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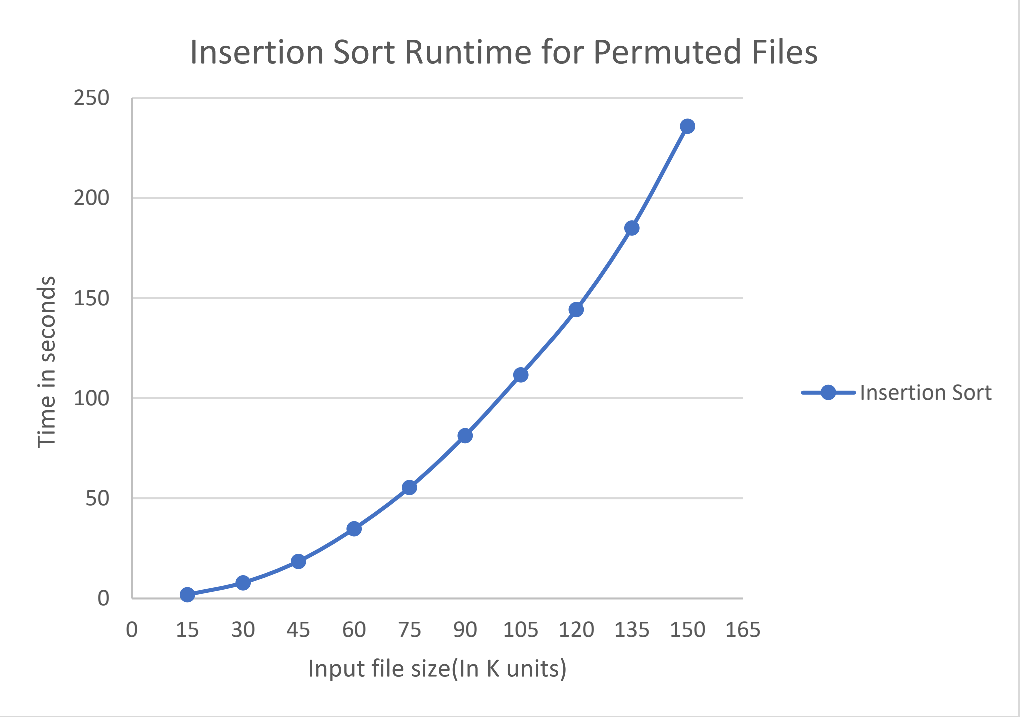
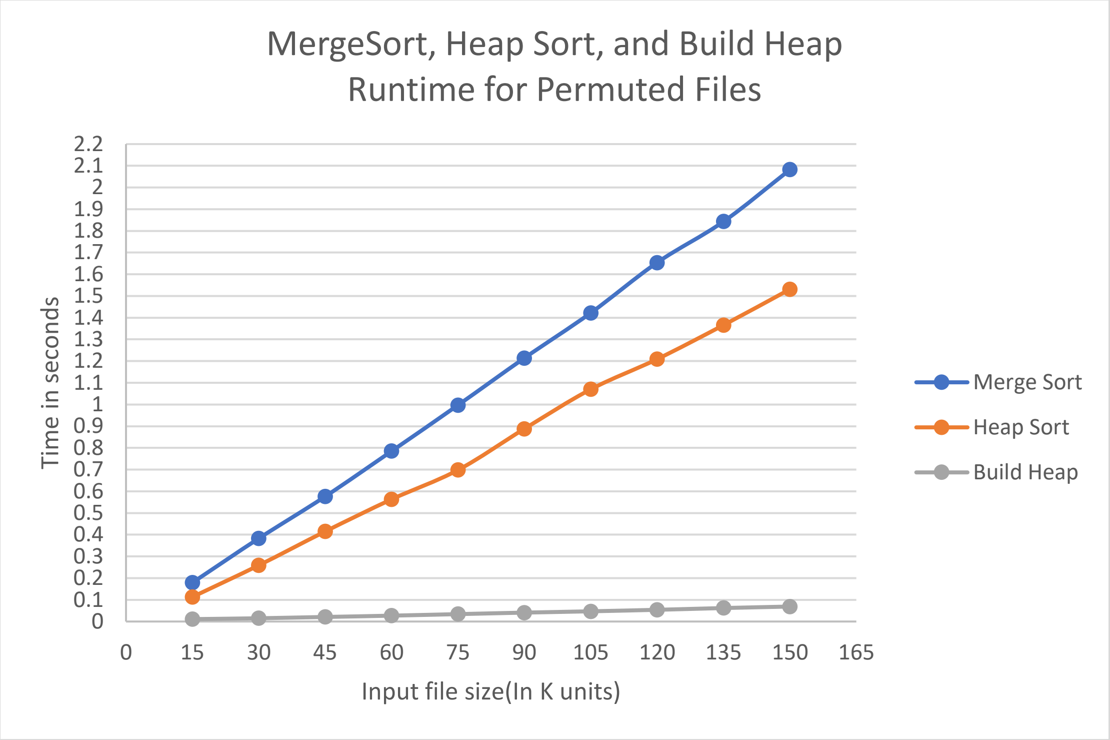
CS-340 Project I Sorting

Report and Plots

Here is runtime for each sorting method in seconds on all permuted files.

