Third Lecture:

Constants , Variables , Objects and Colors ,

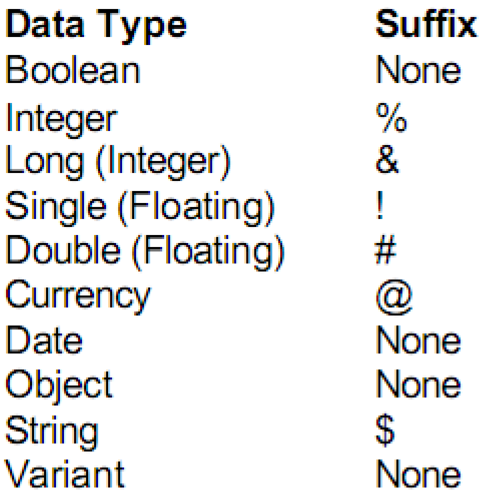
Variables and Constants

Variables are locations in memory used by Visual Basic to hold data and/or information needed by your application.

Rules used in naming variables:

1. Must begin with letter.
2. Can't contain an embedded type-declaration character.
3. Must not exceed 255 characters.
4. They can't be the same as restricted keywords (a restricted keyword is a word that Visual Basic uses as part of its language. This includes predefined statements such as "If and Loop", functions such as "Len and Abs", and operators such as "Or and Mod").

Visual Basic Data Types



Data Type	Suffix
Boolean	None
Integer	%
Long (Integer)	&
Single (Floating)	!
Double (Floating)	#
Currency	@
Date	None
Object	None
String	$
Variant	None

Variable Declaration

There are three ways for a variable to be typed (declared):

1. Default
2. Implicit
3. Explicit

<u>1: Default</u> If variables are not implicitly or explicitly typed, they are assigned the **variant** type by **default**. The variant data type is a special type used by Visual Basic that can contain numeric, string, or date data.

2:Implicitly To **implicitly** type a variable, use the corresponding suffix shown above in the data type table. For example,

TextValue$ = "This is a string" creates a string variable, while
Amount% = 300   creates an integer variable.

3:Explicitly There are many advantages to **explicitly** typing variables. Primarily, we insure all computations are properly done, mistyped variable names are easily spotted, and Visual Basic will take care of insuring consistency in upper and lower case letters used in variable names. Because of these advantages, and because it is good programming practice, we will explicitly type all variables.

Visual Basic Operators:

1- The simplest operators carry out arithmetic operations. These operations in their order of precedence are:

Operation Code	Operation
^	Exponent
*,/	Multiplication and division
\	Integer division
Mod	Modulus – rest of division
-,+	Subtraction and addition

2- To Concatenate two strings, use the **&** symbol or the **+** symbol

3- There are six Comparison operators in Visual Basic.

Operation Code	Comparison
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
=	Equal to
< > or > <	Not equal to

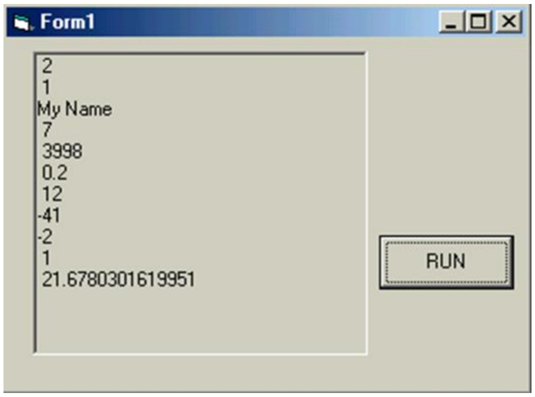
4-There are three logical operators:

Operation Code	Operation
Not	Logical not
And	Logical and
Or	Logical or

Note: Logical operators follow arithmetic operators in precedence.

<u>Examples:</u>

```
Private Sub Command1_ click ( )
Picture1.Print  7\3
Picture1.Print  7 Mod 3
Picture1.Print  "My"&" Name"
Picture1.Print  10/3*15/3*3/2-9/3/2*4*3
Picture1.Print   4E3-3E2/5/3E1
Picture1.Print  4E-8/2*5E8/6E16*4E14*3
Picture1.Print  4/3^3/4^2*3^4*2^4
Picture1.Print   27^1/3-2E2^3*4E-4/4^3
Picture1.Print  (3-3^3)/((3^2+3^3)/3^5)/3^4
Picture1.Print  (14+2^5/2^4)^(1/4)+((15-5*4)/(3^2-2^3/2))
Picture1.Print   (((3^(3^3)/3^3)^(1/3)+3^4)^(1/3)* 5^2)^(1/2)
```



```
2
1
My Name
7
3998
0.2
12
-41
-2
1
21.6780301619951
```

The Objects names

Naming Rules and Conventions for Objects :

Using good consistent names for objects can make a project easier to read and understand , as well as easier to debug. You ***<u>must</u>*** follow the visual basic rules for naming objects , procedures , and variables. In addition , programmers will also follow certain naming conventions.

The Naming Rules :

1. The name of object must begin with a letter.
2. The name can be up to 40 characters in length.
3. It can contain letters , digits , and underscores.
4. It cannot include a space or punctuation marks.

The Naming Conventions:

The industry wide naming conventions help make projects more understandable : Always begin a name with a ***lowercase three-letter prefix***, which identifies the object type (such as label , command button , or form) and capitalize the first character after the prefix (the "real" name of the object). For names with multiple words , capitalize the first letter of each word in the name. All names must be meaningful and indicate the purpose of the objects.

