

# 1.4

## The Programming Process

The Programming Process Consists of Several Steps, Which Include Design, Creation, Testing, and Debugging Activities





# Step 1 of Developing an Application

- Clearly define what the program is to do
- For example, the *Wage Calculator* program:
  - Purpose: To calculate the user's gross pay
  - Input: Number of hours worked, hourly pay rate
  - Process: Multiply number of hours worked by hourly pay rate (result is the user's gross pay)
  - Output: Display a message indicating the user's gross pay



# Step 2 of Developing an Application

- Visualize the application running on the computer and design its user interface

Number of Hours Worked

Hourly Pay Rate

Gross Pay Earned: \$0.00



# Step 3 of Developing an Application

- Make a list of the controls needed

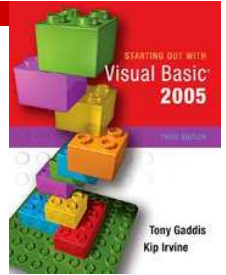
<u>Type</u>	<u>Name</u>	<u>Description</u>
TextBox	txtHoursWorked	Allows the user to enter the number of hours worked.
TextBox	txtPayRate	Allows the user to enter the hourly pay rate
Label	lblGrossPay	Displays the gross pay, after the btnCalcGrossPay button has been clicked
Button	btnCalcGrossPay	When clicked, multiplies the number of hours worked by the hourly pay rate
Button	btnClose	When clicked, terminates the application
Label	(default)	Description for Number of Hours Worked TextBox
Label	(default)	Description for Hourly Pay Rate TextBox
Label	(default)	Description for Gross Pay Earned Label
Form	(default)	A form to hold these controls



# Step 4 of Developing an Application

- Define values for each control's relevant properties:

<u>Control Type</u>	<u>Control Name</u>	<u>Text</u>
Form	(Default)	"Wage Calculator"
Label	(Default)	"Number of Hours Worked"
Label	(Default)	"Hourly Pay Rate"
Label	(Default)	"Gross Pay Earned"
Label	lblGrossPay	"\$0.00"
TextBox	txtHoursWorked	""
TextBox	txtPayRate	""
Button	btnCalcGrossPay	"Calculate Gross Pay"
Button	btnClose	"Close"



# Step 5 of Developing an Application

- List the methods needed for each control:

## Method

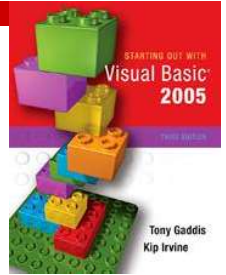
btnCalcGrossPay\_Click

btnClose\_Click

## Description

Multiplies hours worked by hourly pay rate  
These values are entered into the  
txtHoursWorked and txtPayRate TextBoxes  
Result is stored in lblGrossPay Text property

Terminates the application

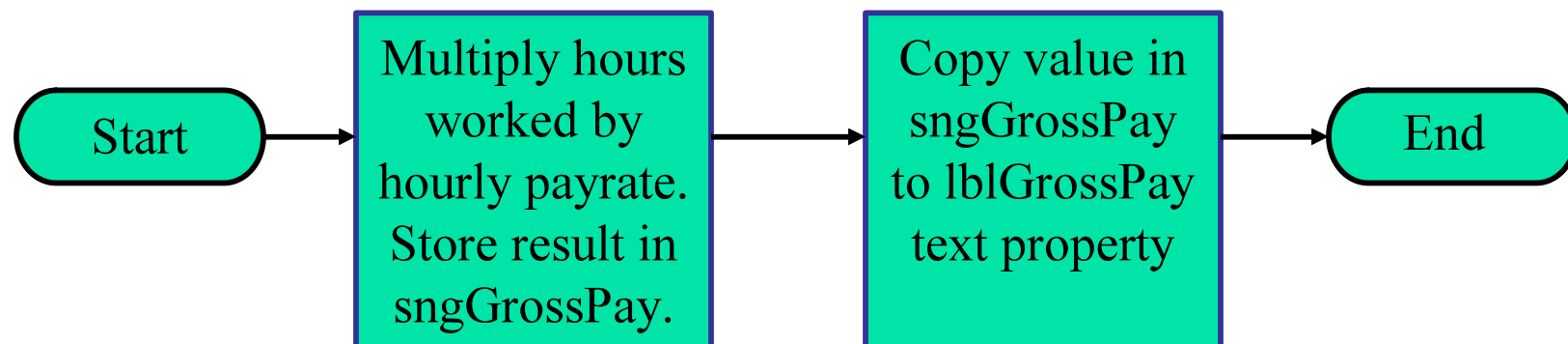


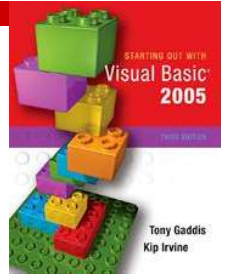
# Step 6 of Developing an Application

- Create *pseudocode* **or** a *flowchart* of each method:
  - Pseudocode is an English-like description in programming language terms

```
Store Hours Worked x Hourly Pay Rate in sngGrossPay.  
Store the value of sngGrossPay in lblGrossPay.Text.
```

- A flowchart is a diagram that uses boxes and other symbols to represent each step

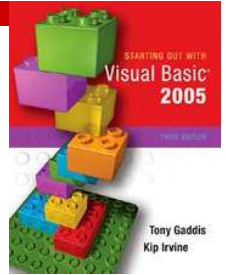




# Step 7 of Developing an Application

- Check the code for errors:
  - Read the flowchart and/or pseudocode
  - Step through each operation as though ***you*** are the computer
  - Use a piece of paper to jot down the values of variables and properties as they change
  - Verify that the expected results are achieved





# Step 8 of Developing an Application

- Use Visual Basic to create the forms and other controls identified in step 3
  - This is the first use of Visual Basic, all of the previous steps have just been on paper
  - In this step you develop the portion of the application the user will see



# Step 9 of Developing an Application

- Use Visual Basic to write the code for the event procedures and other methods created in step 6
  - This is the second step on the computer
  - In this step you develop the methods behind the click event for each button
  - Unlike the form developed on step 8, this portion of the application is invisible to the user



# Step 10 of Developing an Application

- Attempt to run the application - find syntax errors
  - Correct any syntax errors found
  - *Syntax errors* are the incorrect use of an element of the programming language
  - Repeat this step as many times as needed
  - All syntax errors must be removed before Visual Basic will create a program that actually runs



# Step 11 of Developing an Application

- Run the application using test data as input
  - Run the program with a variety of test data
  - Check the results to be sure that they are correct
  - Incorrect results are referred to as a *runtime error*
  - Correct any runtime errors found
  - Repeat this step as many times as necessary