeVar#:

```
TimeVar# = CDBl(TimeValue("1:25PM"))
TimeVar# = TimeValue("1:25PM") * 1
```

**Returns** Date

- TimeValue return value looks like a time but is stored internally as a double-precision fractional number between 0 and .99999. This number represents a time between 00:00:00 and 23:59:59, or 12:00:00 A.M. and 11:59:59 P.M., inclusive.

In other contexts, this fractional number becomes part of what is known as a date serial number—a number that represents a date and/or time from midnight January 1, 100, through December 31, 9999, inclusive.

- The integer component of any date serial number represents the date (day, month, and year) while the decimal or fractional component represents the time of day on that date as a proportion of a whole day—where January 1, 1900, at noon has the date serial number 2.5, and where negative numbers represent dates prior to December 30, 1899 (0).

**Example** The following example displays the number of hours, minutes, and seconds remaining until midnight:

```
Sub Start()
 Dim HrDiff As Integer, MinDiff As Integer, SecDiff As Integer
 Dim RightNow As Double, Midnight As Double
 Dim TotalDiff As Double, TotalMinDiff As Double
 Dim TotalSecDiff As Double, Msg As String
 Super::Start()

 Midnight = TimeValue("23:59:59")
' Get current time
 RightNow = Now
' Get diffs from midnight
 HrDiff = Hour(Midnight) - Hour(RightNow)
 MinDiff = Minute(Midnight) - Minute(RightNow)
 SecDiff = Second(Midnight) - Second(RightNow) + 1

' Restate seconds and minutes if necessary
 If SecDiff = 60 Then
 ' Add 1 to minute
 MinDiff = MinDiff + 1
 ' And set 0 seconds
 SecDiff = 0
 End If

 If MinDiff = 60 Then
 ' Add 1 to hour
 HrDiff = HrDiff + 1
 ' And set 0 minutes
 MinDiff = 0
 End If

' Now get totals
 TotalMinDiff = (HrDiff * 60) + MinDiff
 TotalSecDiff = (TotalMinDiff * 60) + SecDiff
 TotalDiff = TimeSerial(HrDiff, MinDiff, SecDiff)

' Prepare msg for display
 Msg = "There are a total of " & Format(TotalSecDiff, "#,##0")
+ & " seconds until midnight. That translates to "
+ & HrDiff & " hours, "
+ & MinDiff & " minutes, and "
+ & SecDiff & " seconds. "
+ & "In standard time notation, it becomes "
```

```
' Remember not to use "mm" for minutes! m is for month.
Msg = Msg & Format(TotalDiff, "hh:nn:ss") & "."
ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** DateSerial function  
 DateValue function  
 Hour function  
 Minute function  
 Now function  
 Second function  
 TimeSerial function

---

## Trim, Trim\$ functions

Returns a copy of a string after removing leading and trailing spaces.

**Syntax** Trim(<string expression>)  
 Trim\$(<string expression>)

**Parameters** **<string expression>**  
 String expression from which Trim[\$] strips leading and trailing spaces. Leading spaces are any spaces that occur before the first non-space character in a string. Trailing spaces are any spaces that occur after the last non-space character in a string.

**Returns** Trim: Variant  
 Trim\$: String

- If there are no leading or trailing spaces, Trim[\$] returns the original <string expression>.
- Trim[\$] has no effect on spaces in the middle of a string.
- If <string expression> evaluates to Null, Trim[\$] returns Null.

**Tips** ■ To strip extraneous spaces a user added in response to a prompt, use Trim[\$].  
 ■ To find other spaces in the middle of a string, use InStr.

**Example** The following example strips leading and trailing spaces from a string variable. It shows a typical situation in which you use Trim[\$] to remove extraneous spaces that occur in data or when a user enters a value in response to a prompt.

## Type...End Type statement

```
Sub Start()
 Dim Msg, NL, CustName, CustName1, LeftSpcs, RightSpcs
Super::Start()
 CustName = " Customer Name "
 ' Number of leading spaces
 LeftSpcs = Len(CustName) - Len(LTrim$(CustName))
 ' Number of trailing spaces
 RightSpcs = Len(CustName) - Len(RTrim$(CustName))
 ' Strip left and right spaces
 CustName1 = Trim$(CustName)

 Msg = "The original name " & "'" & CustName & "'"
+ & " was " & Len(CustName) & " characters long. "
+ & "There were " & LeftSpcs & " leading spaces and "
+ & RightSpcs & " trailing spaces. "
+ & "The name after stripping the spaces is: "
+ & "'" & CustName1 & "'" & " which is only "
+ & Len(CustName1) & " characters."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    Format, Format\$ functions  
              LTrim, LTrim\$ functions  
              RTrim, RTrim\$ functions

---

## Type...End Type statement

Declares a user-defined variable or record structure.

**Syntax**    Type <user-defined variable type>  
              <component variable> [( <subscripts> )] As <data type>  
              [ <component variable> [( <subscripts> )] As <data type>]  
              ...  
              End Type

**Parameters**    **<user-defined variable type>**  
The name of a user-defined data type. <user-defined variable type> must follow standard variable-naming conventions.

**<component variable>**  
The name of an element of the user-defined data type. <component variable> must follow standard variable-naming conventions.

**<subscripts>**

The dimensions of an array element. Each <subscripts> argument specifies the number of elements in a single dimension. The number of <subscripts> arguments for an array variable specifies the number of dimensions in the array.

The syntax of <subscripts> is as follows:

```
[<lower> To<upper>[, [<lower> To<upper>]...]
```

The following conditions apply to <subscripts>:

- <lower> and <upper> can range from -2,147,483,648 to +2,147,483,647 inclusive.
- <lower> must always be less than <upper>.
- <lower> and <upper> cannot be the names of variables. They must be literal numeric constants.
- Each <subscripts> clause can specify up to 60 dimensions.

You cannot use Type to declare dynamic arrays. However, you can declare the dimensions for an existing dynamic array within Type.

**<data type>**

The name of a valid data type.

The following conditions apply to <data type>:

- Can be any valid Actuate Basic data type except an object type, including String, for variable-length strings.
- Can be another user-defined type.

For example, the following three arrays are equivalent if you do not use Option Base:

```
MyArray(7,5)
MyArray(0 TO 7, 0 TO 5)
MyArray(7, 0 TO 5)
```

The following shows the use of array variables in the context of Type:

```
Declare
 Type CustomerData
 CustName As String
 CustAddress As String
 ArrayPhones(5) As String
 ArrayOther(5 To 10, 31) As Double
 End Type
End Declare
```

Rules:

- You cannot use line numbers or line labels in Type.

## Type...End Type statement

- When declaring a static array within Type, you must use literal numeric constants rather than variables to declare its dimensions.

**Tip** To more easily manipulate data records that consist of a number of related elements of different data types, use Type to define your own custom data types.

**Example** The following example creates a user-defined type with three elements. Then, it declares a new variable of the user-defined type and assigns data to each element.

```
Declare
 Type AddressStruct
 StreetAddr As String
 City As String
 State As String
 End Type
End Declare

Function VerifyAddress(NewAddr As AddressStruct) As Integer
 If IsNull(NewAddr.StreetAddr) Or (NewAddr.StreetAddr = "")
+ Or IsNull(NewAddr.City) Or (NewAddr.City = "")
+ Or IsNull(NewAddr.State) Or (NewAddr.State = "") Then
 VerifyAddress = 0
 Else
 VerifyAddress = 1
 End If
End Function

Sub Start()
 Dim Msg As String, NL As String
 Dim Address1 As AddressStruct, Address2 As AddressStruct
 Dim TestResult1 As String, TestResult2 As String
 Super::Start()

 Address1.StreetAddr = "1024 Lexington Drive"
 Address2.StreetAddr = "40000 New County Road"
 Address2.City = "Redwood Hills"
 Address2.State = "CA"
 TestResult1 = IIf(VerifyAddress(Address1), "", "not ")
 TestResult2 = IIf(VerifyAddress(Address2), "", "not ")
 Msg = "Address 1: " & Address1.StreetAddr & ", "
+ & Address1.City & ", " & Address1.State & " is "
+ & TestResult1 & "a valid address. "
 ShowFactoryStatus(Msg)
 Msg = "Address 2: " & Address2.StreetAddr & ", "
+ & Address2.City & ", " & Address2.State & " is "
+ & TestResult2 & "a valid address."
 ShowFactoryStatus(Msg)
End Sub
```



For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Class statement  
Declare statement  
Type...As statement

---

## Type...As statement

Declares an alias for an existing data type.

**Syntax** Type <alias data type name> As <existing data type name>

**Parameters** **<alias data type name>**  
The name you assign as an alias for an existing data type. <alias data type name> must follow standard naming conventions.

**<existing data type name>**

The name of an existing, valid data type. <existing data type name> must follow standard naming conventions.

**Example** The following example shows how to use Type As:

```
Declare
 Type SampleRec
 ClientNum As Long
 ClientName As String
 ClientPurchase As Currency
 End Type
 Type OtherName As SampleRec
 Type LogicalVar As Boolean
End Declare

Sub Start()
 Dim UserVar1 As OtherName, IsValid As LogicalVar
 Dim Msg As String, UserAns
 Super::Start()
 UserVar1.ClientName = "Samita Jain"
 Msg = "Client name is: " & UserVar1.ClientName
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Class statement  
Declare statement  
Type...End Type statement

---

## UBound function

Returns the largest available subscript for the given dimension of an array.

**Syntax** UBound(<array name>[,<dimension>])

**Parameters** **<array name>**  
Name of an array variable.

**<dimension>**

Numeric expression that specifies the array dimension for which you want to determine the upper bound. The default is 1.

The following conditions apply to <dimension>:

- Use 1 for the first dimension, 2 for the second, and so on.
- Must not be larger than the total number of dimensions in <array name>.
- Must not be zero, negative, or Null.

The following example shows the values UBound returns for an array with these dimensions:

```
Dim MyArray(1 To 55, 0 To 27, -3 To 42)
UBound(MyArray, 1) = 55
UBound(MyArray, 2) = 27
UBound(MyArray, 3) = 42
```

**Returns** Integer

If <dimension> is not an Integer, UBound rounds it to the nearest Integer before evaluating it.

- Tips**
- To determine the lower bound of an array, use LBound.
  - To determine the total number of elements in a given dynamic array dimension, take the value returned from UBound, subtract the value returned from LBound, then add 1.

**Example** The following example uses UBound to determine the upper bounds of an array of 3 dimensions. The use of Rnd simulates changes in upper bounds that the user made at run time in response to the program.

