CS2413: Assignment 3

Total Points: 100

Due: Oct 17, midnight.

Primary objectives of this assignment

Be able to sort an arbitrary input list in descending order.

Be able to implement the bubble sort algorithm.

Be able to implement the merge sort algorithm with the selection sort algorithm as its subroutine.

Project Overview

In this assignment, we input a arbitrarily sized list of non-repeated integers and our program should output its sorted version, where the input integers are sorted in *descending* order.

Our program should selectively perform the following two tasks:

- apply bubble sort on the list and output the sorted list

- apply merge sort (with selection sort as subroutine) on the list and output the sorted list

Specific Input and Output

Our program should have two inputs:

(1) A task selection integer

- if 0, do bubble sort

- if 1, do merge sort (+ selection sort)

(2) An arbitrary list of non-repeated integers

An example input is in Figure 1, and the correct output should be 21 17 9 7 5 2 1.

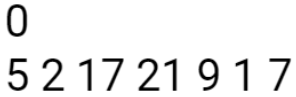

Fig. 1. Example Input with Task Selection Integer being 0

Another example input is in Figure 2 and the correct output should be 88 69 68 54 43 31 12.

```
1
31 54 68 43 69 88 12
```

Fig. 2. Example Input with Task Selection Integer being 1

Additional Requirements and Tips

For merge sort, you only need to implement one divide and one merge. For example, given an input list { 1, 3, 5, 2, 4, 6 }, your algorithm just need to divide it into two sub-lists { 1, 3, 5 } and { 2, 4, 6 }, apply selection sort on each sublist to get { 5, 3, 1 } and { 6, 4, 2 }, and merge the two sublists into { 6, 5, 4, 3, 2, 1 }. If you want to further split {1, 3, 5} into {1, 3 } and { 5 }, sort each using selection sort, and merge them to get { 5, 3, 1 }, that's fine but not required.

You are free to store the list using any data structure such as vector or linked list.

You are free to use either recursive or non-recursive implementations of any sorting algorithms.

To enable Gradescope grading, please only use 'cin' and 'cout' for data input and output.

Please name your submitted code as `cs2413_hw3.cpp`.

Rubrics

- bubble sort: 35 points.

- merge sort: 55 points.

- Documentation: 10 points.