

## Indexing



A common way to refer to many instances of the same thing is to give them a single name and index them. So we have Super Bowl XX, Pope John 23, Games of the XXIII Olympiad

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## FIT 100 Indexing, A Basic Idea

❖ Motivation: When there is a large number of similar things that must be referenced and manipulated, it can be inconvenient to think up a unique name for each, and to refer to them by the name

- ❑ For example: Each of the 7 Continents also has a name, but who can remember them? (What if we were referring to city sites of the Olympics?)
- ❑ Also, it is difficult to refer to them in a loop since there is no way to enumerate them

### 7 Continents

Africa  
Antarctica  
Asia  
Australia/Oceania  
Europe  
North America  
South America

❖ Concept: Indexing names items by associating a base name and a number – the index – with each

❖ Computer notation: Continent(4) → Europe © Copyright 2000-2001, University of Washington

## FIT 100 Indexing Particulars

- ❖ Everyday indexing commonly begins with 1
  - ❑ May 1, SuperBowl 1, Elizabeth 1
- ❖ The number at which indexing begins is its origin
- ❖ Many computer languages use 1 as the origin, but for many others, including VB 6, the index origin is 0

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## FIT 100 Arrays

- ❖ When a variable is indexed it is called an *array*
- ❖ Arrays represent collections of data values (integers, strings, etc.)
  - ❑ For example: continent(0) = "Africa"  
continent(1) = "Antarctica"  
continent(2) = "Asia"  
.....
- ❖ Elements of an array must all be of the same type
- ❖ The index of an array element is also known as a *subscript*

Notice that x0 and x1 are variable names, while x(0) and x(1) are different elements of array x

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## FIT 100 Arrays in VB6

- ❖ Arrays are declared like any other variable using a Dim statement

Keyword      Array name      Largest Index      Type  
Dim continent (6) As String

- ❖ Notice
  - ❑ The syntax is just like a normal declaration except for the pair of parenthesis
  - ❑ In the parenthesis is the largest desired index
  - ❑ The total number of elements of the array will be one more than the largest index since the origin is 0
  - ❑ The type applies to all of the elements

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## FIT 100 Indexing Arrays

- ❖ To refer to the individual elements of the array, all you have to do is change the index...
- ❖ The index value must be an integer constant (1), a variable (myNdex) or expression (myNdex +1)
- ❖ A loop can sweep through all of the elements

```
Form      Click
Option Explicit
Dim continent(6) As String

Private Sub Form_Click()
Dim index As Integer
index = 0
Do While index < 7
Print continent(index)
index = index + 1
Loop
End Sub
```

Africa  
Antarctica  
Asia  
Australia/Oceania  
Europe  
North America  
South America

Initialize the array in the Form Load event

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## FIT 100 Combining Indexing, Arrays, Loops

- ❖ A common error is to index beyond the end of the array ...

```

Option Explicit
Dim continent(6) As String
Private Sub Form_Click()
    Dim index As Integer
    index = 1
    Do While index <= 7
        Print continent(index)
        index = index + 1
    Loop
  
```

Run-time error '9':  
Subscript out of range

Antarctica  
Asia  
Australia/Oceania  
Europe  
North America  
South America

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## FIT 100 Experiment with Rnd

```

Private Sub spin(choices as Integer, result as Integer)
    result = Int(choices * Rnd)
End Sub

Private Sub experiment ()
    Dim roll As Integer
    Dim outcome0 As String
    Dim outcome1 As String
    Dim outcome2 As String
    Dim outcome3 As String
    Dim reps As Integer
    reps = 0
    outcome0 = "0 : "
    outcome1 = "1 : "
    outcome2 = "2 : "
    outcome3 = "3 : "
End Sub

Private Sub Form_Click()
    Call experiment
End Sub

Do While reps < 100
    Call spin (4, roll)
    If roll = 0 Then
        outcome0=outcome0 & ""
    Elseif roll = 1 Then
        outcome1=outcome1 & ""
    Elseif roll = 2 Then
        outcome2=outcome2 & ""
    Elseif roll = 3 Then
        outcome3=outcome3 & ""
    End If
    reps = reps + 1
Loop
lblBar0.Caption = outcome0
lblBar1.Caption = outcome1
lblBar2.Caption = outcome2
lblBar3.Caption = outcome3
End Sub
  
```

0: .....  
1: .....  
2: .....  
3: .....

## FIT 100 Experiment with Rnd

```

Private Sub spin(choices as Integer, result as Integer)
    result = Int(choices * Rnd)
End Sub

Private Sub experiment ()
    Dim roll As Integer
    Dim outcome(3) As String
    reps = 0
    i = 0
    Do While i <= 3
        outcome(i) = i & ": "
        i = i + 1
    Loop
    Do While reps < 100
        Call spin(4, roll)
        outcome(roll) =
            outcome(roll) & ""
        reps = reps + 1
    Loop
End Sub

Do While reps < 100
    Call spin (4, roll)
    If roll = 0 Then
        outcome0=outcome0 & ""
    Elseif roll = 1 Then
        outcome1=outcome1 & ""
    Elseif roll = 2 Then
        outcome2=outcome2 & ""
    Elseif roll = 3 Then
        outcome3=outcome3 & ""
    End If
    reps = reps + 1
Loop
lblBar0.Caption = outcome(0)
lblBar1.Caption = outcome(1)
lblBar2.Caption = outcome(2)
lblBar3.Caption = outcome(3)
End Sub
  
```

0: .....  
1: .....  
2: .....  
3: .....

## FIT 100 To Sum Up Indexes

- ❖ Indexing is a general means of naming like things by a base name and a number
- ❖ Controls, variables and other objects can be indexed
- ❖ VB uses 0 origin indexing

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## FIT 100 The Segway to Our Next Topic ....

- ❖ Arrays are the cornerstones of databases.
- ❖ An simple array is just a single table.

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## FIT 100 Why Know About Databases?

- ❖ Much of the data people keep is not stored as text, but is instead organized in the form of tables.
- ❖ Knowing how the data is structured and becoming proficient at retrieving and manipulating it is a very powerful skill to have.

"If spreadsheets are the 'number crunchers' of the digital world, databases are the real 'information crunchers'. Databases excel at managing and manipulating structured information."

-Rose Vines  
GeekGirls.com

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## For Next Week

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- ❖ Lab 15 will be posted today for you to review
  
- ❖ Read Chapter 16 for Monday
  - pick up the missing page from me after class
  
- ❖ Project 3, part 2 is due Wednesday