This is CS50x

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Lab 3: Sort

You are welcome to collaborate with one or two classmates on this lab, though it is expected that every student in any such group contribute equally to the lab.

GitHub now requires that you use SSH or a personal access token instead of a password to log in, but you can still use check50 and submit50! See cs50.ly/github (https://cs50.ly/github) for instructions if you haven't already!

Analyze three sorting programs to determine which algorithms they use.

When to Do It

By Saturday, January 1, 2022, 1:59 AM GMT-3 (https://time.cs50.io/2021-12-31T23:59:00-05:00).

Background

Recall from lecture that we saw a few algorithms for sorting a sequence of numbers: selection sort, bubble sort, and merge sort.

- Selection sort iterates through the unsorted portions of a list, selecting the smallest element each time and moving it to its correct location.
- Bubble sort compares pairs of adjacent values one at a time and swaps them if they are in the incorrect order. This continues until the list is sorted.
- Merge sort recursively divides the list into two repeatedly and then merges the smaller lists back into a larger one in the correct order.

Getting Started

- 1. Log into ide.cs50.io (https://ide.cs50.io/) using your GitHub account.
- 2. In your terminal window, run wget https://cdn.cs50.net/2020/fall/labs/3/lab3.zip to download a Zip file of the lab distribution code.
- 3. In your terminal window, run unzip lab3.zip to unzip (i.e., decompress) that Zip file.
- 4. In your terminal window, run cd lab3 to change directories into your lab3 directory.

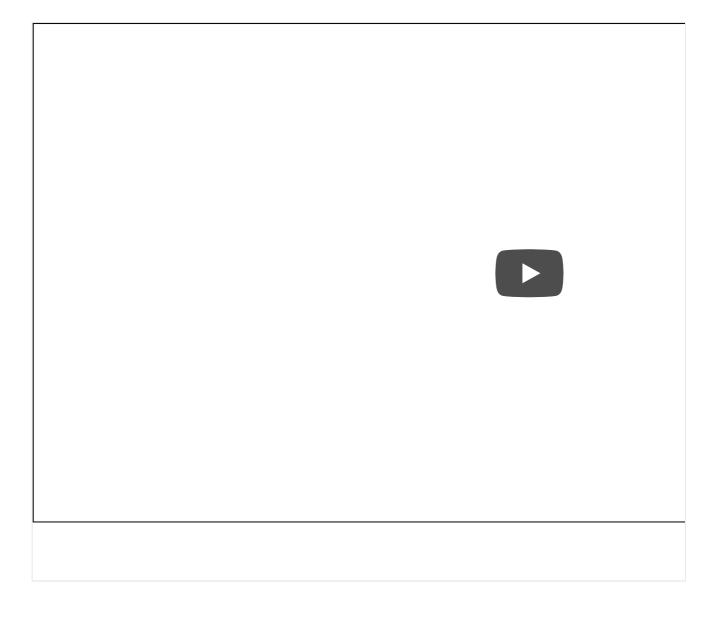
Instructions

Provided to you are three already-compiled C programs, sort1, sort2, and sort3. Each of these programs implements a different sorting algorithm: selection sort, bubble sort, or merge sort (though not necessarily in that order!). Your task is to determine which sorting algorithm is used by each file.

- sort1, sort2, and sort3 are binary files, so you won't be able to view the C source code for each. To assess which sort implements which algorithm, run the sorts on different lists of values.
- Multiple .txt files are provided to you. These files contain n lines of values, either reversed, shuffled, or sorted.
 - For example, reversed10000.txt contains 10000 lines of numbers that are reversed from 10000, while random100000.txt contains 100000 lines of numbers that are in random order.
- To run the sorts on the text files, in the terminal, run ./[program_name] [text_file.txt].
 - For example, to sort reversed10000.txt with sort1, run ./sort1 reversed10000.txt.
- You may find it helpful to time your sorts. To do so, run time ./[sort_file] [text_file.txt].
 - For example, you could run time ./sort1 reversed10000.txt to run sort1 on 10,000 reversed numbers. At the end of your terminal's output, you can look at the real time to see how much time actually elapsed while running the program.

■ Record your answers in answers.txt, along with an explanation for each program, by filling in the blanks marked TODO.

Walkthrough



Hints

- The different types of .txt files may help you determine which sort is which. Consider how each algorithm performs with an already sorted list. How about a reversed list? Or shuffled list? It may help to work through a smaller list of each type and walk through each sorting process.
- ▶ Not sure how to solve?

How to Check Your Answers

Execute the below to evaluate the correctness of your answers using check50. But be sure to fill in your explanations as well, which check50 won't check here!

check50 cs50/labs/2021/x/sort

How to Submit

Execute the below to submit your work.

submit50 cs50/labs/2021/x/sort