Delta College

CST 283
Programming Assignment 10

Winter 2024
Instructor: T. Klingler

Objective

This program will provide an opportunity to use and analyze various sorting algorithms.

Overview & Instructions

Write a program to compare the relative performance of different sorting algorithms on three datasets containing the integers 1..100. Ultimately, the data should be sorted in ascending order. The three input datasets are respectively sorted:

- **`inverse.txt`** (in opposite order - descending)
- **`random.txt`** (randomly)
- **`almost.txt`** (almost in order - ascending)

Access to all three files this link

You should include the following sorting algorithms in your analysis. Feel free to place all of these in the same file. This is an analysis problem, not a structured software solution.

- N^2 Sorting Algorithms (found here)
  - Selection Sort
  - Bubble Sort
  - Insertion Sort
  - Bubble Sort2 (abbreviated Bubble Sort - found here)
- N log2 N Sorting Algorithms (found here)
  - Heap Sort
  - QuickSort
  - *MergeSort* (requires an online search; not included in course materials)

To measure the performance of the various sorting routines, **count** the number of **comparisons** and **swaps** required to achieve the desired ascending sorted order. You will be required to perform this analysis for all sorting routines for all three datasets. Be sure to measure compares as occurrences in each algorithm where array elements themselves are compared. Some algorithms compare counters as part of the algorithm. These should not be included in the count of compares.

You should utilize global variables as counters. This is required for the recursive algorithms. Place all functions in one file, if necessary. For counting the comparisons, consider each place in each algorithm where an expression exists such as: **`if (array[] > array[])`** where an array element is compared to another. Swaps in the algorithms utilize an included function **`swap()`**. Be sure to utilize two separate counters; one for total swaps and one for total comparisons.

Consider this similar to a science lab experiment where you are asked to document your outcomes and draw a conclusion. To summarize your results, a worksheet is provided that suggests a format for reporting the results. You may use this worksheet or simply enter the same information (and short conclusion) in your own format. Your conclusion should include a general reaction to the results of the experiment.

Deliverables

Demonstrate the development steps of your program with at least two version commits to the assignment Git repository.

Deliver the following to the online course management system **Assignment** drop box:

- A **summary table** (similar to model provided) that describes the results of the experiment
- A short **discussion** defining your results for the experiment
- **Source code** (.java) file(s) altered and used for the experiment