Program Structures and Algorithms
Spring 2023(Section - 1)

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Task:

To determine--for sorting algorithms--what is the best predictor of total execution time: comparisons, swaps/copies, hits (array accesses), or something else.

Relationship Conclusion:

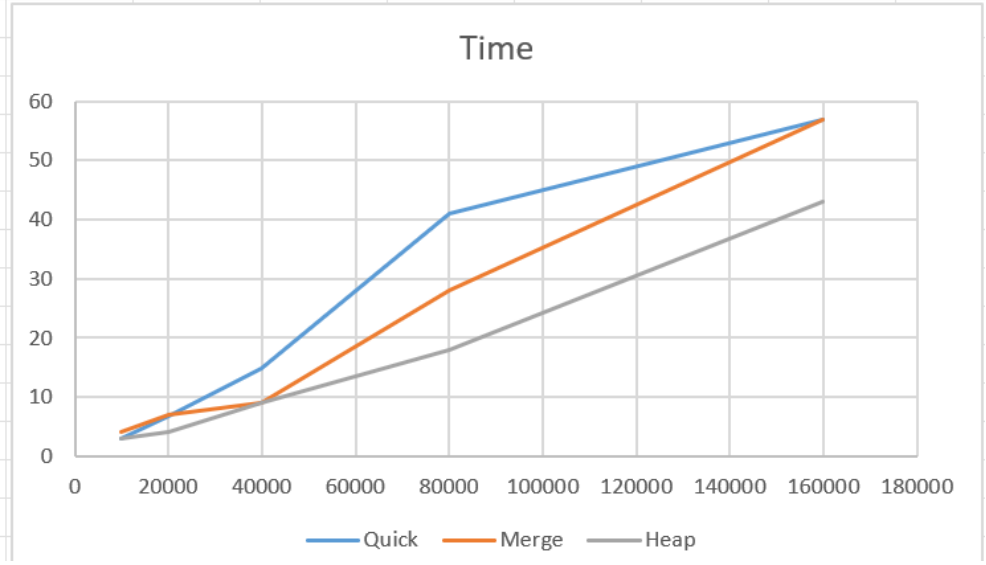
From the below graphs it can be seen that hits and compares are both important predictors of the total execution time for a sorting algorithm.

Evidence to Conclusion:

We cannot use swaps as a criteria because for merge sort, as the number of swaps is always zero

Graphical representation of time v/s the array size

	Quick	Merge	Heap
10000	3.07	4	3
20000	6.7	7	4
40000	14.91	9	9
80000	41	28	18
160000	57	57	43