```
Sub Start()
 Dim First As Integer, Sec As Integer, Third As Integer
 Dim Msg As String
 ' Declare array variable
 Dim MyArray()
 Super::Start()
 ' Seed rnd generator
 Randomize
```

```

' First dimension
First = Int(14 * Rnd + 3)
' Second dimension
Sec = Int(14 * Rnd + 3)
' Third dimension
Third = Int(14 * Rnd + 3)
' Set dimensions
ReDim MyArray(First, Sec, Third)
Msg = "MyArray has the following upper bounds: "
+ & "Dimension 1 -> " & UBound(MyArray, 1)
+ & "Dimension 2 -> " & UBound(MyArray, 2)
+ & "Dimension 3 -> " & UBound(MyArray, 3)
ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Dim statement  
LBound function  
Rnd function

---

## UCase, UCase\$ functions

Converts all lowercase alphabetic characters in a string to uppercase.

**Syntax** UCase(<string exprs>)  
UCase\$(<string exprs>)

**Parameters** <string exprs>  
String expression that contains the characters to convert to uppercase.

For example, the following statements are equivalent. Each returns 6 JANE STREET, 2ND FL.

```

UCase$("6 jane street, 2nd fl")
UCase$("6 Jane Street, 2nd Fl")
UCase$("6 jAn" & "E sTreeT, 2nD fL")

```

**Returns** UCase: Variant  
UCase\$: String

- If <string exprs> contains no lowercase alphabetic characters, UCase[\$] returns the original <string exprs>.
- UCase[\$] has no effect on non-alphabetic characters in <string exprs>.
- If <string exprs> evaluates to Null, UCase[\$] returns Null.

- Tips**
- To ensure uniformity in the data you get from the user so that, for example, strings like MacManus, Macmanus, and macMaNus are always sorted, compared, or otherwise treated in the same way, use UCase[\$] to convert the data before using it.
  - To convert alphabetic characters in <string exprs> to all lowercase characters, use LCase[\$].

**Example** The following example uses UCase[\$] to render a customer's name in uppercase letters:

```
Sub Start()
 Dim AnyCase As String, Uppercase As String, Msg As String
 Super::Start()
 AnyCase = "CusTomer naME"
 ' Convert to uppercase
 Uppercase = UCase$(AnyCase)
 Msg = "UCase$ converts "" & AnyCase & "" to ""
+ & Uppercase & ""."
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** LCase, LCase\$ functions

---

## Val function

Returns the numeric value of a string expression.

**Syntax** Val(<string exprs>)

**Parameters** <string exprs>

String expression from which to extract a numeric value.

For example, the following are equivalent. They both return the value 118.

```
Val("118 36th Street")
Val("118 36th Street, #55")
```

The following returns the value 11836:

```
Val("&H2E3C")
```

Because the first character is non-numeric, the following returns 0:

```
Val("$1,275,332.52")
```

**Rules:**

- Starts translating a string into a number by starting at the left of the string and proceeding toward the right.

- Stops translating the string as soon as it encounters a non-numeric character or the end of the string, whichever comes first.
- Interprets the prefixes &O and &H as numeric characters representing octal and hexadecimal numbers, respectively.
- Interprets dollar sign as non-numeric.
- Ignores spaces, tabs, thousands separators, and line feeds.
- Stops translating at the appearance of the second decimal point.
- Returns zero if it stopped before it encounters a numeric character.
- Parses data according to the formatting rules of the run-time locale. Table 6-57 shows how Val parses strings in different locales.

**Table 6-57** Comparison of how Val parses strings in different locales

| String      | US English | Greek     | French  |
|-------------|------------|-----------|---------|
| 123.456     | 123.456    | 123456    | 123,456 |
| 123,456     | 123456     | 123,456   | 123,456 |
| 123.456.789 | 123.456    | 123456789 | 123,456 |
| 123,456,789 | 123456789  | 123,456   | 123,456 |

- Interprets the first decimal separator in a numerical string as a decimal separator and stops conversion at the second decimal separator. Both "123.456" and "123.456.789" convert to 123.456 in US English. In the French locale, Val converts "123.456" to 123,456. Similarly, Val converts "123.456.789" in the French locale.
- In a locale that uses a dot as a thousands separator, Val ignores any dots it encounters. In the Greek locale, for example, Val converts "123.456" to 123456 and converts 123.456.789 to 123456789.
- In a locale that uses a comma as a thousands separator, Val ignores the comma. For example, in the US English locale, Val converts "123,456" to 123456.
- In a locale that does not use a dot as a thousands separator or decimal separator, Val interprets a dot as a decimal separator.

**Returns** Double

If <string expr> evaluates to Null, Val returns Null.

**Tips**

- To convert a number to a String use Str\$.
- To avoid using Val, use the Variant data type for variables when it is necessary to convert between strings and numbers.

**Example** The following example creates a string, then returns the numeric value of that string:

## VarType function

```
Sub Start()
 Dim Msg As String, Number As Double
 Super::Start()
 ' A string containing some numbers
 Number = Val("987,123.654")
 Msg = "VAL extracted this value from the input: " & Number
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    Format, Format\$ functions  
              Str, Str\$ functions

---

## VarType function

Returns a value that indicates how Actuate Basic stores a Variant internally.

**Syntax**    VarType(<variant variable>)

**Parameters**    <variant variable>  
                  String expression that specifies a variant of the Variant data type.

**Returns**    Integer

Table 6-58 shows the values VarType returns, the Variant data types they indicate, and the names of the corresponding symbolic constants that are stored in Header.bas.

**Table 6-58**    VarType return values and the corresponding <variant variable> data types and symbolic constants

| VarType returns | Data type of <variant variable> | Symbolic constant |
|-----------------|---------------------------------|-------------------|
| 0               | Empty                           | V_EMPTY           |
| 1               | Null                            | V_NULL            |
| 2               | Integer                         | V_INTEGER         |
| 3               | Long                            | V_LONG            |
| 4               | Single                          | V_SINGLE          |
| 5               | Double                          | V_DOUBLE          |
| 6               | Currency                        | V_CURRENCY        |
| 7               | Date                            | V_DATE            |
| 8               | String                          | V_STRING          |

If <variant variable> evaluates to Null, VarType returns Null.

**Example** The following example displays the Variant data type for a date, number, and string:

```
Sub Start()
 Dim TypeData
 Super::Start()
 TypeData = "This is data"
 ShowFactoryStatus("The value "" & TypeData &
+ "" is of VarType: " & VarType(TypeData))
 TypeData = 42
 ShowFactoryStatus("The value "" & TypeData &
+ "" is of VarType: " & VarType(TypeData))
 TypeData = CDate("12/10/59")
 ShowFactoryStatus("The value "" & TypeData &
+ "" is of VarType: " & VarType(TypeData))
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** IsDate function  
IsEmpty function  
IsNull function  
IsNumeric function

---

## Weekday function

Returns an integer between 1 (for Sunday) and 7 (for Saturday) that represents the day of the week for a specified date argument.

**Syntax** Weekday(<date exprs>)

**Parameters** <date exprs>

Date expression, or any numeric or string expression that can be interpreted as a date, or both a date and a time:

- Can be a string such as November 12, 1982 8:30 PM, Nov. 12, 1982 08:30 PM, 11/12/82 8:30pm, or any other string that can be interpreted as a date or both a date and a time in the valid range.
- Can be a date serial number such as 30267.854, which corresponds to November 12, 1982 at 8:30 P.M., or any other number that can be mapped to a date or both a date and a time in the valid range.
- For date serial numbers, the integer component represents the date itself while the fractional component represents the time of day on that date, where January 1, 1900, at noon has the date serial number 2.5, and negative numbers represent dates prior to December 30, 1899 (0).

The following conditions apply to <date exprs>:

- If <date exprs> includes a time, it must be a valid time, even though Weekday does not return a time. A valid time is one that is in the range 00:00:00 (12:00:00 A.M.) through 23:59:59 (11:59:59 P.M.), in either 12- or 24-hour format.
- If <date exprs> is a numeric expression, it must be in the range -657434 to +2958465, inclusive.
- If <date exprs> is a variable containing a date serial number, the variable must be explicitly declared as one of the numeric types.
- <date exprs> is parsed according to the formatting rules of the current run-time locale.

The following assumes that the AC\_CENTURY\_BREAK property is set to the default value of 30. For details on how to set AC\_CENTURY\_BREAK to some other value, please see *Accessing Data using e.Report Designer Professional*.

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000. For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).
- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

Note that a date can contain an abridged month, such as Nov. 12, 1982 as opposed to November 12, 1982.

For example, the following statements are equivalent. Each assigns 1 (which maps to Sunday) to the variable DayOfWeek.

