What Have You Learned About Programming So Far?

FIT 100

Let's review:

- Variables
- Expressions
- Conditionals
- Procedures

FIT 100 Expressions

- A means of performing the actual computation
- Many kinds of expressions. They can include:
  - logical operators: And, Or, Not
  - relational operators: <, >, <=, >=, < >
    - When used here = means test to see of operands are the same
  - binary operators: +, *, &
  - unary operators : -, ^, Not

FIT 100 Variables

- Variables
  - Locations in memory
- Variable names
  - The way we refer to the locations in memory in our program
- Variable declaration
  - Listing the names of variables to be used in program
- Data types of variables
  - String, Integer or Double - there are other types but we won't cover them in this course
- Variable initialization
  - Assigning a value to a variable to begin with so that we control content
- Variable values
  - The data stored in those memory locations, subject to change
- Assignment statements
  - The command to change the value of a variable

<Variable Name> <Assignment Symbol> <Expression>

  - x= 127 or x = x + 1

FIT 100 Conditionals

- Used when a decision must be made between one or more possibilities (conditions)
- Basic conditional
  - If <T/F Statement> Then — 'tests for one condition: true
- General conditional
  - If <T/F Statement> Then — 'tests for one condition, allows 2 outcomes. One for True,

```
    <code statements>
Else                                  the other for False (or otherwise)
    <code statements>
End If
```

  - If <T/F Statement> Then — 'tests for multiple conditions

```
    <code statements>
Elseif <T/F Statement> Then
    <code statements>
...
Else
    <code statements>
End If
```

FIT 100 Conditionals

```
gradePt = 4.O
If passClass = true then
    If theLetterGrade = "A" then
        lblGrade.Caption = "You got a " & gradePt
    Else
    lblGrade.Caption = "You didn't quite get a " & gradePt & ", but you passed!"
    End If
Else
    lblGrade.Caption = "You did not pass and are nowhere near a " & gradePt
End If
```

- Take out a piece of paper
- What does this program put into lblGrade.Caption if the variables have the following values:
  - A) passClass = false; theLetterGrade = "A";
  - B) passClass = true; theLetterGrade = "C"
  - C) passClass = true; the LetterGrade = "A"

FIT 100 Example of ElseIf


```
If   txtPlayerNum.Text  = 23        Then
  lblPlayerName.Caption = "Michael Jordan"     'executed if .Text = 23

ElseIf    txtPlayerNum.Text = 3   Then
  lblPlayerName.Caption = "Allan Iverson"      'executed if .Text <>23 and
                                               'Text= 3
ElseIf    txtPlayerNum.Text  = 8    Then
  lblPlayerName.Caption = "Kobe Bryant"        'executed if .Text <>23 Or 3
                                               'and Text = 8
ElseIf    txtPlayerNum.Text  = 20   Then
  lblPlayerName.Caption = "Gary Payton"    'executed if .Text <>23, 3 Or 8
Else                                       'and Text = 20
  lblPlayerName.Caption = "I'm sorry, " & _    'executed if .Text is none of
   "I don't recognize the number!"             'of the above
End If
```


FIT 100 Adding Another Condition: ElseIf

- The conditional statement (If-Then-Else) is one way you know, so far, to control which statements are executed.
- In VB6, using ElseIf is a way to test a long sequence of possible conditions:

```
If <T/F condition> Then
      <code statement list>          'code statements for 1st condition
ElseIf <T/F condition> Then
      <code statement list>          'code statements for 2nd condition
ElseIf <T/F condition> Then
      <code statement list>          'code statements for 3rd condition
....
Else
      <code statement list>          'code statements for "otherwise"
End If
```


FIT 100 Potential Problems with ElseIf

- An If statement that uses ElseIf passes through all of the previous cases before reaching a given test. What are the consequences of this?

```
If num > 10 Then
  result = "More than 10"
Elseif num > 20 Then
  result = "More than 20"
Else
  result = "Less than or equal to 10"
End If
```

- Will the ElseIf statement ever be executed?

FIT 100 ElseIf Is NOT a Nested If Statement…

- …But it is similar

```
If   txtPlayerNum.Text = 23   Then
 lblPlayerName.Caption = "Michael Jordan"
ElseIf     txtPlayerNum.Text = 3   Then
   lblPlayerName.Caption = "Allan Iverson"
ElseIf     txtPlayerNum.Text = 8     Then
   lblPlayerName.Caption = "Kobe Bryant"
ElseIf     txtPlayerNum.Text = 20   Then
   lblPlayerName.Caption = "Gary Payton"
Else
   lblPlayerName.Caption = "I'm sorry, " & _
     "I don't recognize the number!"
End If
```

```
If   txtPlayerNum.Text = 23   Then
   lblPlayerName.Caption = "Michael Jordan
Else
   If  txtPlayerNum.Text = 3   Then
    lblPlayerName.Caption = "Allan Iverson"
    Else
      If txtPlayerNum.Text = 8     Then
    lblPlayerName.Caption = "Kobe Bryant"
          Else
             If  txtPlayerNum.Text = 20  Then
     lblPlayerName.Caption = "Gary Payton"
             Else
    lblPlayerName.Caption = "I'm sorry, " & _
    "I don't recognize the number!"
          End If
       End If
    End If
 End If
```


