

IST 256  
Lab Week 12, Tuesday, April 10, 2012

**1. Understanding Bubble Sort**

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

```
int [] numbers = new int[5];
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:

```
int n = 5; // n is the length of the array
for (int i = 0; i < (n - 1); i++) // if array has n elements, number of passes is n-1
{
    for (int j = 0; j < (n - (i+1)); j++) // number of comparisons in interval of pass i
    {
        if (numbers[ j ] > numbers [ j + 1])
        {
            temp = numbers [ j ];
            numbers [ j ] = numbers [ j + 1];
            numbers [ j + 1] = temp;
        }
    }
} // end of sorting
```

Show the order of these array elements after the first, second, third and fourth passes of the **bubble sort algorithm**. Note that this means that we are writing down the values in the array at the end of every iteration of the outer loop with index variable *i*.

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

Observe that on each pass, the next highest number is moved to the end of the interval.

## 2. Extending the Student Data program to sort students by age

- a. In this lab, we will continue our running example of the Student Data project.
- b. To the form, add a button for sorting. We can use the Student display label already on the form to show the result.

Add a button

|\_\_Sort Students by age: \_\_|

Add the Event -> actions -> actionPerformed event to this button.

- c. Look at your Student class. Does this class have an accessor method called getAge? If not, then add this method.
- d. Use the code given for Bubble Sort in part 1 of this lab as a guide to adding a sort to the new button. Note that this code is sorting the values of an array of numbers, while the student program will have a sort that is sorting the age fields of an array of Student objects.
- e. After sorting the student array by age, display the students in the Students label that was used by the first button to display students.
- e. Test your program. Do the results look correct?

**To submit this lab, copy and paste the code for the new student sort button. It is not necessary to resubmit the other parts of the program since they have already been submitted. Submit the program with this lab sheet by Tuesday, April 17.**