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 works: 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

- Arithmetic Operations   Order of Operation
- + Addition   1. Parentheses ( )
- - Subtraction   2. ^
- * Multiplication   3. *,/
- Mod Modulas   4. \
- / division   5. Mod
- \ integer division   6. +,-
- ^ Exponentiational
- Modulas 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