CSE 1530

Introduction to Computer Use II: Programming

Winter 2005 (Section M)

Topic C: Control Structures - Iteration

Wednesday, February 1 2006

Bill Kapralos

Overview (1):

- **Before We Begin**
  - Some administrative details
  - Some questions to consider
- **The "If" Statement**
  - Introduction to the If statement
  - The If/Else statement
  - The nested If statement
  - Examples
    - Exercise 4-2

Before We Begin

Administrative Details (1):

- **Lab Exercise 3-3**
  - Exercise has been graded and will be distributed back to you after today's lecture
  - Has been graded /1 (e.g., either it is correct or not correct)
- **Reminder**
  - You should be working on Ex 4-4 this week
  - Test 1 will be held February 8 2006
    - More details to follow on Friday

Some Questions to Consider (1):

- What is a Boolean expression ?
- What is a comparison operator ?
- List some of the common comparison operators
- How do we use a comparison operator (and how many values (variables) does it require) ?
- Can we compare two variables of different types ?

If Statements

Introduction (1):

- **So Far, Boolean Expressions → Limited Use**
  - We can obtain a Boolean value by evaluating the Boolean expression but we have not used it!
  - Basically, as hinted at in the previous lecture, the Boolean expression provides one of two values → True or False
    - What about executing one set of statements if the value is True and another if it is False ?
    - This is actually the most common use of a Boolean condition → directly used in the If statement

Introduction (2):

- **The If Statement**
  - Select whether a set of statements are executed
  - Simplest type of If statement → block If statement
  - Syntax of the block If statement

```
Other statements in sub-program
If (Boolean Value) Then
  statement 1
  statement 2
  …
End If
More statements
```

Boolean Value → Boolean expression that is evaluated to a single value (True or False) or simply a Boolean variable

If (Boolean Value) = True then execute the statements within the If and End If block

Statements follow "Then" on new line and "Then" must appear on same line as "If"

Introduction (3):

- **The If Statement (cont.)**
  - An everyday analogy to the If statement

```
Enter shop
Look around
Find item
If (itemPrice < myCash) Then
  Buy item
End If
Leave shop
```

"Statements" before the If statement that are executed in sequence before the IF

If it is true that itemPrice is less than myCash we "execute" the statement "Buy item" otherwise we do not

Regardless, the statement "Leave shop" is always executed

Introduction (4):

- **The Else Statement**
  - As we previously saw, we can generally use a Boolean value (expression) to decide one of two sets of statements to execute

```
Other statements in sub-program
If (Boolean Value) Then
  statements
Else
  statements
End If
More statements
```

Boolean Value → Boolean expression that is evaluated to a single value (True or False) or simply a Boolean variable

If (Boolean Value) = True then execute the statements within the If block otherwise execute statements in "Else" block

"Else" statement must be on new line by itself

Introduction (5):

- **The ElseIf Statement**
  - So far, depending on the value of the Boolean expression
    - One set of statements is executed if True
    - One set of statements is executed if False
  - We can actually expand on this and allow for choosing between one of three sets of statements to be executed
    - This actually is extremely useful!

Introduction (6):

- **The ElseIf Statement**
  - ElseIf syntax

```
Other statements in sub-program
If (Boolean expression 1) Then
  statement(s)
ElseIf (Boolean expression 2) Then
  statement(s)
Else
  statement(s)
End If
More statements
```

Boolean Value → Boolean expression that is evaluated to a single value (True or False) or simply a Boolean variable

If (Boolean Value 1) = True then execute the statements within the If block otherwise

if (Boolean value 2) = True then execute statements in "ElseIf" block otherwise,

if both Boolean values are false then execute statements in the Else block

As soon as one true expression is encountered and corresponding code is executed, then "exit" the nested if statement

Introduction (7):

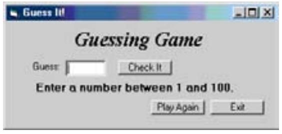
- **General ElseIf Statement (Nested IF)**
  - Multiple ElseIf statements

```
Other statements in sub-program
If (Boolean expression 1) Then
   statement(s)
ElseIf (Boolean expression 2) Then
   statement(s)
… (More ElseIf statements)
Else
   statement(s)
End If
More statements
```

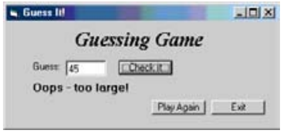
The multiple ElseIf statements as well as the Else statement are all optional

Exercise 4-2 (1):

- **If Statement Examples**
  - Ex 4-2: The number guessing game
    - Simple game program whereby the player (user) tries to guess a number that has been selected randomly between 1 and 100



Enter a number between 1 and 100.



Guess: 45

Oops - too large!

Exercise 4-2 (2):

- **Exercise 4-2 Brief Description**
  - User enters a guess and presses the "Check It" button
  - Message is displayed indicating whether guess is too small, too large or equal to some random number chosen by the program
  - When the "Play Again" button is pressed, we start game over
    - New random number is chosen

Exercise 4-2 (3):

- **Exercise 4-2 Brief Description (cont.)**
  - But how do we choose a random number ?
    - Most programming languages provide one or more functions that generate random numbers
    - Visual Basic has the "Rnd" function → generates a random number between 0 and 1

```
Dim rndValue As Single
rndValue = Rnd()
```

Exercise 4-2 (4):

- **Exercise 4-2 Brief Description (cont.)**
  - But if random number is only between 0 and 1 how does this help us with our game that allows numbers between 0 and 100 or in any other range other than 0 and 1?
    - Given a random number between 0 and 1 we can accommodate any range!
    - We simply multiply the randomly generated number by the maximum of our required range
    - But what if the minimum value of our range is greater than 0 ? How do we account for this ?