Data Structures 2720 Lab 08

For this lab you will need to implement selection sort, bubble sort, and insertion sort. The pseudocode for these sort methods is easily found on the internet. In addition to their implementation, you will need to:

Create a method for each sort.

Create three arrays of size 10 and fill them with: {9,8,7,6,5,4,3,2,1,0}

Use one of the three arrays for each sort method.

Track the number of swaps that occur during the sortation for all three sorts.

Track the number of shifts for insertion sort.

Print out the array after each swap (and after each shift, in the case of insertion sort).

Create three new arrays of size 10,000 and fill them with {9999,9998,9997… 0}.

Create three new methods for each sort type (these new methods will not have print lines or swap/shift trackers).

Call these three new methods using the three new arrays as inputs.

Track the amount of time it takes for the each new method to sort.

Expected Output (Yours should look identical to the below, except your execution times will differ):

Selection Sort:
[9, 8, 7, 6, 5, 4, 3, 2, 1, 0]

[0, 8, 7, 6, 5, 4, 3, 2, 1, 9]
[0, 1, 7, 6, 5, 4, 3, 2, 8, 9]
[0, 1, 2, 6, 5, 4, 3, 7, 8, 9]
[0, 1, 2, 3, 5, 4, 6, 7, 8, 9]
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
Swap Count: 5

Bubble Sort:
[9, 8, 7, 6, 5, 4, 3, 2, 1, 0]

[8, 9, 7, 6, 5, 4, 3, 2, 1, 0]
[8, 7, 9, 6, 5, 4, 3, 2, 1, 0]

[8, 7, 6, 9, 5, 4, 3, 2, 1, 0]
[8, 7, 6, 5, 9, 4, 3, 2, 1, 0]
[8, 7, 6, 5, 4, 9, 3, 2, 1, 0]
[8, 7, 6, 5, 4, 3, 9, 2, 1, 0]
[8, 7, 6, 5, 4, 3, 2, 9, 1, 0]
[8, 7, 6, 5, 4, 3, 2, 1, 9, 0]
[8, 7, 6, 5, 4, 3, 2, 1, 0, 9]
[7, 8, 6, 5, 4, 3, 2, 1, 0, 9]
[7, 6, 8, 5, 4, 3, 2, 1, 0, 9]
[7, 6, 5, 8, 4, 3, 2, 1, 0, 9]
[7, 6, 5, 4, 8, 3, 2, 1, 0, 9]
[7, 6, 5, 4, 3, 8, 2, 1, 0, 9]
[7, 6, 5, 4, 3, 2, 8, 1, 0, 9]
[7, 6, 5, 4, 3, 2, 1, 8, 0, 9]
[7, 6, 5, 4, 3, 2, 1, 0, 8, 9]
[6, 7, 5, 4, 3, 2, 1, 0, 8, 9]
[6, 5, 7, 4, 3, 2, 1, 0, 8, 9]
[6, 5, 4, 7, 3, 2, 1, 0, 8, 9]
[6, 5, 4, 3, 7, 2, 1, 0, 8, 9]
[6, 5, 4, 3, 2, 7, 1, 0, 8, 9]
[6, 5, 4, 3, 2, 1, 7, 0, 8, 9]
[6, 5, 4, 3, 2, 1, 0, 7, 8, 9]
[5, 6, 4, 3, 2, 1, 0, 7, 8, 9]
[5, 4, 6, 3, 2, 1, 0, 7, 8, 9]
[5, 4, 3, 6, 2, 1, 0, 7, 8, 9]
[5, 4, 3, 2, 6, 1, 0, 7, 8, 9]
[5, 4, 3, 2, 1, 6, 0, 7, 8, 9]
[5, 4, 3, 2, 1, 0, 6, 7, 8, 9]
[4, 5, 3, 2, 1, 0, 6, 7, 8, 9]
[4, 3, 5, 2, 1, 0, 6, 7, 8, 9]
[4, 3, 2, 5, 1, 0, 6, 7, 8, 9]
[4, 3, 2, 1, 5, 0, 6, 7, 8, 9]
[4, 3, 2, 1, 0, 5, 6, 7, 8, 9]
[3, 4, 2, 1, 0, 5, 6, 7, 8, 9]
[3, 2, 4, 1, 0, 5, 6, 7, 8, 9]
[3, 2, 1, 4, 0, 5, 6, 7, 8, 9]
[3, 2, 1, 0, 4, 5, 6, 7, 8, 9]
[2, 3, 1, 0, 4, 5, 6, 7, 8, 9]
[2, 1, 3, 0, 4, 5, 6, 7, 8, 9]
[2, 1, 0, 3, 4, 5, 6, 7, 8, 9]
[1, 2, 0, 3, 4, 5, 6, 7, 8, 9]
[1, 0, 2, 3, 4, 5, 6, 7, 8, 9]
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
Swap Count: 45

