Program Structures & Algorithms

INFO 6205 Fall 2019

Assignment 2

1. Benchmarks Code

In the benchmark assignment, I complete two java files to test the Insertion-Sort code and record the run time with 4 different data sets, which includes “random set”, “ordered set”, “partially-ordered set” and “reverse-ordered set”, all these 4 data sets are defined in the Benchmark file. To record the run time, I use the function System.nanoTime() as suggested in the requirement. The original value of n is 1000, for each time I double the value n to make the data sets much bigger to test the Insertion-Sort.

1. Run-Time Graph & Conclusion

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By saving all 5 times data getting from 4 different data sets, I draw this graph as the output, “Random” in blue, “Ordered” in orange; “Partially-Ordered” in gray; “Reverse-Ordered” in yellow, and I get these following conclusions.

Firstly, the curve for “Random” and “Partially-Ordered” are almost the same, with “Random” slightly faster than “Partially-Ordered” when value n is bigger than 8000, the reason for this phenomenon may be the error in the execution of the program;

Secondly, for all “Random”, “Partially-Ordered” and “Reverse-Ordered”, the run time for each is 4 times slower than last one with value n is increased in 2 times, when n is bigger than 8000, they may be more than 4 times slower, for “Ordered” data set, it is 2 times slower for each time, which is same as the value n’s growth.

Thirdly, for “Ordered” data set, the run time is the fastest one in all 4 data sets, which can approximately be regarded as 0, as when value n is set to 16000 and the runtime is smaller than 0.1, so the Insertion Sort deal with the “ordered” data set best;

Finally, for “Reverse-Ordered” data set, it runs 2 times slower than “Random” or “Partially-Ordered”, which is the slowest one in all 4 data sets. We can regard that this kind of sorting is the worst case for particular data set’s length, and both “Random” and “Partially-Ordered” is the average case for the data sets in same length.

All in all, Insertion Sort feats the “Ordered” best, feats the “Reverse-Ordered” worst, deal with the “Random” and “Partially-Ordered” as the average speed.