```
DayOfWeek = Weekday("6/7/64 2:35pm")
DayOfWeek = Weekday("June 7, 1964 2:35 PM")
DayOfWeek = Weekday("Jun " & 5+2 & ", 1964")
DayOfWeek = Weekday(23535.6076)
DayOfWeek = Weekday(0.6076) - 6
```

### Returns Integer

- If <date exprs> is Null, Weekday returns Null.
- If Weekday returns 1, the day of the week is Sunday. If Weekday returns 2, the day of the week is Monday, and so on.
- If <date exprs> cannot be evaluated to a date, Weekday returns Null.

Example:

```
Weekday("This is not a date.") returns Null
```



- If <date exprs> fails to include all date components (day, month, and year), Weekday returns Null.

Examples:

```
Weekday("Nov 12, 1982") returns 6, but
Weekday("Nov 1982") returns Null
```

**Tip** If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

**Example** The following example displays a message indicating whether today is a weekend day or a weekday:

```
Sub Start()
 Dim DayNum As Integer, Msg As String, FullDesc as String
 Super::Start()
 ' Get current day of week
 DayNum = Weekday(Now)
 FullDesc = Format(Now, "dddd, mmmm dd, yyyy")
 ' Is it a weekend day?
 If DayNum = 1 Or DayNum = 7 Then
 Msg = "Today is " & FullDesc & ". It is a weekend day."
 '... or is it a weekday?
 Else
 Msg = "Today is " & FullDesc & ". It is a weekday."
 End If
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Day function  
Hour function  
Minute function  
Month function  
Now function  
Second function  
Year function

---

## While...Wend statement

Repeats a block of instructions each time a specified condition is True.

**Syntax** While <expression to reevaluate>

## While...Wend statement

<statements to repeat>

Wend

**Description** First, <expression to reevaluate> is tested. If it is True, the <statements to repeat> in the body of the loop are executed. Then <expression to reevaluate> is tested again. If it is still True, <statements to repeat> are executed again. This process repeats until <expression to reevaluate> is False. In that case, Actuate Basic skips all intervening <statements to repeat> and passes control to the statement immediately following Wend.

Do not branch into the middle of a While...Wend statement. Execute the entire statement instead, starting at the line with the While keyword.

**Parameters** **<expression to reevaluate>**  
Any valid numeric or string expression that evaluates to True (1) or False (0 or Null).

**<statements to repeat>**

One or more valid Actuate Basic statements; the statements that, collectively taken, are referred to as the loop.

For example, assuming the variable Counter starts at 1 and is incremented by 1 each time through the loop, the following statement causes its associated loop to be executed nine times:

```
While Counter < 10
```

- Tips**
- To take advantage of its greater flexibility, use Do...Loop instead of While Wend.
  - To be sure the loop executes at least once, explicitly set <expression to reevaluate> to True in a statement that closely or immediately precedes the While...Wend statement.
  - It is good programming practice to evaluate Boolean variables by using the keywords True or False instead of by inspecting their content for a nonzero (True) or zero (False) numeric value.

**Example** The following example sorts an array:

```
Sub Start()
 Dim SwapThese, Position As Integer, TempVar
 Static Cities(5)
 Super::Start()
 'Now assign array data out of alphabetical order
 'so we can see sort illustrated.
 Cities(1) = "New York"
 Cities(2) = "San Francisco"
 Cities(3) = "Paris"
 Cities(4) = "Boston"
 Cities(5) = "Seattle"
```

```

' Make sure we loop at least once
SwapThese = True
' Sort while there still are elements we need to swap
While SwapThese
' Now compare array elements by pairs. When two are swapped,
' ensure another pass thru loop by setting SwapThese to TRUE:
SwapThese = False
For Position = 2 To 5
 If Cities(Position - 1) > Cities(Position) Then
 SwapThese = True
 ' Now do the swap:
 TempVar = Cities(Position)
 Cities(Position) = Cities(Position - 1)
 Cities(Position - 1) = TempVar
 End If
Next Position
Wend
ShowFactoryStatus("New, sorted order: ")
For Position = 1 To 5
 ShowFactoryStatus(Cities(Position))
Next Position
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Do...Loop statement  
If...Then...Else statement

---

## Width statement

Defines the width of the output line of a sequential file.

**Syntax** Width #<open file number>, <new line width>

**Description** When you print to an ASCII text file, you might need to define a maximum output length for each line. Use the Width statement for this operation.

**Parameters** **<open file number>**  
Numeric expression that is the file number for a file opened with the Open statement. The file number must refer to a file that is currently open.

**<new line width>**  
Numeric expression that is the new width for the line. Width is measured as the number of characters Actuate Basic prints on a line before it begins a new line. If <new line width> is specified as 0, there is no limit to the length of the line. <new line width> must be in the range of 0–255, inclusive. The default is 0.

## Width statement

For example, the following statement sets the output line width to 75 columns for open file #1:

```
Width #1, 75
```

**Example** The following example creates a test file and writes some ASCII characters to it using the default output width of unlimited. Then, it changes the width and appends the same ASCII characters to the file. Finally, it reads the entire file back and displays it with both sets of ASCII characters, then deletes the file.

```
Sub Start()
 Dim I As Integer, Msg As String, TextLines As String
Super::Start()
 ' Create a sample text file
 Open "Testfile.txt" For Output As #1
 ' Print ASCII characters . . . 0-9 all on same line
 Width #1, 10
 Print #1, "Width 10:"
 For I = 0 To 9
 Print #1, Chr$(48 + I)
 Next I
 ' Start a new line
 Print #1,
 ' Change the line width to 4
 Width #1, 4
 ' Print ASCII characters . . . 4 characters to a line
 For I = 0 To 9
 Print #1, Chr$(48 + I)
 Next I
 Close #1
 ShowFactoryStatus("The effect of WIDTH is as displayed: ")
 ' Reopen test file for input
 Open "Testfile.txt" For Input As #1
 Do While Not EOF(1)
 ' Get contents of each line
 Input #1, TextLines
 ShowFactoryStatus(TextLines)
 Loop
 Close #1
 ShowFactoryStatus("Test file will now be deleted.")
 Kill "Testfile.txt"
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Open statement  
Print statement

Space, Space\$ functions  
Tab function

# Write statement

Formats and writes data to a sequential file.

- Syntax**
- Write #<file number> [, <exprs 1>] [, <exprs 2>] [, <exprs 3>]...
- Description**
- When Write writes to the file it inserts commas between items and places quotation marks around strings. You do not need to put explicit delimiters in the list. Write also inserts a newline character after it writes the final <exprs> to the file.

Write usually writes Variant data to a file the same way it writes data of any other Actuate Basic data type. Table 6-59, however, notes certain exceptions.

**Table 6-59** Exceptions to how Write writes Variant data to a file

| Data                                                                               | Write writes this to the file...                             |
|------------------------------------------------------------------------------------|--------------------------------------------------------------|
| One Variant of type V_EMPTY (Empty)                                                | Nothing at all                                               |
| More than one Variant of type V_EMPTY                                              | Delimiting commas                                            |
| Variant of type V_NULL (Null)                                                      | Literal #NULL#                                               |
| Variant of type V_DATE (Date)                                                      | The date, using the fixed date format: #yyyy-mm-dd hh:nn:ss# |
| Variant of type V_DATE, but with either the date or time component missing or zero | Only the part of the date provided                           |

- <file number> must match the number of a currently open file.
- The file corresponding to <file number> must be open under either the Output or Append mode.
- You must have write access to the open file. That is, the file must not have been opened using a Lock Write or Lock Read Write clause.
- The data cannot be an object variable, user-defined data type structure, handle to a class, or CPointer.

- Parameters**
- <file number>**  
Numeric expression that is the file number of a sequential file that is Open for Output or Append.
- For example, the following statements work together, although they can be separated from one another by lines of code. The first statement opens a file called Mynotes.fil, the second one writes the contents of four variables to that file, and

the third, by closing it, turns the file over to the operating system to complete the process of writing it to the disk.

```
Open "C:\Myfiles\Mynotes.fil" FOR OUTPUT AS #2
Write #2, A$, B%, C!, D#
Close #2
```

The following statement writes the specified variables to the file opened by a previous Open statement under number 1. Actuate Basic places double quotation marks around the value in StringVar\$, and it inserts commas between all the variables to delimit them. Finally, after the value in DoubleVar#, it writes a newline character.

```
Write #1, StringVar$, IntVar%, SingleVar!, DoubleVar#
```

### <exprs n>

Numeric and/or string expression that specifies the data that Write places in the file. There can be any number of these. The default is the newline character.

**Tip** Many database programs let you import data when the data is structured in the way that Write structures it. Such programs interpret each newline character as delimiting the end of a complete record, and treat each comma on a line as delimiting the end of a field within that record. This means you can use Write to export information from Actuate Basic to almost any database program.