File Size(in K units)	Insertion Sort (Time in sec.)	Merge Sort (Time in sec.)	Heap Sort (Time in sec.)	Build Heap (Time in sec.)
15	1.901	0.179	0.113	0.011
30	7.858	0.383	0.259	0.015
45	18.584	0.576	0.415	0.021
60	34.82	0.785	0.563	0.027
75	55.456	0.997	0.698	0.034
90	81.35	1.214	0.888	0.041
105	111.708	1.422	1.07	0.047
120	144.237	1.654	1.209	0.054
135	185.077	1.843	1.366	0.062
150	235.848	2.082	1.531	0.069



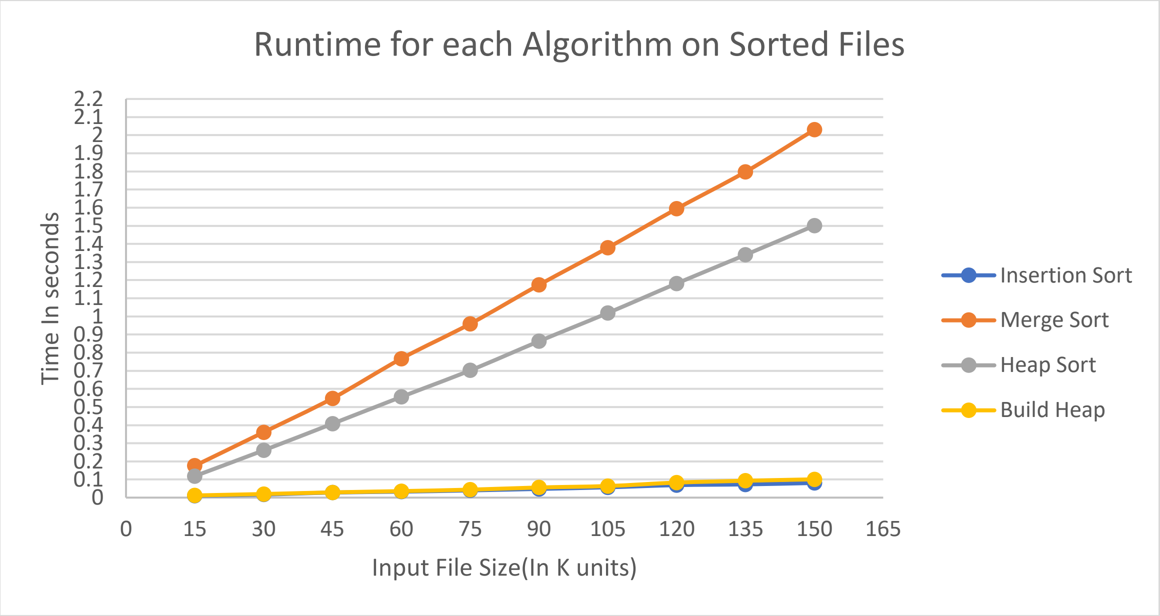


Summary on sorting permuted files for each Algorithm:

1. Insertion Sort: In average, insertion sort take Ɵ (N^2) time to sort. In my algorithm, it strictly follow the same time complexity. It does take Ɵ (N^2) amount of time to sort each permuted files.
2. Merge Sort: In all cases, merge sort take Ɵ (N logN) time to sort which is also true in all my cases. No wired time was found.
3. Heap Sort: In all cases, heap sort take Ɵ (N logN) time to sort which is also true in all my cases. No wired time was found.
4. Build Sort: Surprisingly, build heap took Ɵ (N) which was expected from our class discussion.

Here is runtime for each sorting method in seconds on all sorted files.

File Size(in K units)	Insertion Sort (Time in sec.)	Merge Sort (Time in sec.)	Heap Sort (Time in sec.)	Build Heap (Time in sec.)
15	0.01	0.176	0.119	0.012
30	0.017	0.361	0.261	0.02
45	0.028	0.548	0.408	0.029
60	0.033	0.767	0.556	0.036
75	0.04	0.959	0.702	0.044
90	0.048	1.174	0.863	0.056
105	0.057	1.379	1.019	0.064
120	0.069	1.594	1.182	0.083
135	0.073	1.798	1.34	0.093
150	0.081	2.03	1.501	0.101



Summary on sorting sorted files for each Algorithm:

1. Insertion Sort: In best, insertion sort take ϴ (N) time to sort. In all sorted files, it strictly follow the same time complexity. It does take ϴ (N) amount of time to sort each sorted files.
2. Merge Sort: In all cases, merge sort take ϴ (N logN) time to sort which is also true in all my sorted files cases. No wired time was found.
3. Heap Sort: In all cases, heap sort take ϴ (N logN) time to sort which is also true in all my sorted files cases. No wired time was found.
4. Build Sort: Surprisingly, build heap took ϴ (N) which was expected from our class discussion.