Insertion Sort:
[9, 8, 7, 6, 5, 4, 3, 2, 1, 0]

[9, 9, 7, 6, 5, 4, 3, 2, 1, 0]
[8, 9, 7, 6, 5, 4, 3, 2, 1, 0]
[8, 9, 9, 6, 5, 4, 3, 2, 1, 0]
[8, 8, 9, 6, 5, 4, 3, 2, 1, 0]
[7, 8, 9, 6, 5, 4, 3, 2, 1, 0]
[7, 8, 9, 9, 5, 4, 3, 2, 1, 0]
[7, 8, 8, 9, 5, 4, 3, 2, 1, 0]
[7, 7, 8, 9, 5, 4, 3, 2, 1, 0]
[6, 7, 8, 9, 5, 4, 3, 2, 1, 0]
[6, 7, 8, 9, 9, 4, 3, 2, 1, 0]
[6, 7, 8, 8, 9, 4, 3, 2, 1, 0]
[6, 7, 7, 8, 9, 4, 3, 2, 1, 0]
[6, 6, 7, 8, 9, 4, 3, 2, 1, 0]
[5, 6, 7, 8, 9, 4, 3, 2, 1, 0]
[5, 6, 7, 8, 9, 9, 3, 2, 1, 0]
[5, 6, 7, 8, 8, 9, 3, 2, 1, 0]
[5, 6, 7, 7, 8, 9, 3, 2, 1, 0]
[5, 6, 6, 7, 8, 9, 3, 2, 1, 0]
[5, 5, 6, 7, 8, 9, 3, 2, 1, 0]
[4, 5, 6, 7, 8, 9, 3, 2, 1, 0]
[4, 5, 6, 7, 8, 9, 9, 2, 1, 0]
[4, 5, 6, 7, 8, 8, 9, 2, 1, 0]
[4, 5, 6, 7, 7, 8, 9, 2, 1, 0]
[4, 5, 6, 6, 7, 8, 9, 2, 1, 0]
[4, 5, 5, 6, 7, 8, 9, 2, 1, 0]
[4, 4, 5, 6, 7, 8, 9, 2, 1, 0]
[3, 4, 5, 6, 7, 8, 9, 2, 1, 0]
[3, 4, 5, 6, 7, 8, 9, 9, 1, 0]
[3, 4, 5, 6, 7, 8, 8, 9, 1, 0]
[3, 4, 5, 6, 7, 7, 8, 9, 1, 0]
[3, 4, 5, 6, 6, 7, 8, 9, 1, 0]
[3, 4, 5, 5, 6, 7, 8, 9, 1, 0]
[3, 4, 4, 5, 6, 7, 8, 9, 1, 0]
[3, 3, 4, 5, 6, 7, 8, 9, 1, 0]
[2, 3, 4, 5, 6, 7, 8, 9, 1, 0]
[2, 3, 4, 5, 6, 7, 8, 9, 9, 0]
[2, 3, 4, 5, 6, 7, 8, 8, 9, 0]
[2, 3, 4, 5, 6, 7, 7, 8, 9, 0]
[2, 3, 4, 5, 6, 6, 7, 8, 9, 0]

[2, 3, 4, 5, 5, 6, 7, 8, 9, 0]
[2, 3, 4, 4, 5, 6, 7, 8, 9, 0]
[2, 3, 3, 4, 5, 6, 7, 8, 9, 0]
[2, 2, 3, 4, 5, 6, 7, 8, 9, 0]
[1, 2, 3, 4, 5, 6, 7, 8, 9, 0]
[1, 2, 3, 4, 5, 6, 7, 8, 9, 9]
[1, 2, 3, 4, 5, 6, 7, 8, 8, 9]
[1, 2, 3, 4, 5, 6, 7, 7, 8, 9]
[1, 2, 3, 4, 5, 6, 6, 7, 8, 9]
[1, 2, 3, 4, 5, 5, 6, 7, 8, 9]
[1, 2, 3, 4, 4, 5, 6, 7, 8, 9]
[1, 2, 3, 3, 4, 5, 6, 7, 8, 9]
[1, 2, 2, 3, 4, 5, 6, 7, 8, 9]
[1, 1, 2, 3, 4, 5, 6, 7, 8, 9]
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
Shift Count: 45
Swap Count: 9

Selection Sort Time: 62331111
Bubble Sort Time: 81864599
Insertion Sort Time: 127636797