**Example** The following example creates a name and age. It then writes this information to a test file, reads the file back, places the data in a message, and displays the message to the user. After the user responds, the example deletes the file.

```
Sub Start()
 Dim Msg As String
 Dim UsersAge As Integer, UserName As String
 Super::Start()

 ' Now create a sample data file:
 ' Open the file for output
 Open "Test.fil" For Output As #1
 UserName = "Xudong Ho"
 UsersAge = CInt(Rnd * 25) + 20
 ' Write data to test file
 Write #1, UserName, UsersAge
 ' Close file
 Close #1

 ' Now read back the sample data file:
 ' Open test file for input
 Open "Test.fil" For Input As #1

 ' Read the data in it
 Input #1, UserName, UsersAge
```

```

' Close file
Close #1

Msg = "The name '" & UserName & "' was read from the file. "
+ & "'" & UsersAge & "' is the age."
+ & "The test file will now be deleted."
ShowFactoryStatus(Msg)
' Delete file from disk
Kill "Test.fil"
End Function

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also**    Open statement  
               Print statement

---

## Year function

Returns an integer between 100 and 9999, inclusive, that represents the year of a specified date argument.

**Syntax**    Year(<date exprs>)

**Parameters**    <date exprs>

Date expression, or any numeric or string expression that can evaluate to a date. Specifies a date and/or time.

- Can be a string such as November 12, 1982, Nov. 12, 1982, 11/12/82, 11-12-82, or any other string that can be interpreted as a date in the valid range.
- Can be a date serial number such as 30267.854, which corresponds to November 12, 1982 at 8:30 P.M., or any other number that can be mapped to a date in the valid range.
- For date serial numbers, the integer component represents the date itself while the fractional component represents the time of day on that date, where January 1, 1900 at noon has the date serial number 2.5, and negative numbers represent dates prior to December 30, 1899 (0).
- If <date exprs> is a string expression, must specify a date in the range January 1, 100 through December 31, 9999, inclusive.
- If <date exprs> is a numeric expression, must be in the range -657434 to +2958465, inclusive.
- If <date exprs> is a variable containing a date serial number, the variable must be explicitly declared as one of the numeric types.
- <date exprs> is parsed according to the run-time locale formatting rules.

## Year function

The following assumes that the AC\_CENTURY\_BREAK property is set to the default value of 30. For information about using AC\_CENTURY\_BREAK, please see *Accessing Data using e.Report Designer Professional*.

- For abridged date expressions ending in 00 through 29 that do not specify the century, relevant date functions estimate the unabridged year by adding 2000. For example, while Year(#4/30/1910#) returns 1910, the abridged expression Year(#4/30/10#) returns 2010 (10 + 2000).
- For abridged date expressions ending in 30 through 99 that do not specify the century, relevant date functions estimate the unabridged year by adding 1900. For example, while Year(#11/12/2082#) returns 2082, the abridged expression Year(#11/12/82#) returns 1982 (82 + 1900).

Note that a date can contain an abridged month, such as Nov. 12, 1982 as opposed to November 12, 1982.

For example, the following statements are equivalent. Each assigns 1964 to the variable UserYear.

```
UserYear = Year("6/7/64")
UserYear = Year("June 7, 1964 2:35 PM")
UserYear = Year("Jun 7, 1964")
UserYear = Year(23535)
UserYear = Year(4707*5)
```

### Returns Integer

- If <date exprs> is Null, Year returns Null.
- If <date exprs> cannot be evaluated to a date, Year returns Null. For example:  
`Year("This is not a date.")` returns Null
- If <date exprs> fails to include all date components (day, month, and year), Year returns Null. For example:  
`Year("Nov 12, 1982")` returns 1982, but  
`Year("Nov 1982")` returns Null

**Tip** If you use a date expression in one locale, it might be misinterpreted in another locale. For instance, in the United States, 1/2/2005 means January 2nd, 2005, but in France, it means February 1st, 2005. To avoid such ambiguities, use DateSerial to specify all your dates.

**Example** The following example generates a date. Then, it uses various date functions to display the year, month, day, and weekday of the that date. Finally, it gives the date's serial number.

```
' This function tells us what suffix (1st, 2nd, 3rd) to use
' with a number
Function Suffix (DateNum) As String
```



```

Select Case DateNum
 Case 1, 21, 31
 Suffix = "st"
 Case 2, 22
 Suffix = "nd"
 Case 3, 23
 Suffix = "rd"
 Case Else
 Suffix = "th"
End Select
End Function

Sub Start()
 Dim Date1 As Date, UserYear As Integer, UserMonth As Integer
 Dim UserDay As Integer, UserDOW As Integer, DOWNName As String
 Dim Msg As String, LeapYear As String
 Super::Start()

 ' Get a date
 Date1 = Dateserial(Rnd * 120 + 1899, 1, 1) + CInt(Rnd * 366)
 ' Calculate year
 UserYear = Year(Date1)
 ' Calculate month
 UserMonth = Month(Date1)
 ' Calculate day
 UserDay = Day(Date1)
 ' Calculate day of week
 UserDOW = Weekday(Date1)
 ' Convert to name of day
 DOWNName = Format$(Date1, "dddd")
 ' Determine if the year is a leap year or a centesimal
 If UserYear Mod 4 = 0 And UserYear Mod 100 = 0 Then
 ' Evenly divisible by 400?
 If UserYear Mod 400 = 0 Then
 LeapYear = "is a leap year."
 ' Not evenly divisible
 Else
 LeapYear = "is a centesimal but not a leap year."
 End If
 ElseIf UserYear Mod 4 = 0 Then
 LeapYear = "is a leap year."
 Else
 LeapYear = "is not a leap year."
 End If
End Sub

```

## Year function

```
' Display results for the user after the pattern:
' The given year 1982 is not a leap year. The weekday number
' for the 12th day of the 11th month in 1982 is 6, which
' means that day was a Friday.
' The date serial number for 11/12/82 is: 30267
Msg = "The given year, " & UserYear & ", " & LeapYear
ShowFactoryStatus(Msg)
Msg = "The weekday number for the "
+ & UserDay & Suffix(UserDay) & " day of the "
+ & UserMonth & Suffix(UserMonth) & " month in "
+ & UserYear & " is " & UserDOW & ", which means "
+ & "that day is a " & DOWName & ". "
+ & "The date serial number for " & Date1 & " is: "
+ & CDb1(DateSerial(UserYear, UserMonth, UserDay))
ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

**See also** Date, Date\$ functions  
Day function  
Hour function  
Minute function  
Month function  
Now function  
Second function  
Weekday function



# Operators

This appendix contains information about operators Actuate Basic supports.

When several operations occur in an expression, each part is evaluated and resolved in a predetermined order, known as operator precedence. You can use parentheses to override the order of precedence and force parts of an expression to be evaluated before others. Operations within parentheses are always performed before those outside. Within parentheses, normal operator precedence is maintained.

When expressions contain operators from more than one category, arithmetic operators are evaluated first, comparison operators are evaluated next, and logical operators are evaluated last. Within individual categories, operators are evaluated in the order in which they appear in Table A-1.

**Table A-1** Order of evaluation of arithmetic, comparison, logical, and bitwise operators

| Arithmetic                           | Comparison                | Logical | Bitwise |
|--------------------------------------|---------------------------|---------|---------|
| Exponentiation(^)                    | Equality(=)               | Not     | BNot    |
| Negation(-)                          | Inequality(<>)            | And     | BAnd    |
| Multiplication and Division(* and /) | Less than(<)              | Or      | BOr     |
| Integer division(\)                  | Greater than(>)           | XOr     |         |
| Modulo arithmetic (Mod)              | Less than or Equal to(<=) | Eqv     |         |

(continues)

\* operator

**Table A-1** Order of evaluation of arithmetic, comparison, logical, and bitwise operators (continued)

| Arithmetic                         | Comparison                   | Logical | Bitwise |
|------------------------------------|------------------------------|---------|---------|
| Addition and Subtraction (+ and -) | Greater than or Equal to(>=) | Imp     |         |
| String concatenation(&)            | Like                         | Is      |         |

All comparison operators have equal precedence, that is, they are evaluated in the left-to-right order in which they appear.

When multiplication and division or addition and subtraction occur together in an expression, each operation is evaluated as it occurs from left to right.

In precedence, the string concatenation operator (&) falls after all arithmetic operators and before all comparison operators. The Like operator, while equal in precedence to all comparison operators, is actually a pattern-matching operator.

**\* operator**

Multiplies two numbers.

**Syntax** <result> = <operand1> \* <operand2>

**Description** The operands can be any numeric expression.

The data type of <result> is usually the same as that of the most precise operand. The order of precision, from least to most precise, is Integer, Long, Single, Double, Currency. The following are exceptions to this order:

- When multiplication involves a Single and a Long, the data type of <result> is converted to a Double.
- When the data type of <result> is a Variant of type 3 (Long), type 4 (Single), or type 7 (Date) that overflows its legal range, <result> is converted to a Variant of type 5 (Double).
- When the data type of <result> is a Variant of type 2 (Integer) that overflows its legal range, <result> is converted to a Variant of type 3 (Long).

If one or both operands are Null expressions, <result> is a Null. Any operand that is empty (VarType0) is treated as 0.

**Example** The following example determines tax on a value using the \* operator to multiply the user-supplied value by the tax rate of 15%:

```
Sub Start()
 ' Declare variables
 Dim N As Double, Tax As Double, Msg As String
```

```

Super::Start()
' Get value
N = CInt(Rnd * 125000 + 20000)
' Calculate tax
Tax = .15 * N
' Display results
Msg = "Tax on " & N & " is " & Tax
ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

**See also** VarType function

---

## + operator

Sums two numbers.

**Syntax** <result> = <operand1> + <operand 2>

**Description** Use the & operator for concatenation to eliminate ambiguity and provide self-documenting code.

When you use the + operator, you may not be able to determine whether addition or string concatenation is to occur. If at least one operand is not a Variant, the rules in Table A-2 apply.

**Table A-2** Conditions and the corresponding results for the + operator

| Condition                                                                             | Result                                             |
|---------------------------------------------------------------------------------------|----------------------------------------------------|
| Both expressions are numeric data types (Integer, Long, Single, Double, or Currency). | Add                                                |
| Both expressions are strings.                                                         | Concatenate                                        |
| One expression is a numeric data type and the other is a Variant (other than a Null). | Add                                                |
| One expression is a String and the other is a Variant (other than a Null).            | Concatenate                                        |
| One expression is a Variant containing Empty.                                         | Return the remaining operand unchanged as <result> |
| One expression is a numeric data type and the other is a String.                      | A Type Mismatch error occurs                       |

If either operand is a Null (Variant type 1), <result> is a Null.

If both operands are Variant expressions, the VarType of the operands determines the behavior of the + operator in the way that is shown in Table A-3.

**Table A-3** Conditions and results for the + operator when both operands are Variant expressions

| Condition                                                                                        | Result      |
|--------------------------------------------------------------------------------------------------|-------------|
| Both Variant expressions are of type 2-7 (numeric data types).                                   | Add         |
| Both Variant expressions are of type 8 (String).                                                 | Concatenate |
| One Variant expression is of type 2-7 (a numeric data type) and the other is of type 8 (String). | Add         |

For simple arithmetic addition involving only operands of numeric data types, the data type of <result> is usually the same as the most precise operand.

The order of precision, from least to most precise, is Integer, Long, Single, Double, Currency. The following exceptions are to this order:

- When a Single and a Long are added together, the data type of <result> is converted to a Double.
- When the data type of <result> is a Variant of type 3 (Long), type 4 (Single), or type 7 (Date) that overflows its legal range, <result> is converted to a Variant of type 5 (Double).

If one or both of the expressions are Null expressions, <result> is a Null. If both operands are Empty, <result> is an Integer. If only one operand is Empty, the other operand is returned unchanged as <result>.

**Example 1** The following example adds a number to itself and displays the result:

