Objectives

Program Purpose

- To sort a list of 10 random letters into either ascending or descending order

Learning Goals

- Use of Control Arrays and Variable Arrays
- Sorting characters rather than numbers
- Loops within loops (nested loops)
- Use of Boolean variables to simplify code
- Use of parameter variables
- Further simplification of duplicated code from Program 20
- Use of multiple conditions in IF statements.

Design Notes

Set the properties for one label, then copy and paste it. When pasting, create a control array.

The interface used here is the same to the one used in the last project. Again though, there is a significant difference in the code. A Boolean variable is still passed to this sort procedure, controlling whether the program sorts **Up** (ascending) or **Down** (descending), but the procedure itself is much more refined.

The other significant difference is the sorting of characters rather than numbers.

Interface

Create the interface as shown
Use 1 command button, 1 form, 1 frame, 2 option buttons and 2 control arrays of 10 labels.
Names of Objects

<table>
<thead>
<tr>
<th>Type of Object</th>
<th>Number</th>
<th>Names of Objects</th>
<th>Simple Initial Properties of Objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>1</td>
<td>Form1</td>
<td>Caption - &quot;Arrays &amp; Sorting 3&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Startup Position - 2 (Centre Screen)</td>
</tr>
<tr>
<td>Labels</td>
<td>20</td>
<td>2 control Arrays of 10 labels in each</td>
<td>Font - Bold, 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IblNum(0) to IblNum(9)</td>
<td>Align - Centre</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IblSortedNum(0) to IblSortedNum(9)</td>
<td>Borderstyle - Fixed Single</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BackStyle - Opaque</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Caption - &quot;&quot;</td>
</tr>
<tr>
<td>Command Buttons</td>
<td>1</td>
<td>cmdGenerate</td>
<td>Font - Bold, 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Caption - as per Interface</td>
</tr>
<tr>
<td>Frame</td>
<td>1</td>
<td>None</td>
<td>Caption - &quot;Sort&quot;</td>
</tr>
<tr>
<td>Option Buttons</td>
<td>2</td>
<td>optAsc, optDesc</td>
<td>Font - Bold, 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Caption - Ascending, Descending</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value - False</td>
</tr>
</tbody>
</table>

Code

GENERAL SECTION

Dim SortedNums(9) As Integer 'used for storing the numbers and sorting

Sub Wait(x As Single)

Dim s As Single
s = Timer

While s + x > Timer
  DoEvents
Wend

End Sub

EVENTS

Private Sub cmdGenerate_Click()

Randomize

For z = 0 To 9
  lblSortedChar(z).Caption = ""
  lblChar(z).Caption = Chr(Int(Rnd() * 26) + 65)
  SortedChars(z) = lblChar(z).Caption
  Next z

End Sub

Private Sub optAsc_Click()

Sort (True)

End Sub

Private Sub optDesc_Click()

Sort (False)

End Sub
EVENTS (continued)

Sub Sort(Up As Boolean)

Dim x, y As Integer  'loop variables
Dim endValue As String * 1  'the smallest or biggest in the list
Dim temp As String * 1  'for swapping values

For x = 0 To 9
    endValue = SortedChars(x)  'assume the first is the smallest or biggest (endvalue)
    For y = x + 1 To 9  'compare with the rest in the list
        If (Up And SortedChars(y) < endValue) Or (Not Up And SortedChars(y) > endValue) Then  'record new smallest
            endValue = SortedChars(y)
            temp = SortedChars(y)
            SortedChars(y) = SortedChars(x)
            SortedChars(x) = temp
        End If
    Next y  'Look at the next character
    lblSortedChar(x).Caption = SortedChars(x)
    Wait 0.1  'for effect
Next x  'repeat for the rest of the list
End Sub

Consolidation and Extension

Explain the following lines of code in plain English

1. If (Up And SortedChars(y) < endValue) Or (Not Up And SortedChars(y) > endValue) Then
2. Wait 0.1  ‘for effect
3. lblChar(z).Caption = Chr(Int(Rnd() * 26) + 65

Extensions

4. Modify the code to randomly generate lowercase letters (ASCII values 97-122) rather than uppercase letters.
5. There is a logical error in the program. Try clicking on the Ascending button while it is sorting into Descending order. Is the list sorted correctly? How could you fix this?
6. Create a program to sort whole words. You could randomly assign a word to a pre-defined array, and place in the Form_Load procedure.

Dim Words(9) AS string  'IN GENERAL SECTION
Words(0) = “there”
Words(1) = “must”
...  
Words(9) = “and”