Conditional structures

Fundamentals of Computer Science

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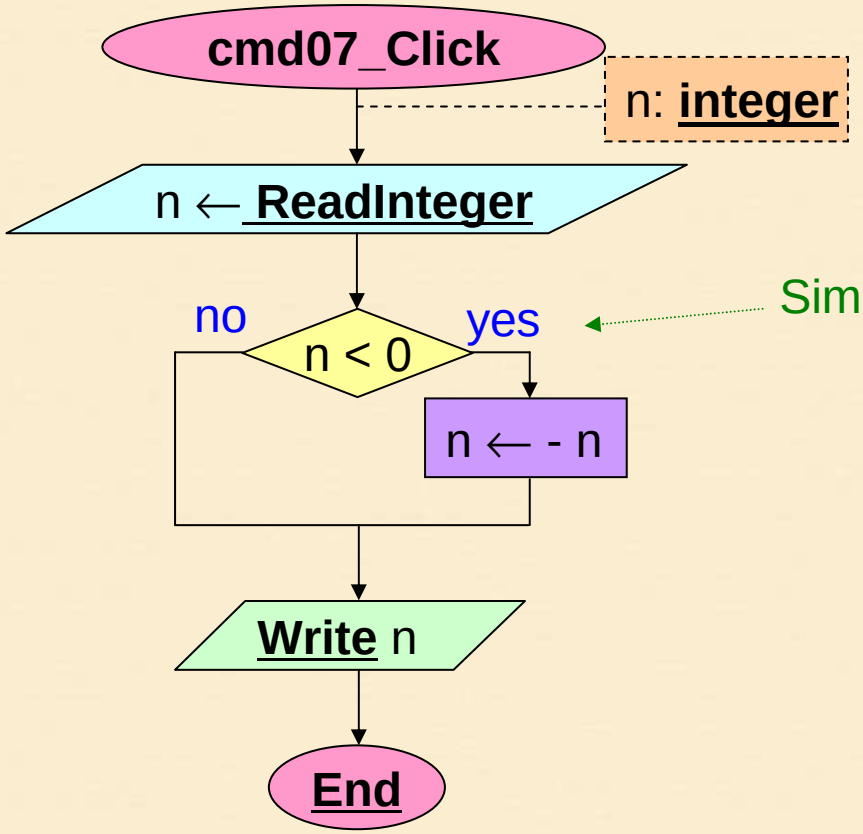
Conditional structures

1. Example 07

- ***Title***
  - Simple conditional
- ***Name***
  - cmd07_Click
- ***Description***
  - Read an integer variable, calculate its **absolute value** (on the same variable) and show the result
- ***Observation***
  - Simple conditional