```
Sub Start()
 Dim N As Double, Res As Double, Fmt As String, Msg As String
 Super::Start()
 Fmt = "#,##0.00"
 ' Get a number
 N = CInt(Rnd * 10000000) / 100)
 'Add numbers
 Res = N + N
 Msg = Format$(N, Fmt) & " plus " & Format$(N, Fmt) & " is "
 Msg = Msg & Format$(Res, Fmt)
 ' Display result
 ShowFactoryStatus(Msg)
End Sub
```

**Example 2** The following example uses the + operator to concatenate strings:

```
Sub Start()
 Dim Msg As String
 Super::Start()
 Msg = "Actuate " + "e.Report " + "Designer Professional"
 ' Display result
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

**See also** VarType function

## - operator

Finds the difference between two numbers or indicates the negative value of an operand.

### Syntax 1

<result> = <operand1> - <operand2>

### Syntax 2

-number

**Description** In Syntax 1, the - operator is the arithmetic subtraction operator used to find the difference between two numbers. The operands can be any numeric expression.

The data type of <result> is usually the same as the most precise operand. The order of precision, from least to most precise, is Integer, Long, Single, Double, Currency. The following exceptions are to this order:

- When subtraction involves a String and a Long, the data type of <result> is converted to a Double.
- When the data type of <result> is a Variant of type 3 (Long), type 4 (Single), or type 7 (Date) that overflows its legal range, <result> is converted to a Variant of type 5 (Double).

If one or both operands are Null expressions, <result> is a Null. If an operand is Empty (VarType 0), it is treated as if it were 0.

**Example 1** The following example subtracts a number from 1000 and displays the result:

```
Sub Start()
 Dim N As Double, Result As Double, Msg As String
```

## / operator

```
Super::Start()
 ' Get a number
 N = CInt(Rnd * 200000) / 100
 Result = 1000 - N
 ' Display result
 Msg = "1000 minus " & N & " is " & Result
 ShowFactoryStatus(Msg)
End Sub
```

**Example 2** The following example uses the - operator to indicate a negative value of a number:

```
Sub Start()
 Dim N As Double, MinusN As Double, Msg As String
 Super::Start()
 ' Get a number
 N = CInt(Rnd * 200000) / 100
 ' Use negation operator
 MinusN = -N
 ' Display result
 Msg = "Negative " & N & " is " & MinusN
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

**See also** VarType function

---

## / operator

Divides two numbers and returns a floating point result.

**Syntax** <result> = <operand1> / <operand2>

**Description** The operands can be any numeric expression.

The data type of <result> is always a Double or a Variant of type 5 (Double).

If one or both operands are Null expressions, <result> is a Null. If an operand is Empty (Variant type 0), it is treated as if it were 0.

**Example** The following example divides 100,000 by 7 and returns 14,285.7142857143:

```
Sub Start()
 ' Declare variable
 Dim Result As Double, Msg As String
 Super::Start()
 ' Divide numbers
 Result = 100000 / 7
```



```

' Display results
Msg = "100000 divided by 7 is " & Result
ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

**See also** VarType function

## \ operator

Divides two numbers and returns an integer result.

**Syntax** <result> = <operand1> \ <operand2>

**Description** The operands can be any numeric expression.

Before division is performed, the operands are rounded to Integer or Long expressions.

The data type <result> is an Integer. Any fractional portion is truncated. However, if any operand is a Null, <result> is also a Null. Any operand that is Empty (Variant type 0) is treated as 0.

**Example** The following example divides 100,000 by 7 using integer division and returns 14,285:

```

Sub Start()
' Declare variables
Dim Result As Double, Msg As String
Super::Start()
' Divide numbers
Result = 100000 \ 7
' Display results
Msg = "100000 divided by 7 is " & Result
ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

## ^ operator

Raises a number to the power of an exponent.

**Syntax** <result> = <number> ^ <exponent>

## & operator

**Description** The <number> and <exponent> operands can be any numeric expression. However, the <number> operand can be negative only if <exponent> is an integer value. When more than one exponentiation is performed in a single expression, the ^ operator is evaluated as it is encountered from left to right.

Usually, the data type of <result> is a Double or a Variant (type 5). However, if either <number> or <exponent> is a Null expression, <result> is also a Null.

**Example** The following example squares (n^2) a number:

```
Sub Start()
 Dim N As Double, Result As Double, Msg As String
 Super::Start()
 ' Get number
 N = CInt(Rnd * 200) - 100
 ' Square number
 Result = N ^ 2
 ' Display result
 Msg = N & " squared is " & Result
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

**See also** VarType function

---

## & operator

Forces string concatenation of two operands.

**Syntax** <result> = <operand1> & <operand2>

**Description** Whenever an operand is a number, it is converted to a Variant of type 8 (String). The data type of <result> is String if both operands are String expressions; otherwise, <result> is a Variant of type 8 (String). If both operand are Null (type 1), <result> is also Null. However, if only one operand is Null, that operand is treated as a zero-length string when concatenated with the other operand. Any operand that is Empty (type 0) is also treated as a zero-length string.

**Example** The following example uses the & operator to concatenate a numeric variable (Var1), a string literal containing a space, and a string variable (Var2) that contains trombones:

```
Sub Start()
 ' Declare variables
 Dim Var1 As Integer, Var2 As String, Msg As String
 Super::Start()
 Var1 = 76
 Var2 = "trombones"
```

```

' Concatenate and display
Msg = Var1 & " " & Var2
ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples,” earlier in this chapter.

## And operator

Performs logical conjunction on two expressions.

**Syntax** <result> = <expr1> And <expr2>

**Description** If, and only if, both expressions evaluate True, <result> is True. If either expression evaluates False, <result> is False. Table A-4 illustrates how <result> is determined.

**Table A-4** Results of expressions that use the And operator

| <expr1> | And <expr2> | <result> |
|---------|-------------|----------|
| True    | True        | True     |
| True    | False       | False    |
| True    | Null        | Null     |
| False   | True        | False    |
| False   | False       | False    |
| False   | Null        | False    |
| Null    | True        | Null     |
| Null    | False       | False    |
| Null    | Null        | Null     |

**Example** The following example displays a message that depends on the value of variables A, B, and C, assuming that no variable is a Null. If A = 10, B = 8, and C = 6, both expressions evaluate True. Because both expressions are True, the And expression is also True.

```

Sub Start()
' Declare variables
Dim A, B, C, Msg
Super::Start()
' Assign values
A = 10: B = 8: C = 6

```

## BAnd operator

```
' Evaluate expressions
If A > B And B > C Then
 Msg = "Both expressions are True."
Else
 Msg = "One or both expressions are False."
End If
' Display results
ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

---

## BAnd operator

Performs a bitwise comparison of identically positioned bits in two numeric expressions.

**Syntax** <result> = <expr1> BAnd <expr2>

**Description** If, and only if, both expressions evaluate True, <result> is True. If either expression evaluates False, <result> is False. The BAnd operator sets the corresponding bit in <result> according to the truth table, Table A-5.

**Table A-5** Results for the BAnd operator

| Bit in <expr1> | Bit in <expr2> | <result> |
|----------------|----------------|----------|
| 0              | 0              | 0        |
| 0              | 1              | 0        |
| 1              | 0              | 0        |
| 1              | 1              | 1        |

**Example** The following example displays a message that depends on the value of variables A, B, and C, assuming that no variable is a Null. If A = 10, B = 8, and C = 6, both expressions evaluate True. Because both expressions are True, the BAnd expression is also True.

```
Sub Start()
 ' Declare variables
 Dim A, B, C, Msg
 Super::Start()
 ' Assign values
 A = 10: B = 8: C = 6
 ' Evaluate expressions
 If A > B BAnd B > C Then
 Msg = "Both expressions are True."
```

```

Else
 Msg = "One or both expressions are False."
End If
' Display results
ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

---

## BNot operator

Inverts the bit values of any variable.

**Syntax** <result> = BNot <expr>

**Description** The BNot operator sets the corresponding bit in <result> according to the truth table, Table A-6.

**Table A-6** Results for the BNot operator

| Bit in <expr> | Bit in <result> |
|---------------|-----------------|
| 0             | 1               |
| 1             | 0               |

If an integer variable has the value 0 (False), the variable becomes 1 (True); if it has the value of 1, it becomes 0.

**Example** The following example displays a message that depends on the value of variables A, B, and C, assuming that no variable is a Null. If A = 10, B = 8, and C = 6, the BNot expression evaluates True because A is not equal to B.

