

Machine Configuration:

I used ideone online judge for time handling. It was troublesome in codeblocks.

[ideone online compiler](#) .

Complexity analysis:

1. Merge Sort:

Let us consider, the running time of Merge-Sort is $T(n)$.

So,

$T(n) = O(1)$ when $n \leq 1$

Otherwise,

$T(n) = 2 * T(n/2) + b * n$, where b is a constant

Therefore, using this recurrence relation,

Base case, $T(n) = b$, case occurs when $2^i = n$

So, $i = \log n$

$T(n) = b * n + b * n * \log n$

Thus, $T(n) = O(n * \log n)$

For merge sort the ascending, descending and random order cases are the same. The time complexity doesn't change according to the order of the array.

Space Complexity: $O(n)$

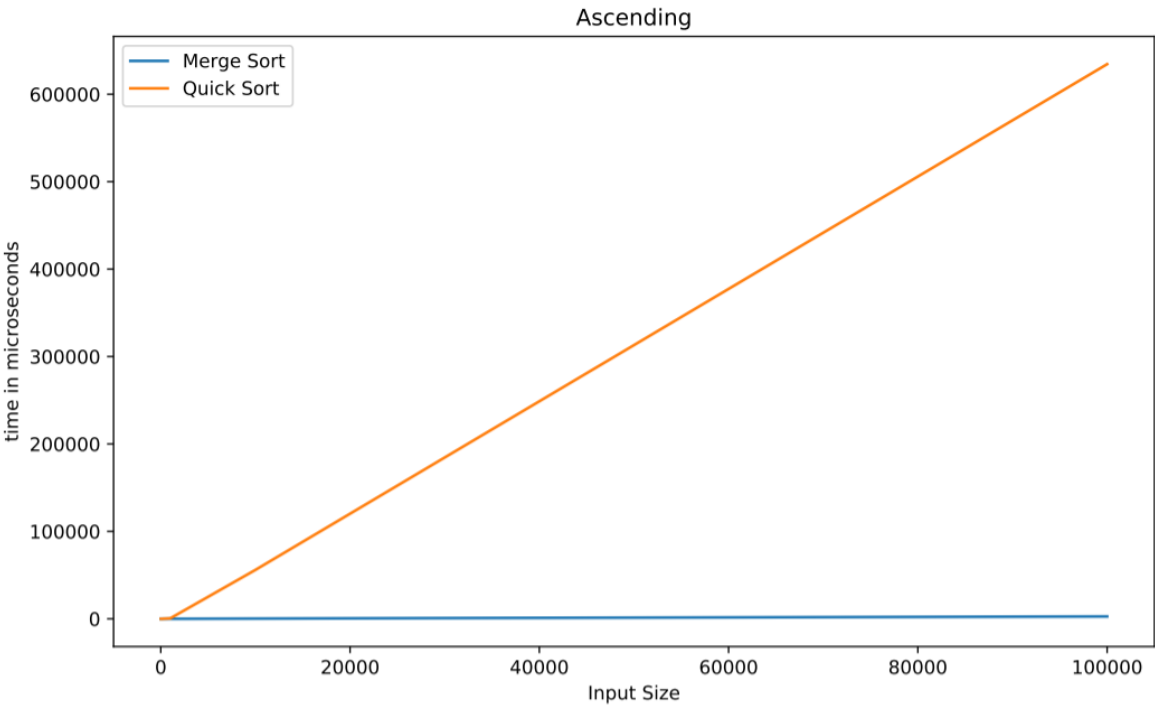
2. Quick Sort:

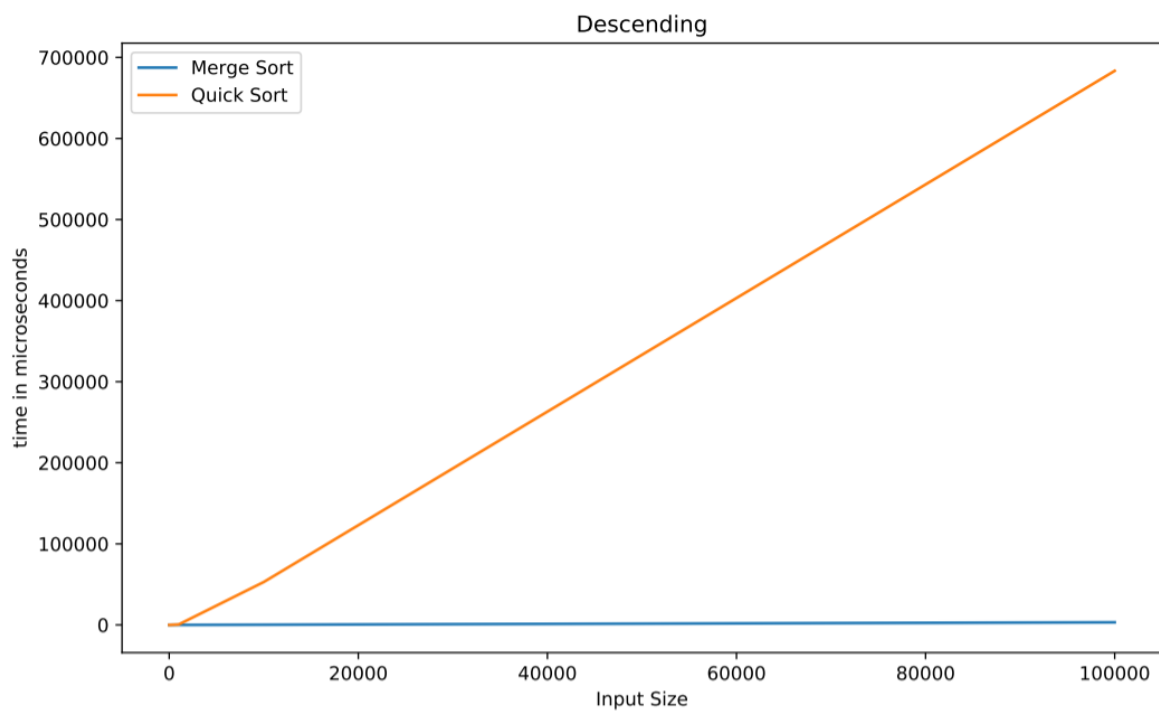
The worst case complexity of Quick-Sort algorithm is $O(n^2)$. However, in average cases we get the output in $O(n \log n)$ time.

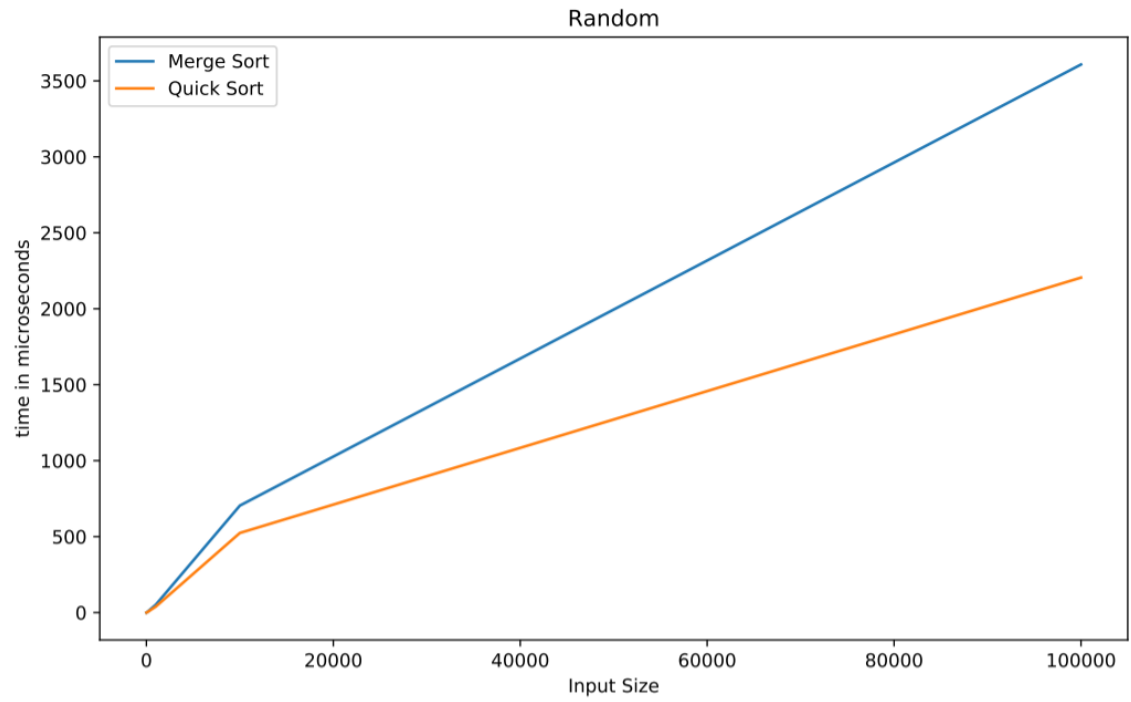
Space complexity: $O(n)$

Data Table:

	N=	10	100	1000	10000	100000	
Case	sort						
Ascending	Merge	0	1.2	21.8	268.8	3208	
	Quick	0	5.2	549.8	55959.6	624567	
Descending	Merge	0	1.2	21	252	2805	
	Quick	0	5.2	539	52922.2	684312	
Random	Merge	0	3.6	51.6	704.2	3608	
	Quick	0	2.6	39	524	2205	







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