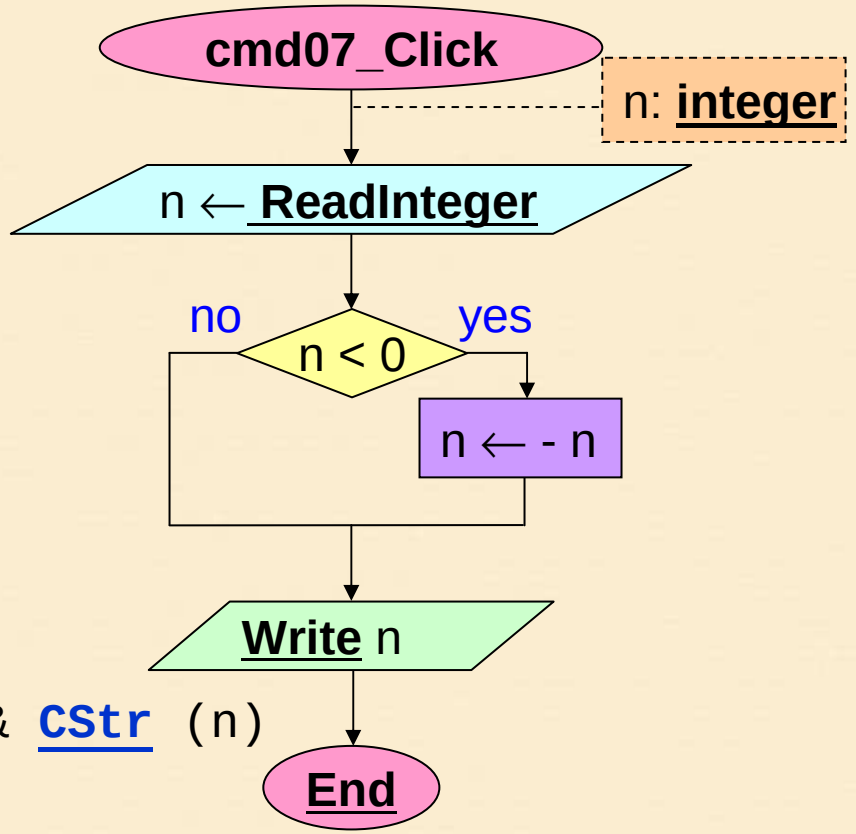
Ex07: Flowchart



Simple conditional

Ex07: VB implementation

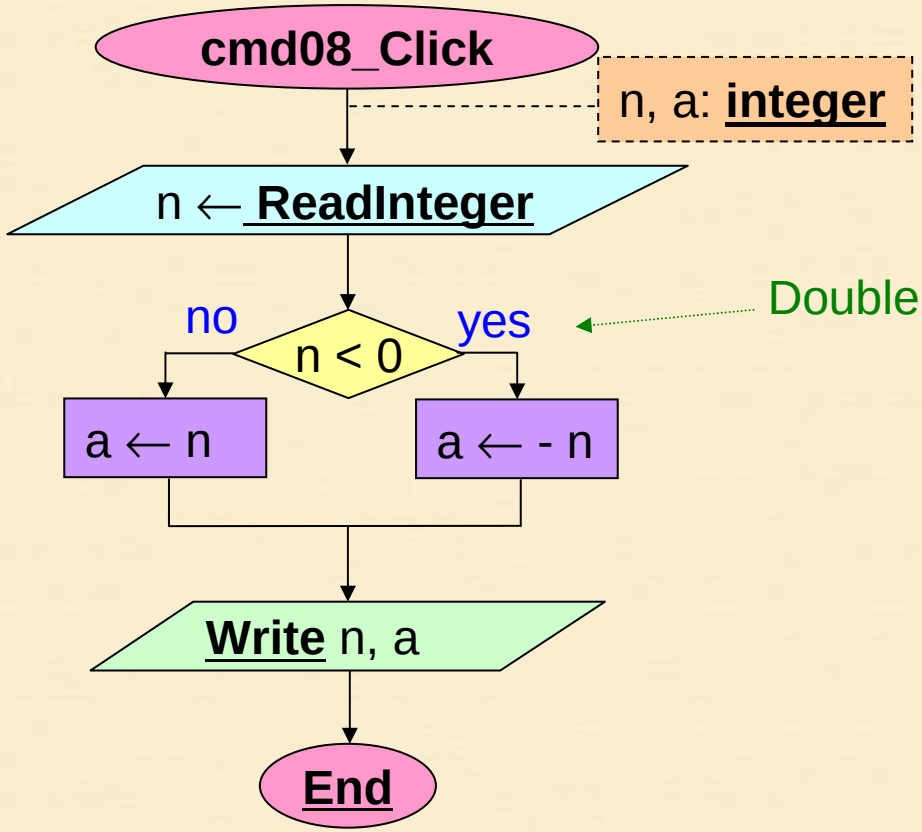
```
Sub cmd07_Click ()
  Dim s As String
  Dim n As Integer

  s = InputBox ("Number:")
  n = CInt (s)
  If n < 0 Then
    n = -n
  End If
  MsgBox "Absolute value: " & CStr (n)
End Sub
```



2. Example 08

- ***Title***
  - Double conditional
- ***Name***
  - cmd08_Click
- ***Description***
  - Read an integer variable, calculate its absolute value (on a different variable) and show the result.
- ***Observation***
  - Double conditional

