Lab 6 part 3 (c)

Merge Sort

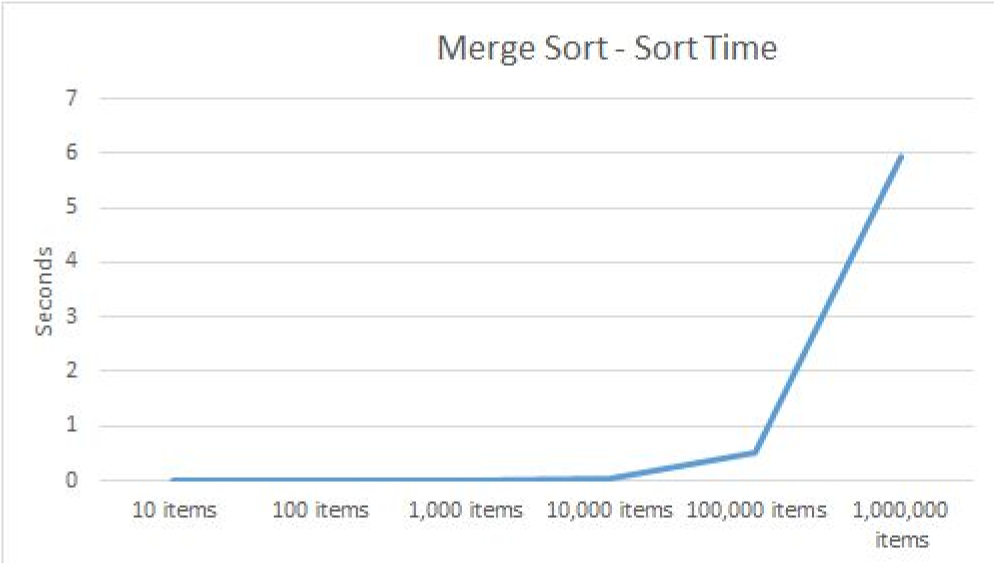
	10 items	100 items	1,000 items	10,000 items	100,000 items	1,000,000 items
Read time (s)	0.000214	0.001091	0.001073	0.002318	0.018811	0.115429
Sort time (s)	6.5e-5	0.000801	0.004688	0.044564	0.523122	5.954241
Write time (s)	0.000466	0.000344	0.000705	0.004435	0.046279	0.47352
Total time (s)	0.000745	0.002236	0.006466	0.051317	0.588212	6.54319
% of Time Taken by Reading and Writing	91.275%	60.805%	27.498%	13.159%	11.066%	9.001%

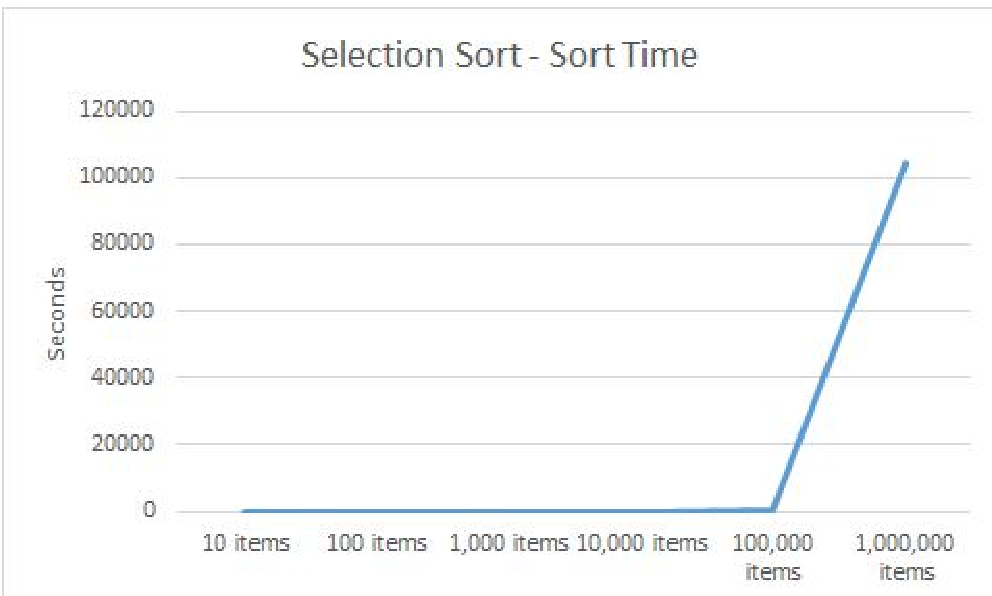
Selection Sort

	10 items	100 items	1,000 items	10,000 items	100,000 items	1,000,000 items
Read time (s)	0.000164	0.000201	0.000458	0.001845	0.012121	Approx. 0.114178
Sort time (s)	3e-5	0.000734	0.039743	3.320191	308.999762	Approx. 104400
Write time (s)	0.000199	0.001127	0.000672	0.004282	0.049535	Approx. 0.502811
Total time (s)	0.000393	0.002062	0.040873	3.326318	309.061418	Approx. 104400.617
% of Time Taken by Reading and Writing	92.366%	64.403%	2.764%	0.184%	0.020%	5.909e-4%

The percent of time taken by reading and writing decreases as the number of items increases. This means that the sorting time is taking more time compared to the total time as the number of items increases. It decreases a lot more and a lot more rapidly in selection sort. This is because selection sort takes significantly more time with a large number of items.

