This is the report for INFO6205 Assignment 6.

In this experiment, we aim to figure out the runtime consumption of operations “compare” and “swap” - which one takes longer runtime, so that we can decide which algorithm to use because it uses less “compare” times or “swap” times.

We set experiments to compare with some sort algorithms. The config settings are shown as followed:

mergesort = false  
timsort = false  
quicksort = true  
heapsort = true  
introsort = true  
insertionsort = true  
bubblesort = true  
quicksort3way = false  
quicksortDualPivot = true  
randomsort = false

We know that the comparisons number of bubble/quick/ sort is about n ^ 2, and the comparisons number of mergesort is about n \* log n.

The swap times of bubble/insertion sort is about n ^ 2, and the swap times of merge sort is about n \* log n.

The results are shown in appendix.

According to the results, the runtime of these algorithms are: quicksort = quicksort 3 way = quicksort

quicksort 3 way > quicksort > intro sort > bubble sort > insertion sort.

Comparisons take more time than swaps.

Appendix: Log result.

2023-03-12 23:39:04 INFO SorterBenchmark - run: sort 1,000 elements using SorterBenchmark on class java.lang.String from 22,865 total elements and 11,724 runs using sorter: Intro sort

2023-03-12 23:39:04 INFO Benchmark\_Timer - Begin run: Helper for Intro sort with 1000 elements with 11,724 runs

2023-03-12 23:39:21 INFO TimeLogger - Raw time per run (mSec): 1.42

2023-03-12 23:39:21 INFO TimeLogger - Normalized time per run (n log n): 27.71

2023-03-12 23:39:21 INFO SortBenchmark - Beginning LocalDateTime sorts

2023-03-12 23:40:42 INFO SorterBenchmark - run: sort 1,000 elements using SorterBenchmark on class java.lang.String from 22,865 total elements and 1,172 runs using sorter: Insertion sort

2023-03-12 23:40:42 INFO Benchmark\_Timer - Begin run: Helper for Insertion sort with 1000 elements with 1,172 runs

2023-03-12 23:40:45 INFO TimeLogger - Raw time per run (mSec): 2.41

2023-03-12 23:40:45 INFO TimeLogger - Normalized time per run (n^2): 1.61

2023-03-12 23:40:45 INFO SortBenchmark - Beginning LocalDateTime sorts

Bubble sort

2023-03-12 23:42:36 INFO Benchmark\_Timer - Begin run: Helper for Bubble sort with 1000 elements with 1,172 runs

2023-03-12 23:42:47 INFO TimeLogger - Raw time per run (mSec): 8.80

2023-03-12 23:42:47 INFO TimeLogger - Normalized time per run (n^2): 5.87

2023-03-12 23:42:47 INFO SortBenchmark - Beginning LocalDateTime sorts

2023-03-12 23:51:28 INFO SortBenchmark - SortBenchmark.main: null with word counts: [1000]

2023-03-12 23:51:28 INFO Benchmark\_Timer - Begin run: intArraysorter with 100 runs

2023-03-12 23:51:29 INFO TimeLogger - Raw time per run (mSec): 3.99

2023-03-12 23:51:29 INFO TimeLogger - Normalized time per run (n log n): .44

2023-03-12 23:51:29 INFO Benchmark\_Timer - Begin run: integerArraysorter with 100 runs

2023-03-12 23:51:30 INFO TimeLogger - Raw time per run (mSec): 12.76

2023-03-12 23:51:30 INFO TimeLogger - Normalized time per run (n log n): 1.40

2023-03-12 23:51:30 INFO SortBenchmark - Beginning String sorts

2023-03-12 23:51:30 INFO SortBenchmarkHelper - Testing with words: 22,865 from eng-uk\_web\_2002\_10K-sentences.txt

2023-03-12 23:51:30 INFO SortBenchmark - Testing pure sorts with 11,724 runs of sorting 1,000 words

2023-03-12 23:51:30 INFO SorterBenchmark - run: sort 1,000 elements using SorterBenchmark on class java.lang.String from 22,865 total elements and 11,724 runs using sorter: QuickSort 3 way

2023-03-12 23:51:30 INFO Benchmark\_Timer - Begin run: Instrumenting helper for QuickSort 3 way with 1,000 elements with 11,724 runs

2023-03-12 23:52:58 INFO TimeLogger - Raw time per run (mSec): 7.41

2023-03-12 23:52:58 INFO TimeLogger - Normalized time per run (n log n): 144.79

2023-03-12 23:52:58 INFO SortBenchmarkHelper - Testing with words: 22,865 from eng-uk\_web\_2002\_10K-sentences.txt

2023-03-12 23:52:58 INFO SortBenchmark - Testing with 11,724 runs of sorting 1,000 words and instrumented

2023-03-12 23:52:58 INFO SorterBenchmark - run: sort 1,000 elements using SorterBenchmark on class java.lang.String from 22,865 total elements and 11,724 runs using sorter: QuickSort 3 way

2023-03-12 23:52:58 INFO Benchmark\_Timer - Begin run: Instrumenting helper for QuickSort 3 way with 1,000 elements with 11,724 runs

2023-03-12 23:54:24 INFO TimeLogger - Raw time per run (mSec): 7.30

2023-03-12 23:54:24 INFO TimeLogger - Normalized time per run (n log n): 142.74

2023-03-12 23:54:24 INFO SortBenchmark - Beginning LocalDateTime sorts