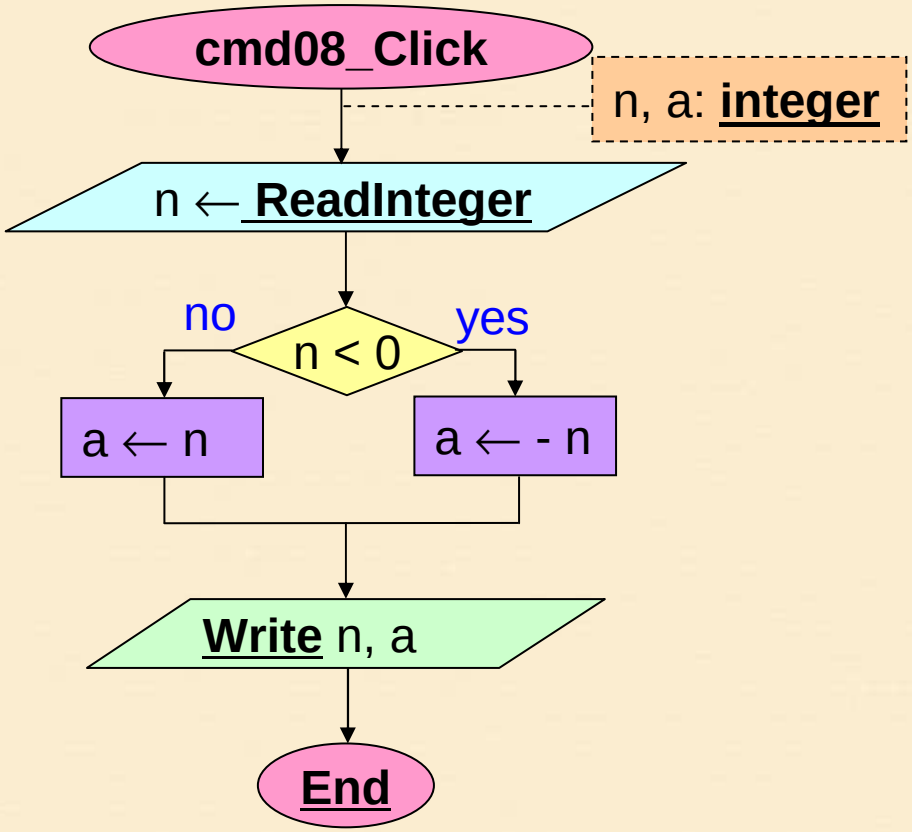
Ex08: Flowchart



Double conditional

Ex08: VB implementation

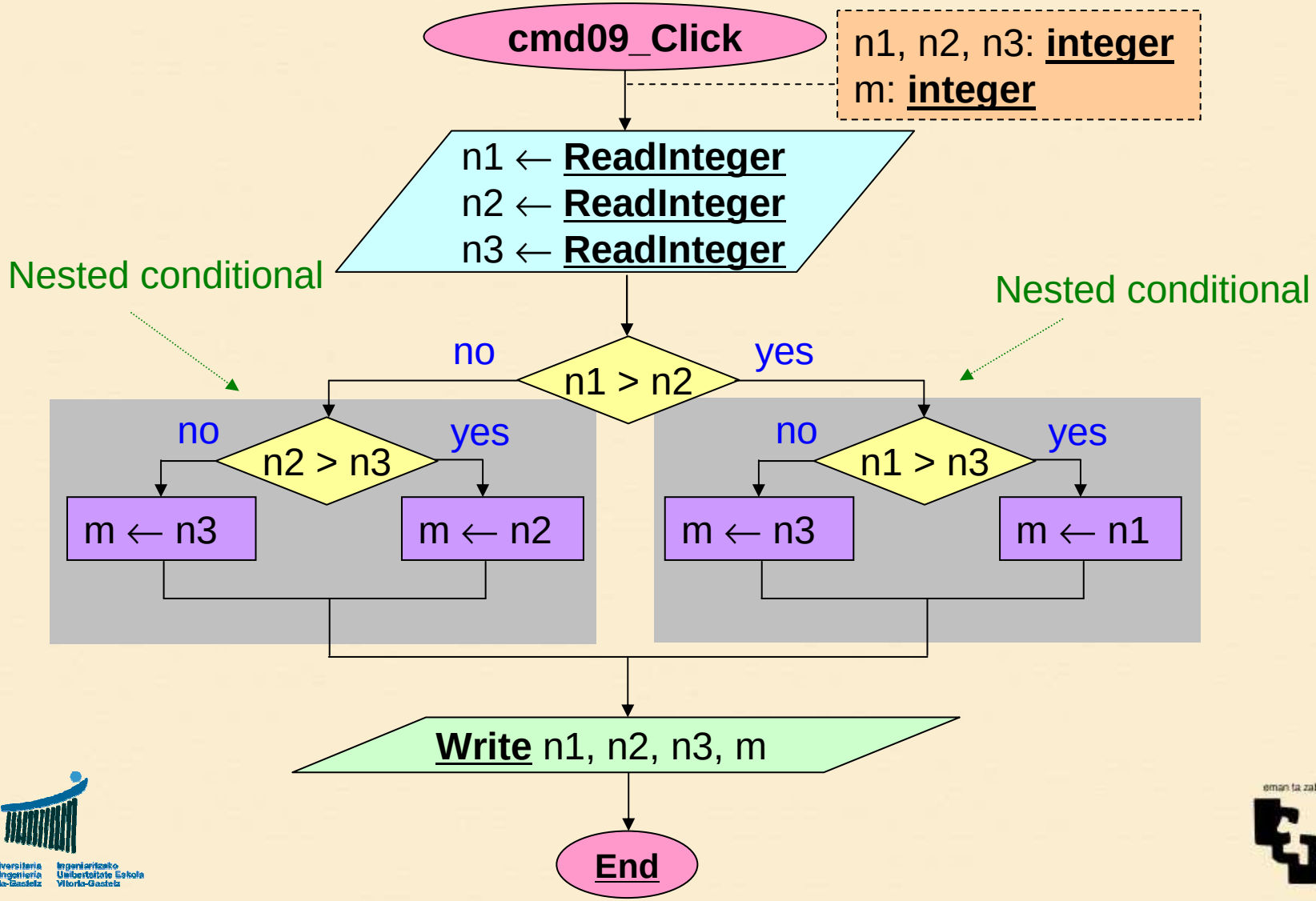
```
Sub cmd08_Click()
  Dim s As String
  Dim n As Integer
  Dim a As Integer

  s = InputBox ("Number:")
  n = CInt (s)
  If n < 0 Then
    a = -n
  Else
    a = n
  End If
  MsgBox "The absolute value of " & CStr (n) & _
         " is " & CStr (a)
End Sub
```



