

INTRODUCTION TO PROGRAMMING

THE BASICS OF OBJECT- ORIENTED VB

- Computer program- set of instructions that enable computer to solve a problem or perform a task.
- Algorithm- set of well-defined steps for performing a task or solving a problem.
- Methods of programming
 - Procedural a set of statements that are executed by the computer, one after another.
 - Object-oriented is centered on creating objects.
 - Object is a programming element that contains data and actions.
 - Attributes are data contained in object
- Note: In VB, attributes are called properties.
 - Methods are actions that an object performs(predefined).

- Object is a self-contained unit consisting of data (properties) and actions (methods).
- Event-driven programming:
 - Operate in GUI environment
 - Event is an action, example is clicking(user starts action)
 - When event occurs, application responds by executing a special type method called an event procedure
 - Process of programming revolves around the design and writing of event procedures.
- Events are created via controls (i.e.,textboxes, labels, command buttons, ect.)
- Controls are considered a class in VB
- Class is a template for an object which defines: supported properties, methods, and events..
 - What the object does and how it behaves.

- Form in VB is an object which allows the interface to be created using various controls.
- Each form is stored as a separate file, called the form module.
- Form module contains information about the control instances drawn on the form.
 - Also, contains statements that are executed when user interacts with form's control instances(ex, clicking buttons)
- Standard module contains statements that several forms can use.
- Each module contains specific statements written to perform some specific action.

- Project file lists each form and standard module (file) used in the program.
 - Also, information about the different types of controls used in each module.
- Note: Each program has a single project file, regardless of the number of modules.
- Event procedure is a set of VB statements that execute when the user performs an action on an object, ex. Clicking the command button.
- Thus, VB stores information about the program in two main files:
 - Project file (.vbp)
 - Program file (.frm)
- These two files are required to run an application.

- Steps for developing a VB application:
 - 1. Clearly define what the application is to do
 - Purpose, input, process, and output
 - 2. Visualize the application running on a computer and design its user interface.
 - 3. Make a list of controls needed.
 - 4. Define values of each control's relevant properties.
 - 5. Make list of methods needed for each control.
 - 6. Create a flowchart or pseudo-code version of each method.
 - 7. Write code for the methods on paper.
 - 8. Desk check code for errors.
 - 9. Start VB, create forms and other controls(step 3).
 - 10. Create event procedures and other methods(step 7).
 - 11. Run application, correcting any syntax errors.
 - 12. When you receive a clean compile, run program with test data for input. Correct any run-time errors.

- **Wage Calculator Program**

- **I.**

- a. Purpose: To calculate the user's gross pay.
- b. Input: Number of hours worked, hourly pay rate
- c. Process: Multiply number of hours worked by hourly pay rate.
 - The result is the user's gross pay.
- d. Output: display a message indicating the user's gross pay

- **II.**

- Draw a picture of the interface.
 - This includes labels, textboxes, command buttons, or other controls.

- **III. Object**

	Object Name
• Form	frmWageCalculator
• Label 1	lblHoursWorked
• Label 2	lblPayRate
• Label 3	lblGrossPayEarned
• Label 4	lblGrossPay
• Textbox 1	txtHoursWorked
• Textbox 2	txtPayRate
• Command button 1	cmdCalculate
• Command button 2	cmdClear
• Command button 3	cmdExit

- **IV. Object**

	Property
• Label 1	Caption: Wage Calculator
• Label 2	Caption: Number of Hours Worked
• Label 3	Caption: Hourly Pay Rate
• Label 4	Caption: Gross Pay Rate
• Textbox 1	clear Text property
• Textbox 2	clear Text property
• Command button 1	Caption: Calculate Gross Pay
• Command button 2	Caption: Clear
• Command button 3	Caption: Exit

- **V. Method**

	Description
• cmdCalculate_Click	Multiplies number of hours worked by hourly rate. These values are entered into txtHoursWorked and txtPayRate textboxes. The result is stored in lblGrossPay caption property.
• cmdClear_Click	Clears both textboxes and result label. Return focus to first textbox.
• cmdExit_Click	End application

- **VI. Pseudocode for cmdCalculate_Click**
 - Store number of hours worked (HoursWorked) times pay rate (PayRate) in GrossPay.
 - Store value in GrossPay in lblGrossPay caption

- **VII. cmdCalculate_Click()**

- Dim HoursWorked As Single, PayRate As Single, GrossPay As Currency
- HoursWorked = txtHoursWorked.Text
- PayRate = txtPayRate.Text
- GrossPay = HoursWorked * PayRate
- lblGrossPay.Caption = Format\$(GrossPay,"Currency")
- **VIII.** Check code for errors
- **IX.** Create VB environment (form)
- **X.** Create objects on the form
- **XI.** Run application (correct syntax errors)
- **XII.** Run with test data (correct run-time errors)

- **VB variable types:**

- Boolean True or False
- Byte small number 0 to 255
- Integer -32,768 to 32,767
- Long -2 billion to 2 billion
- Single single precision, 6 digits of accuracy
- Double double precision, 14 digits of accuracy
- Variant store any type of information
- Currency 15 digits to left of decimal point, 4 digits to right of decimal point
- Date
- String text
- **Val** function changes text numbers to values
- **SetFocus** moves cursor to a specific location on form

- **Variable naming conventions:**
 - Must be at least 1 character in length, but no more than 255 characters in length
 - First character must be letter, then letters, numbers, or underscore
 - Cannot contain periods or spaces
 - Cannot use VB key words: ex., Dim, Integer, Sub, or Private
- **Initial variable settings:**
 - Numeric variables are assigned value of 0
 - String variables are assigned an empty string
 - Boolean variables are assigned False
 - Date variables start with time value, 12:00:00 AM
- **Option Explicit**
 - if not present, VB will not require that a variable be declared before it is used. Thus, if enter this statement: Temp = V1 + V2, where Temp is not created ; VB will use variant type, set to 0.
 - If present, will notify the variable is not created

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|--|--------------------|
| • Arithmetic Operations | Order of Operation |
| • + Addition | 1. Parentheses () |
| • - Subtraction | 2. ^ |
| • * Multiplication | 3. *, / |
| • Mod Modulus | 4. \ |
| • / division | 5. Mod |
| • \ integer division | 6. +, - |
| • ^ Exponential | |
| • Modulus example: LeftOver = 17 Mod 3 | |
| - Remainder = 2 stored in LeftOver | |
| • Const ConstantName As DataType = value | |

Control Type	Prefix	Default Property
• Check Box	ckh	value
• Combo Box	cbo	text
• Command Box	cmd	value
• Frame	fra	caption
• Scroll bars	hsb/vsb	value
• Image	img	picture
• Label	lbl	caption
• Line	lin	visible
• List box	lst	text
• Option buttons	opt	value
• Picture box	pic	picture
• Timer	tmr	enabled
• Shape	shp	shape