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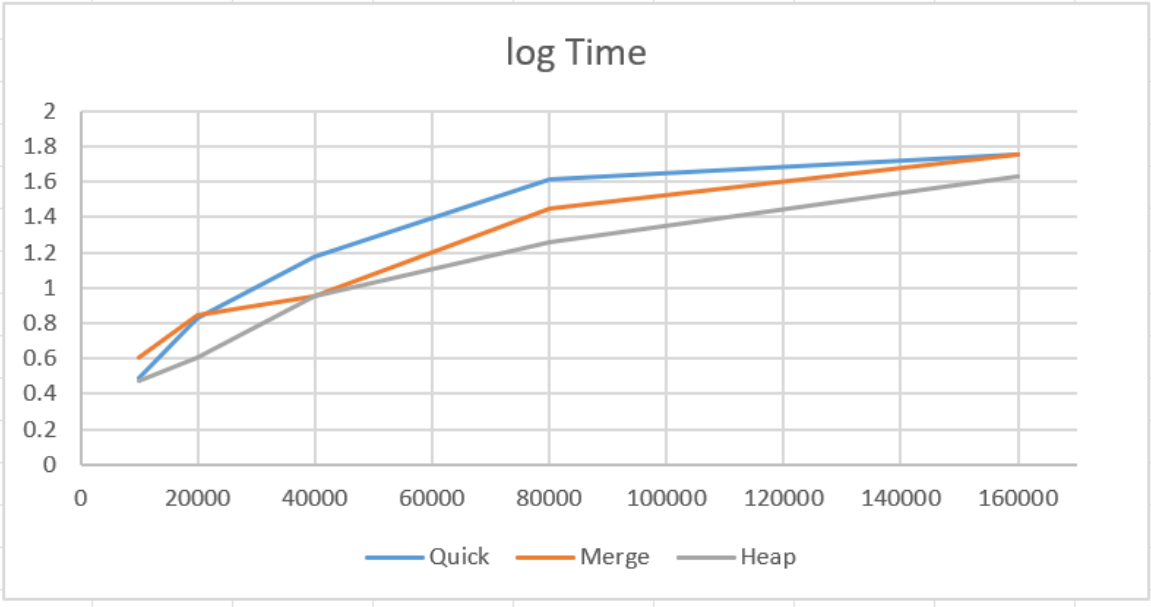
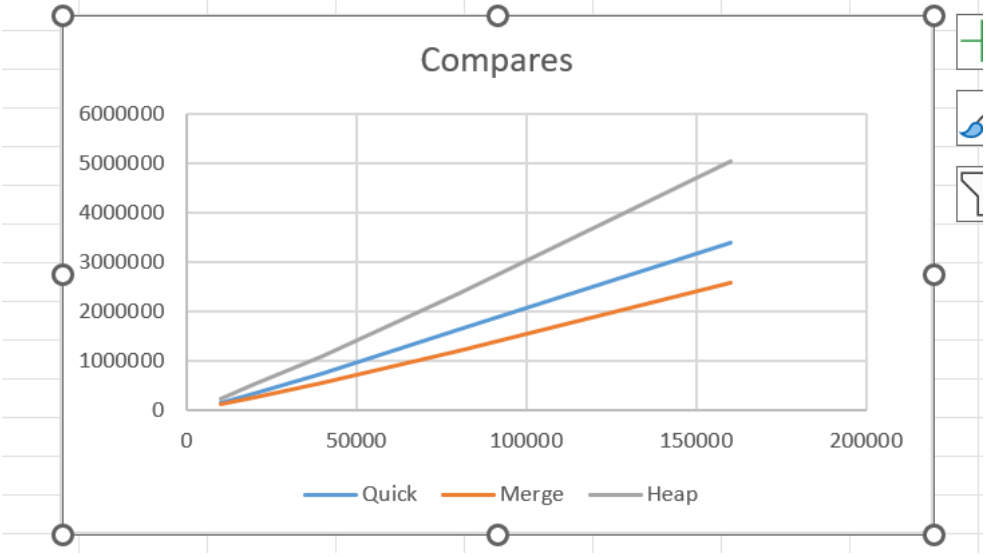
	Quick	Merge	Heap
10000	0.487138	0.60206	0.477121
20000	0.826075	0.845098	0.60206
40000	1.173478	0.954243	0.954243
80000	1.612784	1.447158	1.255273
160000	1.755875	1.755875	1.633468



Graphical representation of compares v/s the array size

	Quick	Merge	Heap
10000	156003	120503	235348
20000	340993	260771	510799
40000	741825	561789	1101402
80000	1629360	1203246	2362735
160000	3400010	2567360	5045778



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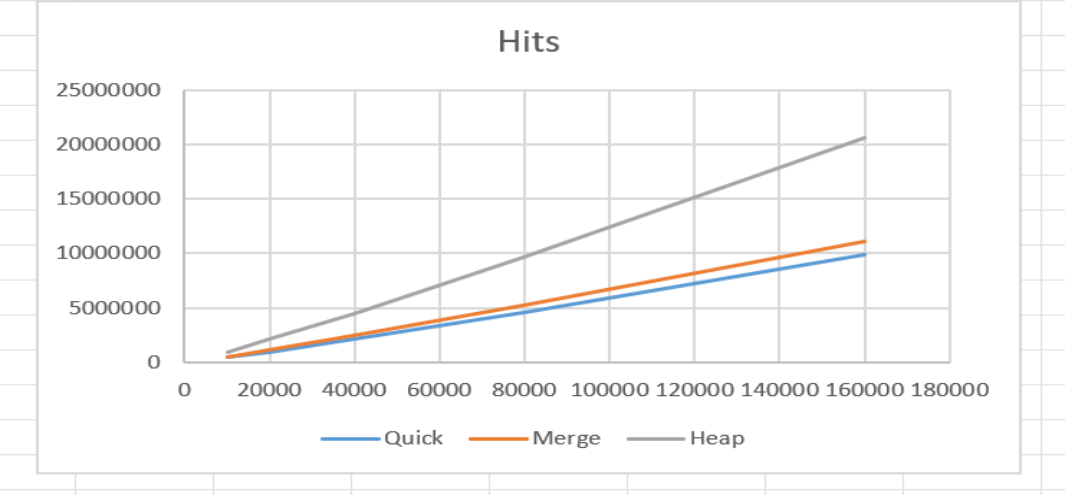
	Quick	Merge	Heap
10000	5.193133	5.080998	5.371711
20000	5.532745	5.416259	5.70825
40000	5.870301	5.749573	6.041946
80000	6.212017	6.080354	6.373415
160000	6.53148	6.409487	6.702928

Graphical representation of Hits v/s the array size

	Quick	Merge	Heap
10000	444358	534464	967508
20000	978463	1148928	2095262
40000	2152820	2457856	4510116
80000	4572201	5235712	9659890
160000	9889611	11111424	20600456