3. Example 09

- ***Title***
  - Nested conditionals
- ***Name***
  - cmd09_Click
- ***Description***
  - Read three integer variables, calculate which is the greatest and show the result
- ***Observation***
  - Nested conditional (conditional within another conditional)

Ex09: Flowchart

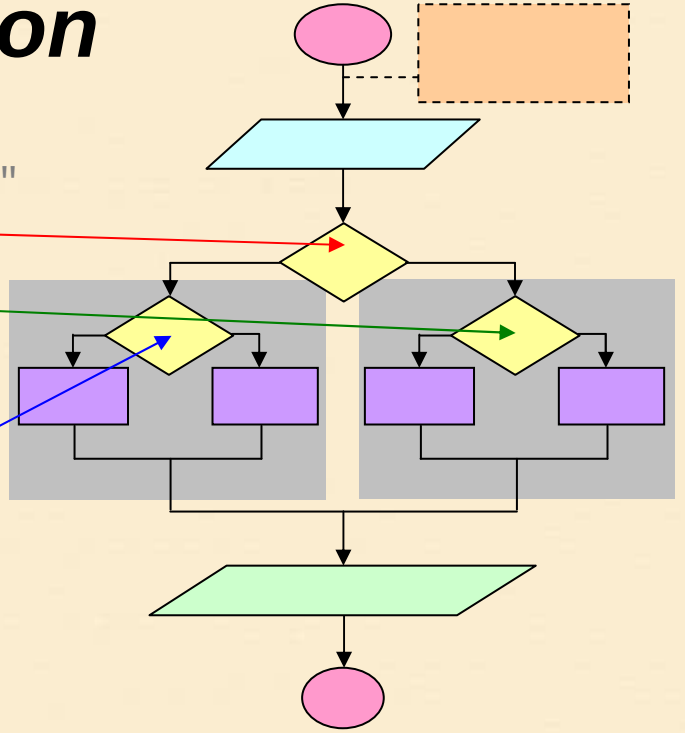


Ex09: VB implementation

```
Sub cmd09_Click()
  Dim s As String
  Dim n1 As Integer, n2 As Integer, n3 As Integer
  Dim m As Integer
  s = InputBox "Introduce first number: "
  n1 = CInt (s)
  s = InputBox "Introduce second number: "
  n2 = CInt (s)
  s = InputBox "Introduce third number: "
  n3 = CInt (s)
  ...
  MsgBox "The greatest among " & CStr (n1) & _
         ", " & CStr (n2) & _
         " and " & CStr (n3) & " is: " & m
End Sub
```