Examples

lblMessage , cmdExit , txtStudentName

Don't keep the default names assigned by visual basic , such as command1, and label1. Also , ***don't name your objects with numbers***. The exception to this rule is for labels that never change during project execution. These labels usually hold items such as titles , instructions, and labels for other controls.

The following tables include the prefix naming of the standard controls (common controls) in visual basic :

Object (tool)	**Prefix**	**Example**
Form	frm	frmDataEntry
Command button	cmd	cmdExit
Text Box	txt	txtStudentName
Label	lbl	lblTitle
Option button	opt	optBold
Check Box	chk	chkItalic
Frame	fra	fraColor
Horizontal Scroll Bar	hsb	hsbRate
Vertical Scroll Bar	vsb	vsbTemperature
Image	img	imgLogo
Picture Box	pic	picLandscape
Combo Box	cbo	cboBookList
List Box	lst	lstDegree

Shape	shp	shpBox

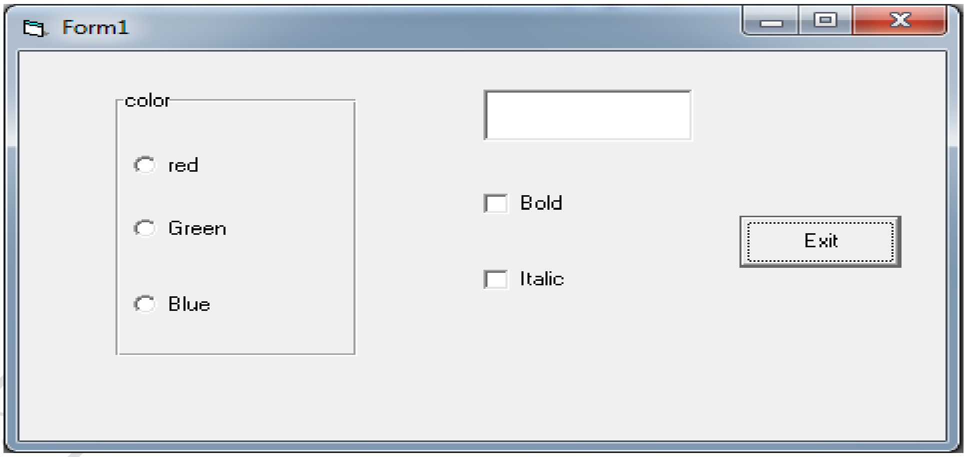
Color Systems in Visual Language:

There are many programming styles (formats) may be used for set or assign the colors to any object with any color degree by using the color properties of these objects within the codes written stage.

1) **QBColor(**n**)** System:
   This system come from **Quick Basic Color** system , and **n** indicate to the number of color among the range (0-15) which mean the range of the spectrum colors , where each selected number represent certain color.
   Ex: *ObjectName*.backcolor=qbcolor(6)
2) **VB***color* color:
   In this system used the "real name" of color instead of *color* word like red , green , black, yellow, ….etc.
   Ex: *ObjectName*.forecolor=vbred
3) Three Base Color System: **RGB(***red*,*green*,*blue***)**
   This system product the desired color by mix three color (red, green and blue) with different degrees for each color in range (0-255)
   Ex: *ObjectName*.backcolor=rgb(15,150,100)
   In this example , the result color will become mixed from 15 degree of red color with 150 degree of green color with 100 degree of blue color.
4) **HexaDecimal** color system :
   In this system , the color consist from six digits represented with hexadecimal numbers system (0,1,2,3,4,5,6,7,8,9,A,B,C,D,F) , where first two digits, from left, indicate the red color, and two second digits indicate the green color , and two third digits indicate the blue color. These digits come after the character **&** followed with capital letter **H** .
   Ex: *ObjectName*.forecolor=&H0023EF

Example : In this lecture will redesign the project in the last lecture but with new names for used objects and will write the codes of option buttons and check boxes inside of these tools and ignore the commands of change

1st Stage: Form Designer:



2nd Stage: Set Properties

Object (Tool)	Property	Setting
Command1	Name	cmdExit
	Caption	Exit
Text1	Name	txtColor
	Text	
Frame1	Caption	Color
Option1	Name	optRed
	Caption	Red
Option2	Name	optGreen
	Caption	Green
Option3	Name	optBlue
	Caption	Blue
Check1	Name	chkBold
	Caption	Bold
Check2	Name	chkItalic
	Caption	Italic

3rd Stage: Write Codes

1) cmdExit (Exit)
   end
2) optRed(red)
    form1.backcolor=vbred
3) optGreen(green)
    form1.backcolor=vbgreen

4) optBlue(blue)
   form1.backcolor=vbblue

5) chkBold(Bold)
   txtColor.fontbold=true

6) chkItalic(Italic)
   txtColor.font.italic=true

Exercises:

1. You should follows the naming rules. Why ?
2. What are the naming rules of the objects?
3. List seven of objects and its prefix with examples?
4. What are the types of the color systems in the visual basic?
5. Design a project include all color systems in VB?

6. Compute depending on the precedence rules (step by step) :

15/3*8/3*9/2-15/3/12*4*3 =
(3+3^3)/((3-3^3)/3^7)/3^5 =
(23+2^6/2^4)^(1/3)+((10-5*4)/(3^2-2^3/2)) =
(((3^(3^3)/3^3)^(1/3)-1)^(1/3)* 2^3)^(1/2) =

7. What are the naming rules of variables ?
8. List at least seven types of variables in VB with its suffix ?
9. Discuss in detail types of the variables declaration?
10. What are the declaration scopes in VB?
11. What the different between the static declaration and other declarations?