```

Sub Start()
 ' Declare variables
 Dim A, B, Msg
 Super::Start()
 ' Assign values
 A = 10: B = 8
 ' Evaluate expression
 If BNot A = B Then
 Msg = "A and B aren't equal."
 Else
 Msg = "A and B are equal."
 End If
 ' Display results
 ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

# BOr operator

Performs a bitwise comparison of identically positioned bits in two numeric expressions.

**Syntax** <result> = <expr1> BOr <expr2>

**Description** The BOr operator sets the corresponding bit in <result> according to the truth table, Table A-7.

**Table A-7** Results for the BOr operator

| Bit in <expr1> | Bit in <expr2> | <result> |
|----------------|----------------|----------|
| 0              | 0              | 0        |
| 0              | 1              | 1        |
| 1              | 0              | 1        |
| 1              | 1              | 1        |

**Example** The following example displays a message that depends on the value of variables A, B, and C, assuming that no variable is a Null. If A = 10, B = 8, and C = 6, the left expression is True and the right expression is False. Because at least one comparison expression is True, the BOr expression evaluates to True.

```
Sub Start()
 ' Declare variables
 Dim A, B, C, Msg
 Super::Start()
 ' Assign values
 A = 10: B = 8: C = 11
 ' Evaluate expression
 If A > B BOr B > C Then
 Msg = "One or both comparison expressions are True."
 Else
 Msg = "Both comparison expressions are False."
 End If
 ' Display results
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

# Comparison operators

Compares two expressions.

- Syntax** <result> = <expr1> <operator> <expr2>
- Description** Comparison operators, also known as relational operators, compare two expressions. Table A-8 contains a list of the comparison operators and the conditions that determine whether <result> is True, False, or Null.

**Table A-8** Comparison operators

|    | Meaning                  | True if        | False if        | Null if              |
|----|--------------------------|----------------|-----------------|----------------------|
| <  | Less than                | expr1 < expr2  | expr1 >= expr2  | expr1 or expr2= Null |
| <= | Less than or equal to    | expr1 <= expr2 | expr1 > expr2   | expr1 or expr2= Null |
| >  | Greater than             | expr1 > expr2  | expr1 <= expr2  | expr1 or expr2= Null |
| >= | Greater than or equal to | expr1 >= expr2 | expr1 < expr 2  | expr1 or expr2= Null |
| =  | Equal to                 | expr1 = expr2  | expr1 <> expr 2 | expr1 or expr2= Null |
| <> | Not equal to             | expr1 <> expr2 | expr1 = expr2   | expr1 or expr2= Null |

When comparing two expressions, you may not be able to easily determine whether the expressions are being compared as numbers or as strings. Table A-9 shows how the expressions are compared or what results when either expression is not a Variant.

**Table A-9** Comparison results when either expression is not a Variant

| If                                                                                                                                                       | Then                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Both expressions are numeric data types (Integer, Long, Single, Double, or Currency).                                                                    | Perform a numeric comparison. |
| Both expressions are String.                                                                                                                             | Perform a string comparison.  |
| One expression is a numeric data type and the other is a Variant of type 2-7 (a numeric data type) or type 8 (String) that can be converted to a number. | Perform a numeric comparison. |

(continues)

**Table A-9** Comparison results when either expression is not a Variant (continued)

| If                                                                                                                        | Then                                                                             |
|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| One expression is a numeric data type and the other is a Variant of type 8 (String) that cannot be converted to a number. | A Type Mismatch error occurs.                                                    |
| One expression is a String and the other is a Variant of any type except Null.                                            | Perform a string comparison.                                                     |
| One expression is Empty and the other is a numeric data type.                                                             | Perform a numeric comparison, using 0 as the Empty expression.                   |
| One expression is Empty and the other is a String.                                                                        | Perform a string comparison, using a zero-length string as the Empty expression. |
| One expression is Empty and the other is a Variant of type 8 (String).                                                    | A Type Mismatch error occurs.                                                    |

If <expr1> and <expr2> are both Variant expressions, their type determines how they are compared. Table A-10 shows how the expressions are compared or what results from the comparison, depending on the type of the Variant.

**Table A-10** Comparison results when either expression is not a Variant

| If                                                                                               | Then                                                                             |
|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Both Variant expressions are of type 2-7 (numeric data types).                                   | Perform a numeric comparison.                                                    |
| Both Variant expressions are of type 8 (String).                                                 | Perform a string comparison.                                                     |
| One Variant expression is of type 2-7 (a numeric data type) and the other is of type 8 (String). | The numeric expression is less than the String expression.                       |
| One Variant expression is Empty and the other is of type 2-7 (a numeric data type).              | Perform a numeric comparison, using 0 as the Empty expression.                   |
| One Variant expression is Empty and the other is of type 8 (String).                             | Perform a string comparison, using a zero-length string as the Empty expression. |
| Both Variant expressions are Empty.                                                              | The expressions are equal.                                                       |

If a Currency is compared with a Single or Double, the Single or Double is converted to a Currency. This causes any fractional part of the Single or Double value less than 0.000000001 to be lost and might cause two values to compare as



equal when they are not. Such a conversion can also cause an Overflow error if the magnitude of the Single or Double is too large.

**Example** The following example shows the typical use of a comparison operator to evaluate the relationship between variables A and B. The example displays an appropriate message depending on whether  $A < B$ ,  $A = B$ , or  $A > B$ . The other comparison operators can be used in a similar way.

```
Sub Start()
 Dim A As Integer, B As Integer, Msg As String
 Super::Start()
 ' Get first variable
 A = Rnd * 1000
 ' Get second variable
 B = Rnd * 1000
 ' Evaluate relationship
 If A < B Then
 ' Create correct message
 Msg = " is less than "
 ElseIf A = B Then
 Msg = " is equal to "
 Else
 Msg = " is greater than "
 End If
 ' Display results
 ShowFactoryStatus(A & Msg & B)
End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

**See also** VarType function

---

## Eqv operator

Performs a logical equivalence on both expressions.

**Syntax** <result> = <expr1> Eqv <expr2>

**Description** If either expression is a Null, <result> is also Null. When neither expression is a Null, result is determined according to Table A-11.

**Table A-11** Results for the Eqv operator when neither expression is a Null

| <expr1> | <expr2> | <result> |
|---------|---------|----------|
| True    | True    | True     |

(continues)

**Table A-11** Results for the Eqv operator when neither expression is a Null

|       |       |       |
|-------|-------|-------|
| True  | False | False |
| False | True  | False |
| False | False | True  |

**Example** The following example displays a message that depends on the value of variables A, B, and C, assuming that no variable is a Null. If A = 10, B = 8, and C = 6, both expressions evaluate True. As a result, the Eqv expression also evaluates to True.

```
Sub Start()
 ' Declare variables
 Dim A, B, C, Msg
 Super::Start()
 ' Assign values
 A = 10: B = 8: C = 6
 ' Evaluate expressions
 If A > B Eqv B > C Then
 Msg = "Both expressions are True or both are False."
 Else
 Msg = "One expression is True and one is False."
 End If
 ' Display results
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

## Imp operator

Performs a logical implication on two expressions.

**Syntax** <result> = <expr1> Imp <expr2>

**Description** Table A-12 illustrates how <result> is determined.

**Table A-12** Results for the Imp operator

| <expr1> | <expr2> | <result> |
|---------|---------|----------|
| True    | True    | True     |
| True    | False   | False    |
| True    | Null    | Null     |
| False   | True    | True     |
| False   | False   | True     |

**Table A-12** Results for the Imp operator

| <expr1> | <expr2> | <result> |
|---------|---------|----------|
| False   | Null    | True     |
| Null    | True    | True     |
| Null    | False   | Null     |
| Null    | Null    | Null     |

**Example** The following example displays a message that depends on the value of variables A, B, and C, assuming that no variable is a Null. If A = 10, B = 8, and C = 6, both expressions evaluate True. Because both are True, the Imp expression is also True.

```
Sub Start()
 ' Declare variables
 Dim A, B, C, Msg
 Super::Start()
 ' Assign values
 A = 10: B = 8: C = 6
 If A > B Imp B > C Then
 Msg = "The left expression implies the right expression."
 Else
 Msg = "The left expression doesn't imply the right
 expression."
 End If
 ' Display results
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

## Is operator

Compares two object reference variables.

**Syntax** <result> = <objref1> Is <objref2>

**Description** If <objref1> and <objref2> both refer to the same object, <result> is True; if they do not, <result> is False. Two variables can be made to refer to the same object in several ways.