Ex09: VB implementation

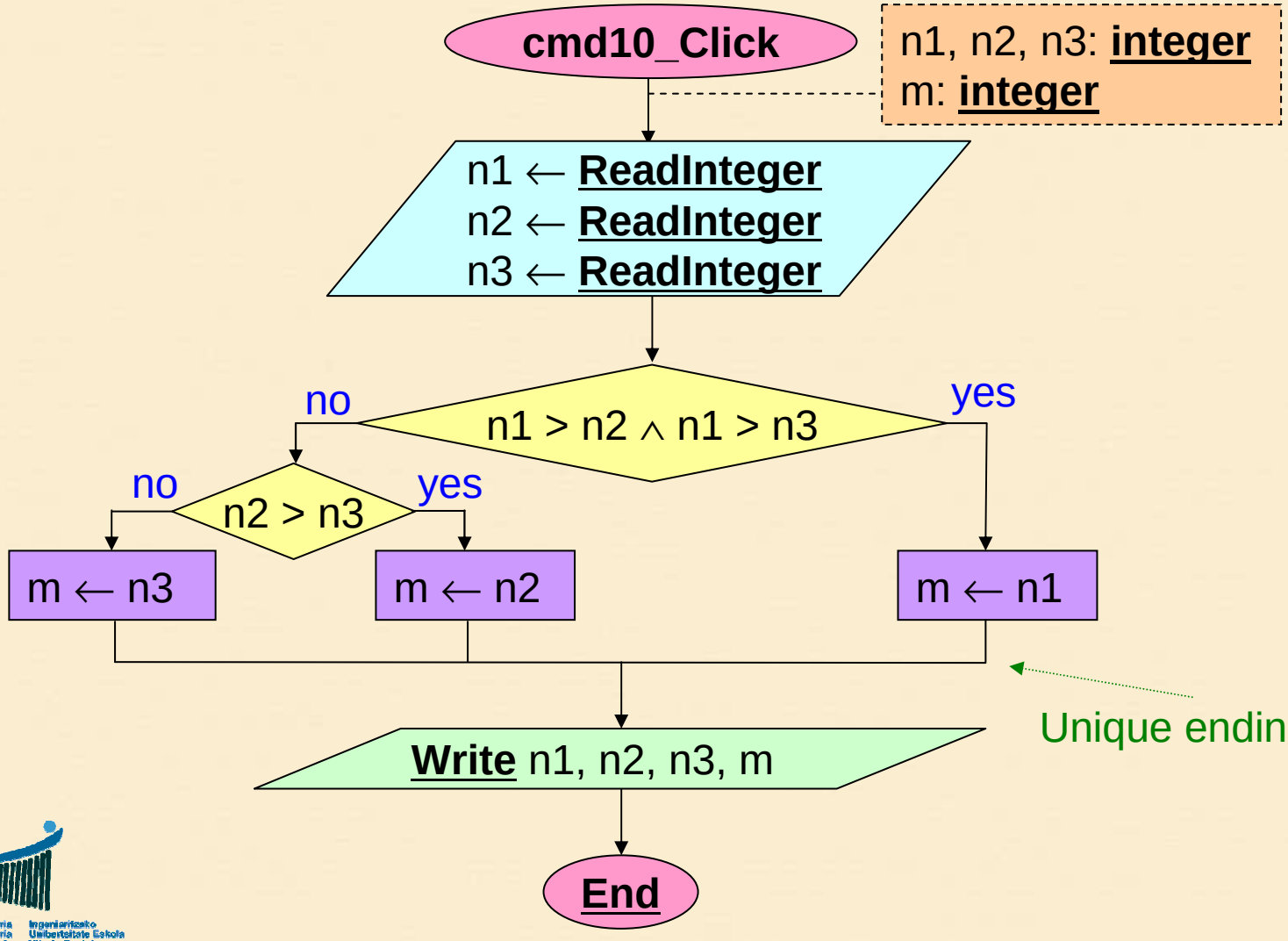
```
…
n3 = InputBox "Introduce third number: "
If n1 > n2 Then
   If n1 > n3 Then
      m = n1
   Else
      m = n3
   End If
Else
   If n2 > n3 Then
      m = n2
   Else
      m = n3
   End If
End If
MsgBox "The greatest among " & CStr (n1) & _
…
```



4. Example 10

- ***Title***
  - Waterfall conditionals
- ***Name***
  - cmd10_Click
- ***Description*** (same problem as in previous example)
  - Read three integer variables, calculate which is the greatest and show the result
  - Different solution variant
- ***Observations***
  - Waterfall conditional
  - Immediately after the **`Else`** alternative there is a new condition, becoming **`ElseIf`**

