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Homework Submission 5
02/09/2016

CST 370
Homework (Sorting)

1. Sort the array of numbers 10, 4, -3, 8, 1 in ascending order using the **selection sort algorithm**. Show the state of the array after each iteration of the algorithm.

10, 4, **-3**, 8, 1 - Scan the entire list and locate the smallest element.
-3, 4, 10, 8, 1 - Swap the smallest element with the element in position 1.
-3, 4, 10, 8, **1** - Scan the list from the 2nd position and locate the smallest element.
-3, 1, 10, 8, 4 - Swap the smallest element with the element in position 2.
-3, 1, 10, 8, **4** - Scan the list from the 3rd position and locate the smallest element.
-3, 1, 4, 8, 10 - Swap the smallest element with the element in position 3.
-3, 1, 4, **8**, 10 - Scan the list from the 4th position and locate the smallest element.
-3, 1, 4, 8, 10 - Swap the smallest element with the element in position 4 (itself in this case, no swap).
-3, 1, 4, 8, **10** - Sort ends, the final element is correctly positioned (outer loop stops at n-1).

1st Iteration: -3, 4, 10, 8, 1
2nd Iteration: -3, 1, 10, 8, 4
3rd Iteration: -3, 1, 4, 8, 10
4th Iteration: -3, 1, 4, 8, 10

Final sorted array: -3, 1, 4, 8, 10

2. Sort the array of numbers 10, 4, -3, 8, 1 in ascending order using the **bubble sort algorithm**. Show the state of the array after each iteration of the algorithm.

10, **4**, -3, 8, 1 - Compare the element at position 0 in the array with the element at position 1.
4, 10, -3, 8, 1 - Swap elements since 4 < 10.
4, **10**, **-3**, 8, 1 - Compare the element at position 1 in the array with the element at position 2.
4, -3, 10, 8, 1 - Swap elements since -3 < 10.
4, -3, **10**, **8**, 1 - Compare the element at position 2 in the array with the element at position 3.
4, -3, 8, 10, 1 - Swap elements since 8 < 10.
4, -3, 8, **10**, **1** - Compare the element at position 3 in the array with the element at position 4.
4, -3, 8, 1, 10 - Swap elements since 1 < 10.

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1st Iteration: 4, -3, 8, 1, 10
2nd Iteration: -3, 4, 1, 8, 10
3rd Iteration: -3, 1, 4, 8, 10
4th Iteration: -3, 1, 4, 8, 10

Final sorted array: -3, 1, 4, 8, 10

3. Sort the array of numbers 10, 7, 3, 8, 1, 9, 0 in ascending order using the insertion sort algorithm. Show the state of the array after each iteration of the algorithm.

Array: 10, 7, 3, 8, 1, 9, 0
1st Iteration: 7, 10, 3, 8, 1, 9, 0
2nd Iteration: 3, 7, 10, 8, 1, 9, 0
3rd Iteration: 3, 7, 8, 10, 1, 9, 0
4th Iteration: 1, 3, 7, 8, 10, 9, 0
5th Iteration: 1, 3, 7, 8, 9, 10, 0
6th Iteration: 0, 1, 3, 7, 8, 9, 10

Final sorted array: 0, 1, 3, 7, 8, 9, 10

4. Use diagrams similar to the one shown in the slides and in your textbook to show the various stages of the merge sort algorithm for the following array of numbers: 13, 57, 39, 85, 70, 22, 64, 48