In the following example, A has been set to refer to the same object as B:

```
Set A = B
```

## Like operator

The following example makes A and B refer to the same object as C:

```
Set A = C
Set B = C
```

**Example** The following example uses the Is operator to evaluate whether two object reference values refer to the same control:

```
Sub Start()

 Dim MLabel1 As AcLabelControl
 Dim MLabel2 As AcLabelControl
 Dim Msg As String, LoopCount As Integer
 Super::Start()

 'Instantiate two new, separate objects
 Set MLabel1 = New AcLabelControl
 Set MLabel2 = New AcLabelControl

 'Loop twice through the Is evaluation
 For LoopCount = 1 to 2
 If MLabel1 Is MLabel2 Then
 Msg = "MLabel1, MLabel2 DO refer to the same object."
 ShowFactoryStatus(Msg)
 Else
 Msg = "MLabel1, MLabel2 DON'T refer to the same object."
 ShowFactoryStatus(Msg)
 'Before the next Is evaluation loop, force identity.
 Set MLabel1 = MLabel2
 End If
 Next LoopCount

End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

**See also** Set statement

---

## Like operator

Compares two string expressions.

**Syntax** <result> = <exprs> Like <pattern>

**Description** If <exprs> matches <pattern>, <result> is True; if there is no match, <result> is False; and if either <exprs> or <pattern> is a Null, <result> is also a Null. The case sensitivity and character sort order of the Like operator depend on the setting of the Option Compare statement.

Unless other wise specified, the default string-comparison method for each module is Option Compare Binary; that is, string comparisons are case-sensitive.

Built-in pattern matching provides a versatile tool for string comparisons. The pattern-matching feature allows you to use wildcard characters, such as those recognized by the operating system, to match strings. The wildcard characters and what they match are shown in Table A-13.

**Table A-13** Wildcard characters

| Character(s) in <pattern> | Matches in <exprs>                           |
|---------------------------|----------------------------------------------|
| ?                         | Any single character                         |
| *                         | Zero or more characters                      |
| #                         | Any single digit (0-9)                       |
| [character list]          | Any single character in <character list>     |
| [^character list]         | Any single character not in <character list> |

A group of one or more characters <character list> enclosed in brackets ( [ ] ) can be used to match any single character in <exprs> and can include almost any characters in the ANSI character set, including digits. The special characters left bracket ( [ ), question mark ( ? ), number sign ( # ), and asterisk ( \* ) can be used to match themselves directly only by enclosing them in brackets. The right bracket ( ] ) cannot be used within a group to match itself, but it can be used outside a group as an individual character.

In addition to a simple list of characters enclosed in brackets, <character list> can specify a range of characters by using a hyphen ( - ) to separate the upper and lower bounds of the range. For example, [A-Z] in <pattern> results in a match if the corresponding character position in <exprs> contains any of the uppercase letters in the range A through Z. Multiple ranges are included within the brackets without any delimiting. For example, [a-zA-Z0-9] matches any alphanumeric character.

Other important rules for pattern matching include the following:

- The hyphen ( - ) can appear either at the beginning (after an exclamation mark if one is used) or at the end of <character list> to match itself. In any other location, the hyphen is used to identify a range of ANSI characters.
- When a range of characters is specified, they must appear in ascending order (low to high).
- The character sequence [ ] is ignored; it is evaluated as a zero-length string.
- The special character exclamation point ( ! ) is ignored.

**Example** The following example shows the result of mixing and matching various wildcard characters in conjunction with the Like operator:

## Mod operator

```
Sub Start()
 Super::Start()
 'Returns True (1)
 ShowFactoryStatus("PB123" Like "P[A-F]###")
 'Returns False (0)
 ShowFactoryStatus("PG123" Like "P[A-F]###")
 'Returns False
 ShowFactoryStatus("PG123" Like "P[^A-F]###")
 'Returns False
 ShowFactoryStatus("PB12x" Like "P[A-F]###")
 'Returns True
 ShowFactoryStatus("PB123" Like "?B???")
 'Returns False
 ShowFactoryStatus("PB123" Like "?B??")
 'Returns True
 ShowFactoryStatus("PB123" Like "P*")
 'Returns False
 ShowFactoryStatus("PB123" Like "*P")
 'Returns True
 ShowFactoryStatus("PB123" Like "*P*")
 'Returns True
 ShowFactoryStatus("F" Like "[^A-Z]*")
 'Returns True
 ShowFactoryStatus("F" Like "[A-Z]*")
 'Returns True
 ShowFactoryStatus("abracadabra12Z%$a" Like "a*a")
 'Returns False
 ShowFactoryStatus("CAT123khg" Like "B?T*")
End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

**See also**    Format, Format\$ functions  
             StrComp function  
             Option Compare statement

---

## Mod operator

Divides two numbers and returns only the remainder.

**Syntax**    <result> = <operand1> Mod <operand2>

**Description**    The modulus, or remainder, operator divides <operand1> by <operand2> (rounding floating point numbers to integers) and returns only the remainder as the <result>. For example, in the expression  $A = 19 \text{ Mod } 6.7$ ,  $A$  (which is <result>) equals 5. The operands can be any numeric expression.

Usually the data type of <result> is an Integer. However, <result> is a Null (Variant type 1) if one or both operands are Null expressions. Any operand that is Empty (Variant type 0) is treated as 0.

**Example** The following example uses the Mod operator to determine if a 4-digit year is a leap year:

```
Sub Start()
 Dim TestYr As Integer, LeapStatus As String
 Super::Start()
 TestYr = Rnd * 120 + 1899
 ' Divisible by 4?
 If TestYr Mod 4 = 0 And TestYr Mod 100 = 0 Then
 ' Divisible by 400?
 If TestYr Mod 400 = 0 Then
 LeapStatus = " is a leap year."
 Else
 LeapStatus = " is centesimal, but not a leap year."
 End If
 ElseIf TestYr Mod 4 = 0 Then
 LeapStatus = " is a leap year."
 Else
 LeapStatus = " is not a leap year."
 End If
 ' Display results
 ShowFactoryStatus(TestYr & LeapStatus)
End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

**See also** VarType function

---

## Not operator

Performs logical negation on an expression.

**Syntax** <result> = Not <expr>

**Description** Table A-14 illustrates how <result> is determined.

**Table A-14** Results for the Not operator

| <expr> | <result> |
|--------|----------|
| True   | False    |

(continues)

## Or operator

**Table A-14** Results for the Not operator (continued)

|       |      |
|-------|------|
| False | True |
| Null  | Null |

---

In addition, the Not operator inverts the bit values of any variable and sets the corresponding bit in <result> according to the truth table, Table A-15.

**Table A-15** Bitwise results for the Not operator

| Bit in <expr> | Bit in <result> |
|---------------|-----------------|
| 0             | 1               |
| 1             | 0               |

---

If an integer variable has the value 0 (False), the variable becomes 1 (True); if it has the value of 1 it becomes 0.

**Example** The following example displays a message that depends on the value of variables A, B, and C, assuming that no variable is a Null. If A = 10, B = 8, and C = 6, the Not expression evaluates True because A is not equal to B.

```
Sub Start()
 ' Declare variables
 Dim A, B, Msg
 Super::Start()
 ' Assign values
 A = 10: B = 8
 ' Evaluate expression
 If Not A = B Then
 Msg = "A and B aren't equal."
 Else
 Msg = "A and B are equal."
 End If
 ' Display results
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

---

## Or operator

Performs a logical disjunction on two expressions.

**Syntax** <result> = <expr1> Or <expr2>



**Description** If either or both expressions evaluate True, <result> is True. Table A-16 illustrates how <result> is determined.

**Table A-16** Results for expressions that use the Or operator when either or both expressions evaluate True

| <expr1> | <expr2> | <result> |
|---------|---------|----------|
| True    | True    | True     |
| True    | False   | True     |
| True    | Null    | True     |
| False   | True    | True     |
| False   | False   | False    |
| False   | Null    | Null     |
| Null    | True    | True     |
| Null    | False   | Null     |
| Null    | Null    | Null     |

The Or operator performs a bitwise comparison of identically positioned bits in two numeric expressions and sets the corresponding bit in <result> according to the truth table, Table A-17.

**Table A-17** Results for expressions that use the Or operator to compare two identically positioned bits in two numeric expressions

| Bit in <expr1> | Bit in <expr2> | <result> |
|----------------|----------------|----------|
| 0              | 0              | 0        |
| 0              | 1              | 1        |
| 1              | 0              | 1        |
| 1              | 1              | 1        |

**Example** The following example displays a message that depends on the value of variables A, B, and C, assuming that no variable is a Null. If A = 10, B = 8, and C = 6, the left expression is True and the right expression is False. Because at least one comparison expression is True, the Or expression evaluates to True.

## XOr operator

```
Sub Start()
 'Declare variables
 Dim A, B, C, Msg
 Super::Start()
 ' Assign values
 A = 10: B = 8: C = 11
 ' Evaluate expression
 If A > B Or B > C Then
 Msg = "One or both comparison expressions are True."
 Else
 Msg = "Both comparison expressions are False."
 End If
 ' Display results
 ShowFactoryStatus(Msg)
End Sub
```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

---

## XOr operator

Performs a logical exclusion on two expressions.

**Syntax** <result> = <expr1> Xor <expr2>

**Description** If only one of the expressions evaluates True, <result> is True. If either expression is a Null <result> is also a Null. When neither expression is a Null, <result> is determined according to Table A-18.

**Table A-18** Results for the XOr operator when neither expression is a Null

| <expr1> | <expr2> | <result> |
|---------|---------|----------|
| True    | True    | False    |
| True    | False   | True     |
| False   | True    | True     |
| False   | False   | False    |

**Example** The following example displays a message that depends on the value of variables A, B, and C, assuming that no variable is a Null. If A = 6, B = 8, and C = 10, both expressions evaluate False. Because both are False, the XOr expression is also False.

```

Sub Start()
 ' Declare variables
 Dim A, B, C, Msg
 Super::Start()
 ' Assign values
 A= 6: B = 8: C = 10
 ' Evaluate expression
 If A > B Xor B = C Then
 Msg = "Only one comparison expression is True, not Both."
 Else
 Msg = "Both comparison expressions are True or both are
 False."
 End If
 ' Display results
 ShowFactoryStatus(Msg)
End Sub

```

For information about using the code examples, see “Using the code examples” in Chapter 6, “Statements and functions.”

XOr operator

# B

## Keywords

Table B-1 lists words Actuate Basic uses as keywords. These words include data types, operators, statements, and other words that the Actuate compiler recognizes. Although Actuate Basic allows using names that are the same as function names, avoid using these names.