Ex10: Flowchart

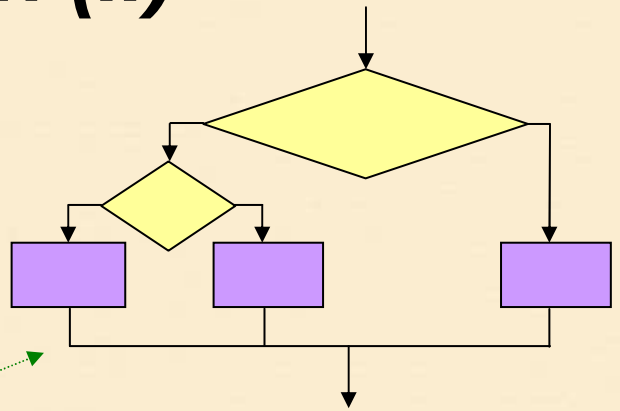


Ej10: VB implementation (I)

```
Sub cmd10_Click()
  Dim s As String
  Dim n1 As Integer, n2 As Integer, n3 As Integer
  Dim m As Integer
  s = InputBox "Introduce first number: "
  n1 = CInt (s)
  s = InputBox "Introduce second number: "
  n2 = CInt (s)
  s = InputBox "Introduce third number: "
  n3 = CInt (s)
  . . .
  MsgBox "The greatest among " & CStr (n1) & ", " & _
         CStr (n2) & " and " & CStr (n3) & _
         " is: " & CStr (m)
End Sub
```

Ej10: VB implementation (II)

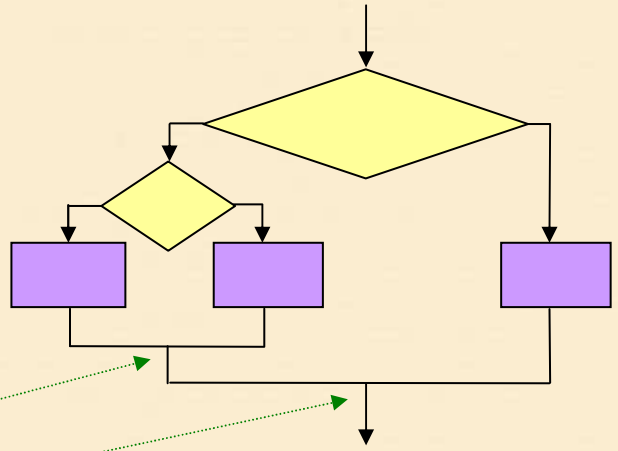
```
    …
n3 = CInt (S)
If n1 > n2 And n1 > n3 Then
   m = n1
ElseIf n2 > n3 Then
   m = n2
Else
   m = n3
End If
MsgBox "The greatest among " & CStr (n1) & ", " & _
    …
```



Unique ending point

Ex10: Nested version (III)

```
    …
n3 = CInt (S)
If n1 > n2 And n1 > n3 Then
   m = n1
Else
   If n2 > n3 Then
      m = n2
   Else
      m = n3
   End If
End If
MsgBox "The greatest among " & CStr (n1) & ", " & _
    …
```



Two ending points

5. Recommendations (I)

- The body of conditional instructions will normally be indented two spaces for each nesting level. This indentation is added to the body of the subprogram.
- This is for the sake of legibility as Visual Basic will understand equally both ways
- **Example**:

```
Sub example ()
  . . .
  If a > b Then
    t = a
    a = b
    b = t
  End If
End Sub
```

5. Recommendations (II)

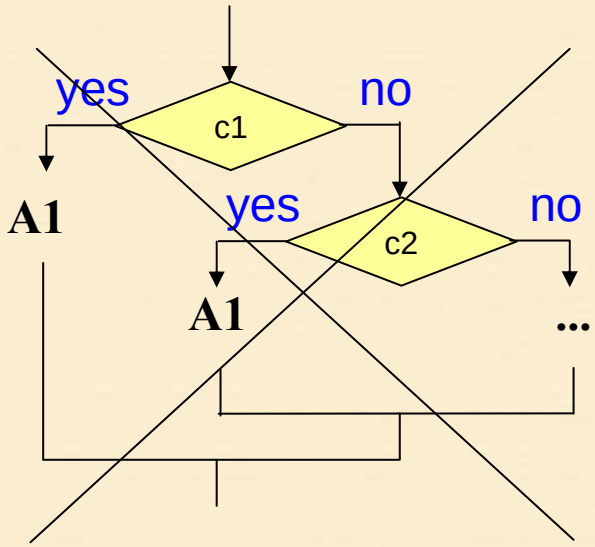
- To easy programming it is important to identify disjoint sets and the condition to distinguish them.
- It is better not to test again conditions that have already been excluded.
- **Example**:

