

IST 256  
Lab Week 14, Part 2 – April 22, 2009

**1. Review of Record Structures and Arrays**

Suppose that we have a record structure that has a field called “name” of type String and a field called “age” of type Integer, and a one-dimensional array of 12 elements that are records. The record structure and the array are declared as follows:

```
Private Structure personrecord
    Dim name as String
    Dim age as Integer
End Structure
```

```
Dim persons ( 0 to 11 ) as personrecord
```

Assume that all 12 elements of the array have already been defined (by reading from a file, for example). Write the code that would compute the average of all the values in the age field in the array.

## 2. Understanding Bubble Sort

Suppose that we have an array with 5 elements that is declared and initialized as follows:

```
Dim numbers ( 0 to 4 ) as Integer
numbers(0) = 24
numbers(1) = 81
numbers(2) = 23
numbers(3) = 18
numbers(4) = 32
```

Suppose that this program also has the following bubble sort:

```
Dim i, j, temp as Integer

For i = 0 To 3 // if array has n elements, number of passes is n-1
  For j = 0 To (3 - i) // number of comparisons
    If numbers(j) > numbers ( j + 1) Then
      temp = numbers( j )
      numbers ( j ) = numbers ( j + 1)
      numbers ( j + 1) = temp
    End If
  Next
Next
```

Show the order of these array elements after the first, second and third passes of the **bubble sort algorithm**.

|            | Initial value | After 1 <sup>st</sup> pass<br>( i=0) | After 2 <sup>nd</sup> pass<br>( i=1) | After 3 <sup>rd</sup> pass<br>( i=2) |
|------------|---------------|--------------------------------------|--------------------------------------|--------------------------------------|
| numbers(0) |               |                                      |                                      |                                      |
| numbers(1) |               |                                      |                                      |                                      |
| numbers(2) |               |                                      |                                      |                                      |
| numbers(3) |               |                                      |                                      |                                      |
| numbers(4) |               |                                      |                                      |                                      |

### 3. Extending the Student Record program to sort students by GPA

a. In this lab, we will continue our running example of the student records data. To work on this program again, copy your Student Records program from the H: drive to the C: drive.

b. To the form, add a button for sorting and a multi-line TextBox to show the result.

There are many objects on the form. Add to the bottom of the form:

|\_\_Sort Students by GPA:\_\_|

Result: (TextBox or label with room for 9 lines)

|\_Close\_|

c. To add code to the program for this button, use the example from the Student Records program on the web page. Start with the code that sorts students by height.

Modify your button code to sort students by the value of their gpa, instead of height. What do you have to change?

d. Test your program. Do the results look correct?

**To complete this lab, hand in the lab sheet and printed program. If your code contains Monday's program, you don't have to hand them both in.**

\*\*\*\*\* **At the end of lab** \*\*\*\*\*

Go to the C: drive where you put your folder with your name. Copy and paste this entire folder to the H: drive under your IST256 projects.

\*\*\*\*\* **Don't forget to save your work!** \*\*\*\*\*