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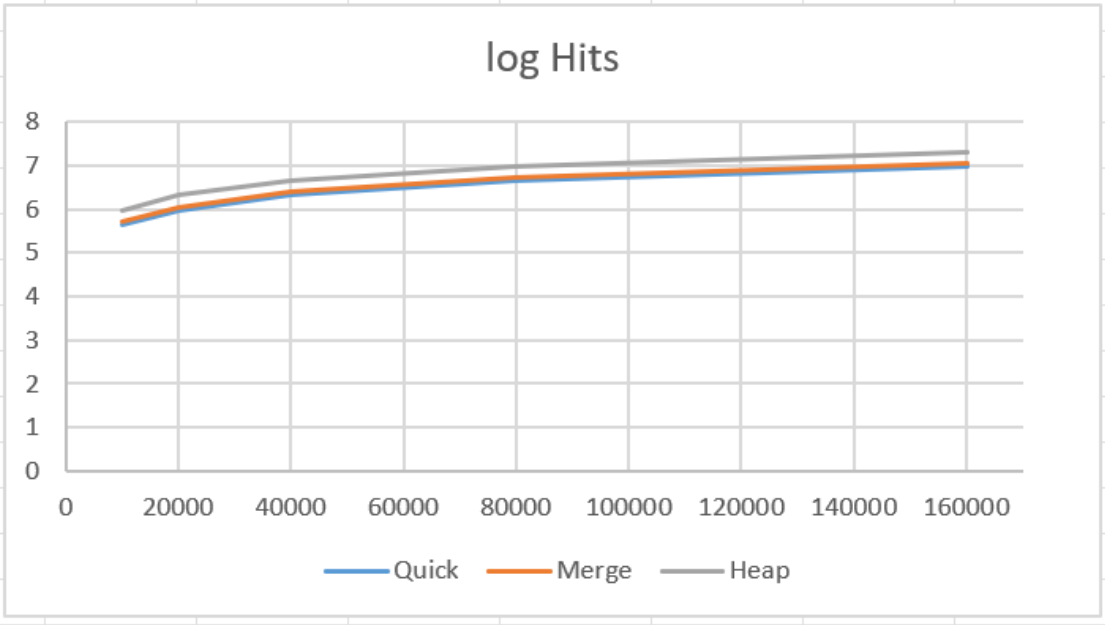
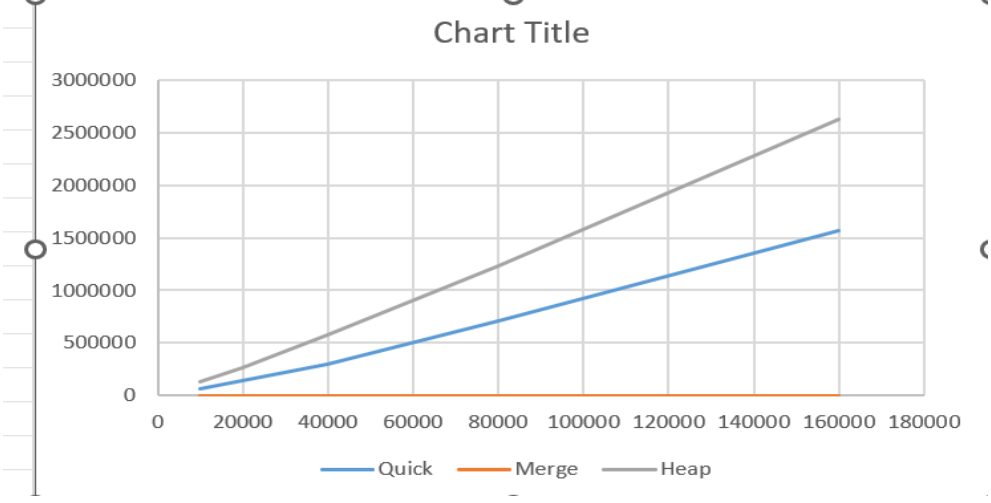
	Quick	Merge	Heap
10000	5.647733	5.727918	5.985655
20000	5.990544	6.060293	6.321238
40000	6.333008	6.390556	6.654188
80000	6.660125	6.718976	6.984972
160000	6.995179	7.04577	7.313877



Graphical representation of swaps v/s array size

	Quick	Merge	Heap
10000	66218	0	124203
20000	141797	0	268416
40000	298827	0	576828
80000	710121	0	1233605
160000	1571296	0	2627225



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	Quick	Merge	Heap
10000	4.820976	#NUM!	5.094132
20000	5.151667	#NUM!	5.428808
40000	5.47542	#NUM!	5.761046
80000	5.851332	#NUM!	6.091176
160000	6.196258	#NUM!	6.419497