**Table B-1** Keywords and the corresponding references

| Keyword     | Reference                                                                              |
|-------------|----------------------------------------------------------------------------------------|
| Access      | Open statement                                                                         |
| Alias       | Declare statement                                                                      |
| And         | And operator                                                                           |
| Any         | Any data type                                                                          |
| AnyClass    | SetBinding function                                                                    |
| AppActivate | Reserved                                                                               |
| Append      | Open statement                                                                         |
| As          | Class statement, Declare statement, Dim statement, Open statement, Type...As statement |
| Assert      | Assert statement                                                                       |
| BAnd        | BAnd operator                                                                          |
| Base        | Option Base statement                                                                  |
| Beep        | Beep statement                                                                         |
| Binary      | Option Compare statement                                                               |

(continues)

**Table B-1**      Keywords and the corresponding references (continued)

| <b>Keyword</b> | <b>Reference</b>                                                              |
|----------------|-------------------------------------------------------------------------------|
| BNot           | BNot operator                                                                 |
| BOr            | BOr operator                                                                  |
| ByVal          | Declare statement, Function...End Function statement, Sub...End Sub statement |
| Call           | Call statement                                                                |
| Case           | Select Case statement                                                         |
| ChDir          | ChDir statement                                                               |
| ChDrive        | ChDrive statement                                                             |
| Class          | Class statement                                                               |
| Clipboard      | Reserved                                                                      |
| Close          | Close statement                                                               |
| Compare        | Option Compare statement                                                      |
| Const          | Const statement                                                               |
| CPointer       | CPointer data type                                                            |
| Currency       | Currency data type                                                            |
| Date           | Date data type                                                                |
| Debug          | Reserved                                                                      |
| Declare        | Declare statement                                                             |
| DefCur         | Reserved                                                                      |
| DefDbl         | Reserved                                                                      |
| DefInt         | Reserved                                                                      |
| DefLng         | Reserved                                                                      |
| DefSng         | Reserved                                                                      |
| DefStr         | Reserved                                                                      |
| Dim            | Dim statement                                                                 |
| Do             | Do...Loop statement                                                           |
| Double         | Double data type                                                              |
| Else           | If...Then...Else statement, Select Case statement                             |
| ElseIf         | If...Then...Else statement                                                    |
| End            | End statement                                                                 |
| Eqv            | Eqv operator                                                                  |
| Erase          | Erase statement                                                               |

**Table B-1** Keywords and the corresponding references (continued)

| Keyword   | Reference                               |
|-----------|-----------------------------------------|
| Err       | Err statement                           |
| Error     | Error statement                         |
| Exit      | Exit statement                          |
| Explicit  | Reserved                                |
| FileCopy  | FileCopy statement                      |
| For       | For...Next statement                    |
| FreeLocks | Reserved                                |
| Function  | Function...End Function statement       |
| Get       | Get statement                           |
| Global    | Global statement                        |
| GoSub     | Reserved                                |
| GoTo      | GoTo statement                          |
| Group     | Reserved                                |
| If        | If...Then...Else statement              |
| Imp       | Imp operator                            |
| Input     | Input statement, Line Input statement   |
| Integer   | Integer data type                       |
| Internal  | Reserved                                |
| Is        | Is operator, Select Case statement      |
| Kill      | Kill statement                          |
| Let       | Let statement                           |
| Lib       | Declare statement                       |
| Like      | Like operator                           |
| Line      | Line Input statement                    |
| Load      | Reserved                                |
| Local     | Reserved                                |
| Lock      | Lock...Unlock statement, Open statement |
| Long      | Long data type                          |
| Loop      | Do...Loop statement                     |
| LSet      | LSet statement                          |

*(continues)*

**Table B-1** Keywords and the corresponding references (continued)

| Keyword    | Reference                                                                |
|------------|--------------------------------------------------------------------------|
| Mid        | Mid, Mid\$ statements                                                    |
| MidB       | MidB, MidB\$ statements                                                  |
| MkDir      | MkDir statement                                                          |
| Mod        | Mod operator                                                             |
| MsgBox     | MsgBox statement                                                         |
| Name       | Name statement                                                           |
| New        | Set statement                                                            |
| Next       | For...Next statement, Resume statement                                   |
| Not        | Not operator                                                             |
| Nothing    | Set statement                                                            |
| Null       | Working with Variant data                                                |
| Object     | Dim statement                                                            |
| Of         | Class statement                                                          |
| Off        | Option Strict statement                                                  |
| On         | On Error statement, Option Strict statement                              |
| Open       | Open statement                                                           |
| Option     | Option Base statement, Option Compare statement, Option Strict statement |
| Or         | Or operator                                                              |
| Output     | Open statement                                                           |
| Persistent | Dim statement                                                            |
| Preserve   | ReDim statement                                                          |
| Print      | Print statement                                                          |
| Put        | Put statement                                                            |
| Random     | Open statement                                                           |
| Randomize  | Randomize statement                                                      |
| Read       | Open statement                                                           |
| ReDim      | ReDim statement                                                          |
| Rem        | Rem statement                                                            |
| Reset      | Reset statement                                                          |
| Resume     | Resume statement                                                         |
| Return     | Reserved                                                                 |



**Table B-1**      Keywords and the corresponding references (continued)

| <b>Keyword</b> | <b>Reference</b>                                                                                 |
|----------------|--------------------------------------------------------------------------------------------------|
| RmDir          | RmDir statement                                                                                  |
| RSet           | RSet statement                                                                                   |
| SavePicture    | Reserved                                                                                         |
| Seek           | Seek statement                                                                                   |
| Select         | Select Case statement                                                                            |
| Set            | Set statement                                                                                    |
| SetAttr        | SetAttr statement                                                                                |
| Shared         | Open statement                                                                                   |
| Single         | Single data type                                                                                 |
| Static         | Class statement, Function...End Function statement,<br>Static statement, Sub...End Sub statement |
| Step           | For...Next statement                                                                             |
| Stop           | Stop statement                                                                                   |
| Strict         | Option Strict statement                                                                          |
| String         | String data type                                                                                 |
| Sub            | Sub...End Sub statement                                                                          |
| Subclass       | Class statement                                                                                  |
| Text           | Option Compare statement                                                                         |
| Then           | If...Then...Else statement                                                                       |
| Time           | Reserved                                                                                         |
| To             | For...Next statement, Lock...Unlock statement,<br>Select Case statement                          |
| Transient      | Dim statement                                                                                    |
| Type           | Type...End Type statement, Type...As statement                                                   |
| Unload         | Reserved                                                                                         |
| Unlock         | Lock...Unlock statement                                                                          |
| Until          | Do...Loop statement                                                                              |
| Variant        | Variant data type                                                                                |
| Verify         | Reserved                                                                                         |
| Volatile       | Dim statement                                                                                    |
| Wend           | While...Wend statement                                                                           |

*(continues)*

**Table B-1**      Keywords and the corresponding references (continued)

| <b>Keyword</b> | <b>Reference</b>       |
|----------------|------------------------|
| While          | While...Wend statement |
| Width          | Width statement        |
| Write          | Write statement        |
| XOr            | XOr operator           |



# Trigonometric identities

This appendix contains information about trigonometric formulas that Actuate Basic supports. Actuate Basic supports only the Sin, Cos, Tan, Asin, Acos, and Atn built-in trigonometric functions. To use other trigonometric functions, you need to derive and write the functions yourself. To do this, use Table C-1, which shows the most commonly used trigonometric identities.

**Table C-1** Supported trigonometric formulas

| Name of formula           | Formula                                                                                  |
|---------------------------|------------------------------------------------------------------------------------------|
| Secant                    | $\text{Sec}(X) = 1 / \text{Cos}(X)$                                                      |
| Cosecant                  | $\text{Cosec}(X) = 1 / \text{Sin}(X)$                                                    |
| Cotangent                 | $\text{Cotan}(X) = 1 / \text{Tan}(X)$                                                    |
| Inverse Cotangent         | $\text{Arccotan}(X) = -\text{Atn}(X) + 2 * \text{Atn}(1)$                                |
| Hyperbolic Sine           | $\text{HSin}(X) = (\text{Exp}(X) - \text{Exp}(-X)) / 2$                                  |
| Hyperbolic Cosine         | $\text{HCos}(X) = (\text{Exp}(X) + \text{Exp}(-X)) / 2$                                  |
| Hyperbolic Tangent        | $\text{HTan}(X) = (\text{Exp}(X) - \text{Exp}(-X)) / (\text{Exp}(X) + \text{Exp}(-X))$   |
| Hyperbolic Secant         | $\text{HSec}(X) = 2 / (\text{Exp}(X) + \text{Exp}(-X))$                                  |
| Hyperbolic Cosecant       | $\text{HCosec}(X) = 2 / (\text{Exp}(X) - \text{Exp}(-X))$                                |
| Hyperbolic Cotangent      | $\text{HCotan}(X) = (\text{Exp}(X) + \text{Exp}(-X)) / (\text{Exp}(X) - \text{Exp}(-X))$ |
| Inverse Hyperbolic Sine   | $\text{HArcsin}(X) = \text{Log}(X + \text{Sqr}(X * X + 1))$                              |
| Inverse Hyperbolic Cosine | $\text{HArccos}(X) = \text{Log}(X + \text{Sqr}(X * X - 1))$                              |

(continues)

**Table C-1** Supported trigonometric formulas (continued)

| Name of formula              | Formula                                                                             |
|------------------------------|-------------------------------------------------------------------------------------|
| Inverse Hyperbolic Tangent   | $\text{HArctan}(X) = \text{Log}((1 + X) / (1 - X)) / 2$                             |
| Inverse Hyperbolic Secant    | $\text{HArcsec}(X) = \text{Log}((\text{Sqr}(-X * X + 1) + 1) / X)$                  |
| Inverse Hyperbolic Cosecant  | $\text{HArccosec}(X) = \text{Log}((\text{Sgn}(X) * \text{Sqr}(X * X + 1) + 1) / X)$ |
| Inverse Hyperbolic Cotangent | $\text{HArccotan}(X) = \text{Log}((X + 1) / (X - 1)) / 2$                           |
| Logarithm to base N          | $\text{LogN}(X) = \text{Log}(X) / \text{Log}(N)$                                    |

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