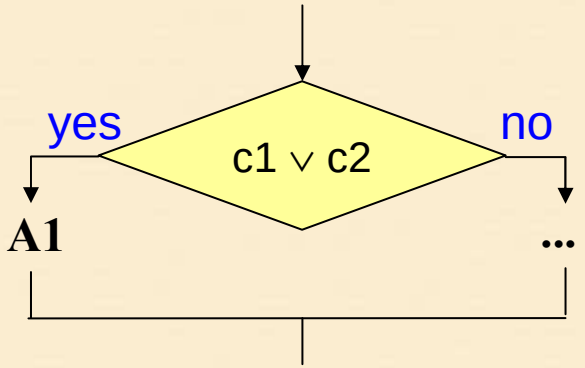
```
If grade < 5 Then
  qual = "D"
ElseIf grade < 7 Then
  qual = "C"
ElseIf grade < 9 Then
  qual = "B"
Else
  qual = "A"
End If
```

We do not re-test if it is greater than or equal to 5

5. Recommendations (III)

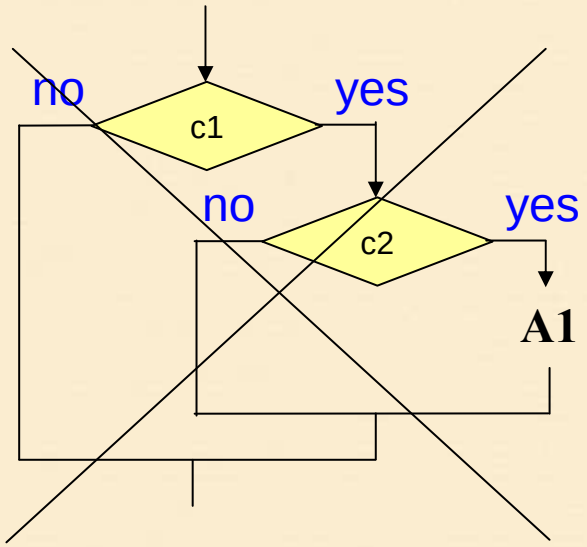
- When we want to associate the same action with two conditions we must group both conditions in one

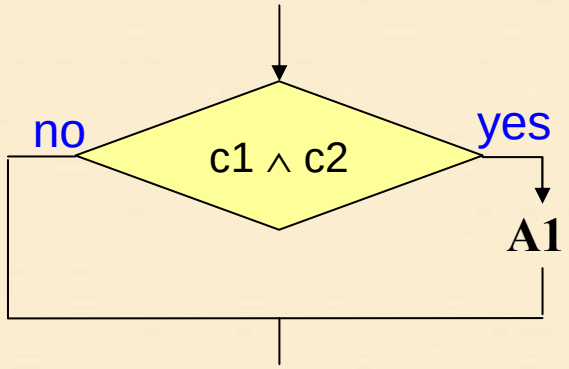




5. Recommendations (IV)

- When two conditions must be fulfilled simultaneously we shall not use two conditional instructions but only one with the conjunction of both conditions





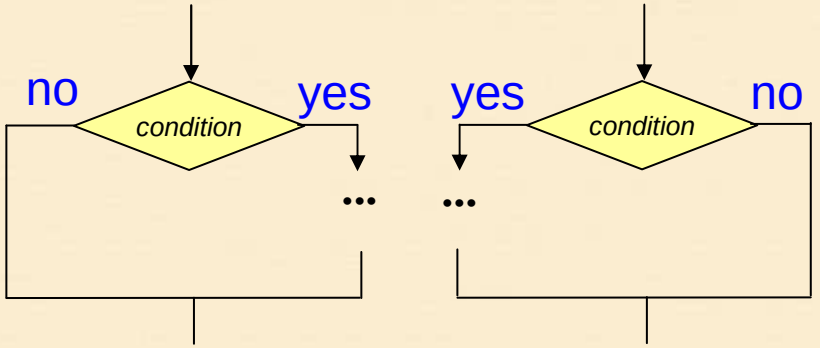
6. Summary (I)

- **Simple conditional**

  If *condition* **Then**

  . . .

  End If



- **Double conditional**

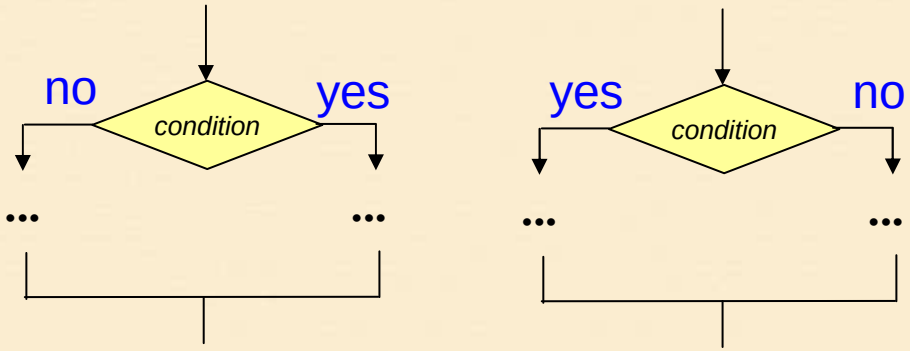
  If *condition* **Then**

  . . .

