ESO207 Assignment 5

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Q1.1

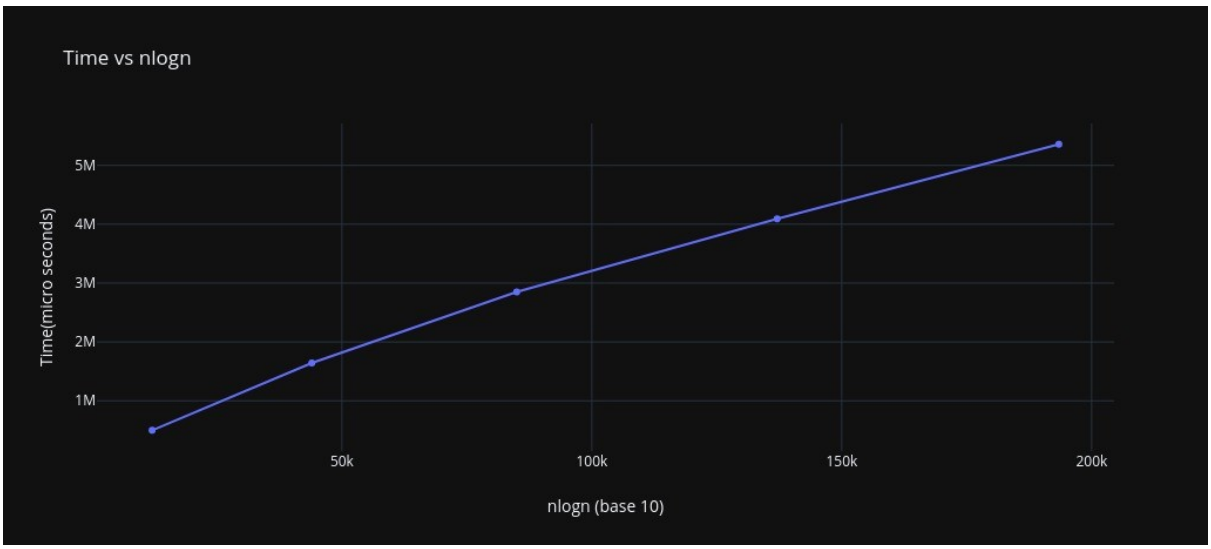
n	1.00E+02	1.00E+03	1.00E+04	1.00E+05	1.00E+06
Avg Comp QS	625.272	10618.272	159483.452	2202636.706	68442518.12
2n*(loge(n))	921.03	13815.51	184206.807	23.02585.09	27631021.11
Avg Comp MS	557.272	8726.272	120460.162	1536388.43	18676089.7
n*log2(n)	664.4	9966	132880	1661000	19930000

As the value of n increases, avg compariosns by Quick Sort remain higher as compared to Merge Sort. Avg comparisons of Quick Sort are of order 2n*log(n) and that of Merge Sort are of n*log2(n).

Q1.2

n	1*1e5	3*1e5	5*1e5	7*1e5	9*1e5
Avg Time QS	12020	43974	84960	137070	193436

Avg running itme of Quick Sort is linear with n*log(n)

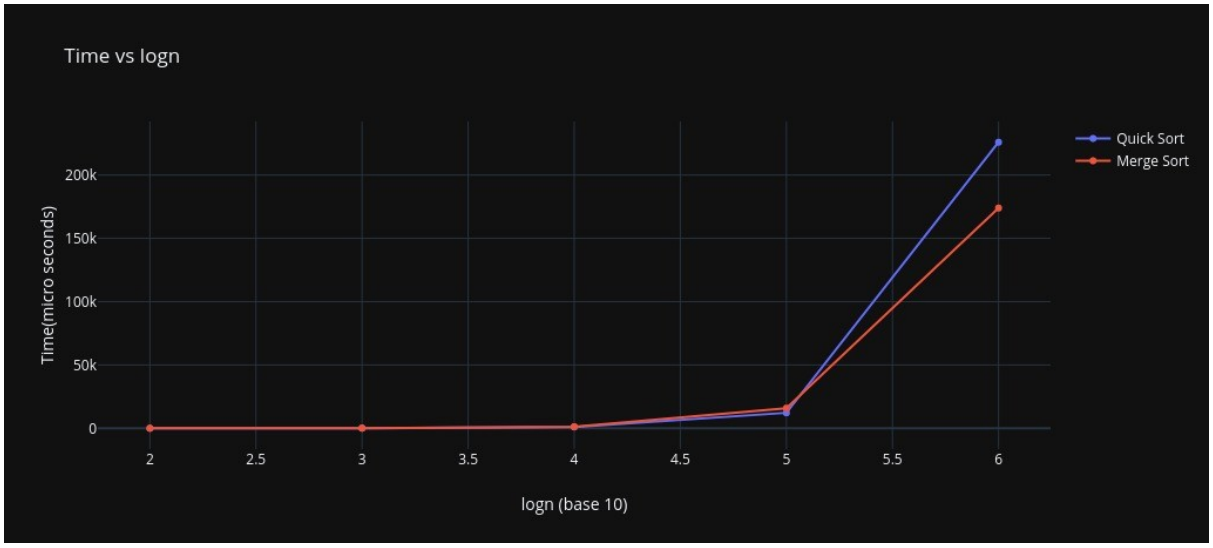


Q1.3

Q3	1.00E+02	1.00E+03	1.00E+04	1.00E+05	1.00E+06
QS Time	4	72	1034	12202	225906
MS Time	6	102	1242	15892	173928
MS outperforms QS	1	32	150	500	500

On average, avg running time of Quick Sort is less than Merge Sort. It is approx. 25% faster than Merge Sort till n = 1E5.

Till n = 1E4, merge sort outperforms quicksort less than 30% of the total cased (500). After 1E4, merge sort almost always outperforms quick sort.



Q2

Q5	1.00E+02	1.00E+03	1.00E+04	1.00E+05	1.00E+06
Avg time of QS	4	72	1034	12202	225906
5%	0	0	0	0	0
10%	0	0	0	15	0
20%	0	0	0	1	0
30%	0	0	0	0	0
50%	0	0	22	0	0
100%	3	37	0	0	0

As the value of m increases, the deviation of run time of quick sort is less than 5% of the avg run time over 500 cases.