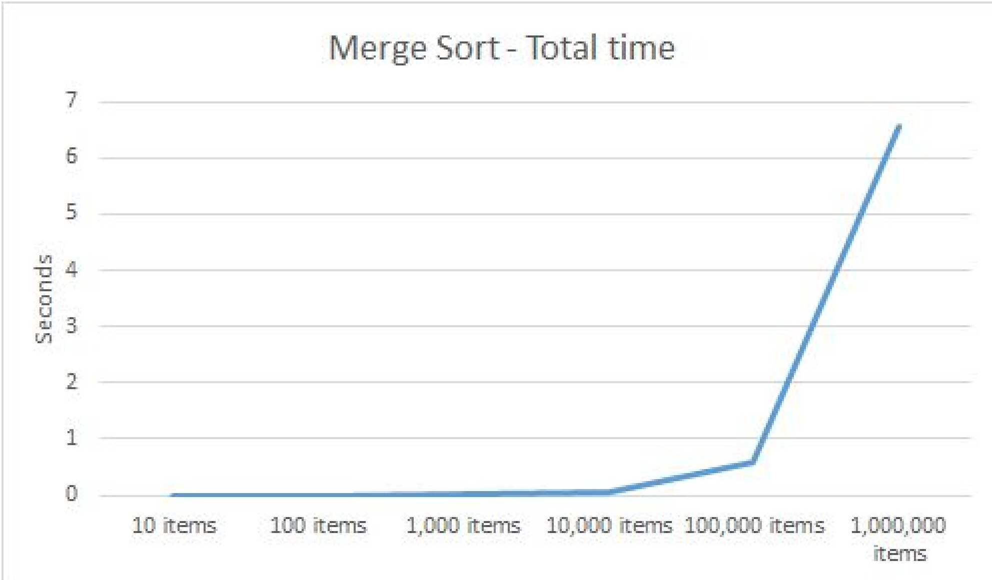
Sort Time Graphs

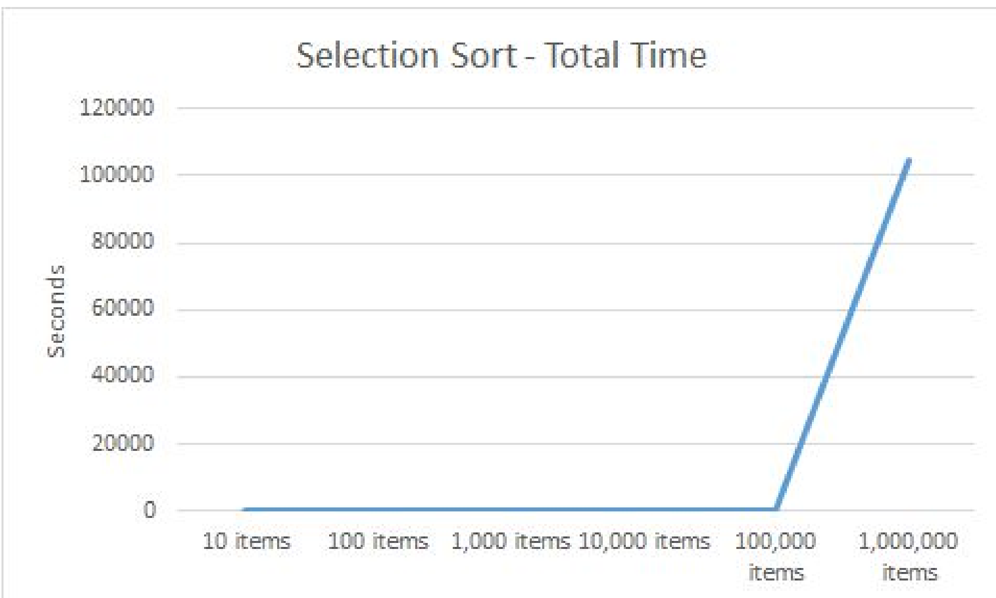




In these two graphs, we can see that as the number of items increases, selection sort time increases a lot more rapidly than the merge sort times. This matches with the theoretical complexities of both types of sorting methods. The complexity for merge sort is O(n*log(n)) which is faster than selection sorts complexity which is $O(n^2)$.

Total Time Graphs





There is a very similar relationship between the two graphs in each set. We can gather the same conclusions from these two graphs as the two graphs above.