  Else

  . . .

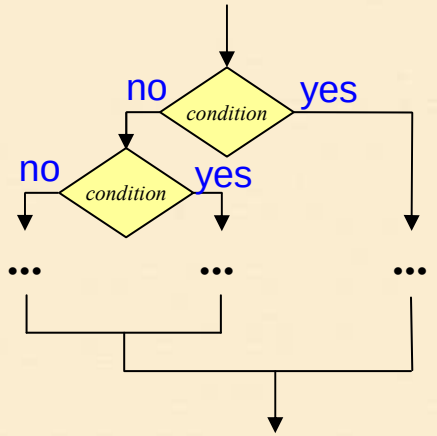
  End If



6. Summary (II)

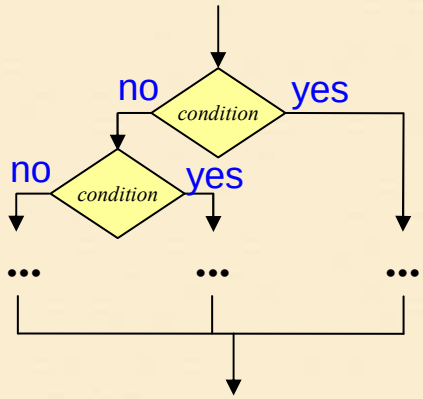
- **Nested conditional**

```
If condition Then
  ...
Else
  If condition Then
    . . .
  Else
    . . .
  End If
End If
```



- **Waterfall conditional**

```
If condition Then
  . . .
ElseIf condition Then
  . . .
Else
  . . .
End If
```

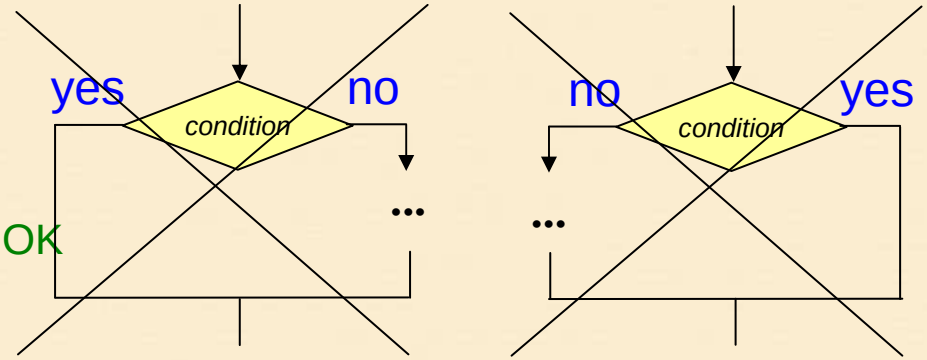


6. Summary (III)

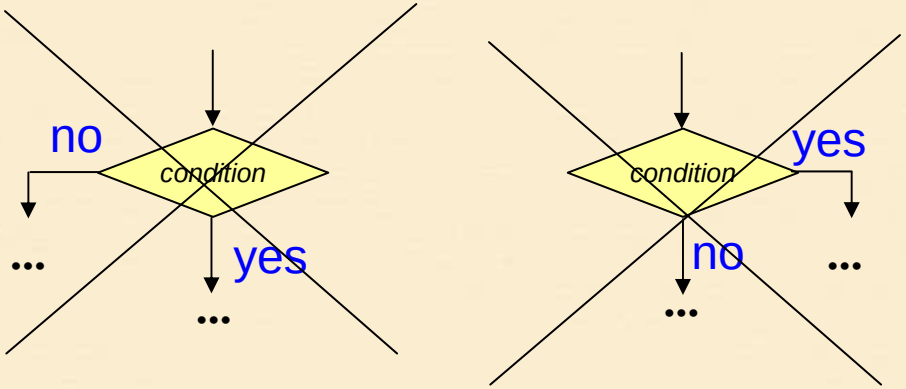
- **Incorrect simple conditional**

```
If condition Then
Else
   . . .
End If
```

  - Negate the condition & OK



- **Two incorrect representations** (confusion with loops)



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