FIT 100 Remember Procedure Structure

- Parts of a procedure specification
  - Name
  - Definition
  - Parameters
  - Declaration

```
Private Sub calcRecArea(base as Integer, height as Integer, _
                        area as Integer)
        area = base * height
End Sub
```


FIT 100 Mini-Exercise #1

- What is the value of x after the form has been loaded?

```
Option Explicit
Dim x As Integer

Private Sub squid()
   x=x+2
End Sub

Private Sub Form_Load
   x=0
   Call squid
End Sub
```

x=2

FIT 100 Input vs. Output

- Many programming languages (including VB6) provided several different ways of passing values back and forth between the actual and formal parameters
- The default in Visual Basic, and the only kind we'll use in this course, is **pass by reference**
- Pass by reference allows information to flow in both directions.
  - Formal parameters can be used as inputs or outputs or both
  - Any changes made to a formal parameters will make a change to the corresponding actual parameter
  - Remember Lab 10 and the Body Mass Index Procedure?

FIT 100 Mini-Exercise #2

- What is the value of y after the form has been loaded?

```
Option Explicit

Private Sub Form_Load()
   Dim y As Integer
   y=0
   Call squid(1, y)
   Call clam (2, y)
End Sub

Private Sub clam(dork As Integer, zebra As Integer)
   call squid (dork, zebra)
    dork = zebra + 2
   call squid(dork, zebra)
End Sub

Private Sub squid(x as Integer, z As Integer)
   z = x+2
End Sub
```

y=8

FIT 100 From Lab 10: Body Mass Index

- The body mass index is defined as 4.89 times weight in lbs divided by height in feet** squared (kg/m²)
- What is the body mass procedure?
  - Name –
  - Definition –
  - Parameters –
  - Declaration –

Use height in inches rather than feet and inches

FIT 100 Actual Parameters

- The actual parameters must follow these formal/actual correspondence rules
  - There must be the same number of actual parameters as there are formal parameters in the procedure declaration
  - The order of the parameters matters!
    - The 1st actual parameter corresponds to the 1st formal parameter
    - The 2nd actual parameter corresponds to the 2nd formal parameter
    - Etc, etc, etc
  - The data types of the actual parameters must match the data types of the formal parameters
  - Any formal parameter used as a procedure output must have a variable for the corresponding actual parameter

FIT 100 From Lab 10: Body Mass Index

- The body mass index is defined as 4.89 times weight in lbs divided by height in feet** squared (kg/m²)
- What is the body mass procedure?
  - Name – findBMI
  - Definition – 4.89 * weightLBS / ((heightIN / 12) ^ 2)
  - Parameters – weightLBS, heightIN, bodyMass
  - Declaration –

```
Private Sub findBMI  (weightLBS as Integer, heightIN as Integer, _
                                                bodyMass as Double)
        bodyMass = 4.89 * weightLBS / ((heightIN / 12) ^ 2)
End Sub
```

FIT 100 Calling the Body Mass Procedure

- How do we call the procedure that will compute the body mass for a student named Jo who is 5'6" tall and weighs 138 lbs?

```
Private Sub findBMI(weightLBS as Integer, heightIN as Integer, _
                    bodyMass as Double)
    bodyMass = 4.89 * weightLBS / ((heightIN / 12) ^ 2)
End Sub
```


FIT 100 Exercise # 3

- Given the following procedure declaration:

```
Private Sub example(r As Double, area As Double)
    area = 3.1415926 * r ^ 2
End Sub
```

and the following statements elsewhere in the program:

```
…
value1=10
value2= 5
Call example(value1, value2)
…
```

```
value2 = 3.1415926 * value1 ^ 2
```

Write a statement with the same affect as the Call statement

FIT 100 Calling the Body Mass Procedure

- How do we call the procedure that will compute the body mass for a student named Jo who is 5'6" tall and weighs 138 lbs?

Call findBMI (138, 66, joBMI)

```
Private Sub findBMI(weightLBS as Integer, heightIN as Integer, _
                    bodyMass as Double)
    bodyMass = 4.89 * weightLBS / ((heightIN / 12) ^ 2)
End Sub
```


FIT 100 Hmmmm, How Is It Done?

- For Monday, think about writing a program to do the following:

10 seconds
9 seconds
8 seconds
7 seconds
6 seconds
5 seconds
4 seconds
3 seconds
2 seconds
1 seconds
Blast Off!!!!!

FIT 100 For Next Week

- Reading for Monday: Chapters 14 and 15 in FIT
- Grace is gone all next week, so David will do all lectures
- Monday office hours:
  - 9:00 AM CANCELLED
  - Afternoon hours: 2:30 – 4:30 PM
- Have Lab 10 ready to show at the beginning of Lab 11 for bonus
- Labs and office hours for the rest or the week are not affected in any way
- Project 2, part 2 due Wednesday and Quiz 3 is Friday!