Report on Merge sort an Quick sort time complexity

Machine Configuration:

Processor:Intel® Core™ i5-8250U CPU @ 1.60GHz to 1.80 GHz

RAM: 8 GB

System-type: 64 bit operating system

Table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Size of array**  **(n)** | Average case time  (microseconds) | | Best Case  (microseconds) | | Worst Case  (microseconds) | |
| **Merge Sort** | **Quick sort** | **Merge Sort** | **Quick sort** | **Merge Sort** | **Quick sort** |
| 10 | 0.1 | 0.1 | 0.2 | 0.3 | 0.2 | 0.1 |
| 100 | 10.2 | 6.6 | 6.3 | 44 | 12.2 | 34.4 |
| 1000 | 242 | 344 | 85.5 | 7234 | 174.5 | 12677.8 |
| 10000 | 3504 | 22486 | 1114 | 89569 | 8793.5 | 707595 |

Complexity Analysis :

Average Case:

For the average case ,time complexity is O(nlogn) for merge sort but

Quick sort time complexity is O(nlogn) for small size of array but

generally it is O(n2).So sometimes for small array ,quick sort perform

well good . But for large size of array, merge sort is better than quick

sort.Besides ,quick sort is better than merge sort according to space

complexity.

Best Case:

In best case ,quick sort time complexity is O(n2) and O(nlogn) for

merge sort .In quick sort ,all element is less than pivot value as array

is in best case. So it takes more time than merge sort. In merge ,time

need less because array is in accending order sorted.

Worst Case:

In worst case,time complexity for quick sort is O(n2) and O(nlog(n))

for merge sort . For worst case array,merge sort is better than quick

sort because array is reversed sorted.

Finally ,we can conclude that for all case for merge sort , time complexity is

O(nlogn) .But for quick sort , for average and best case complexity is O(nlogn) and for worst case it is O(n2).