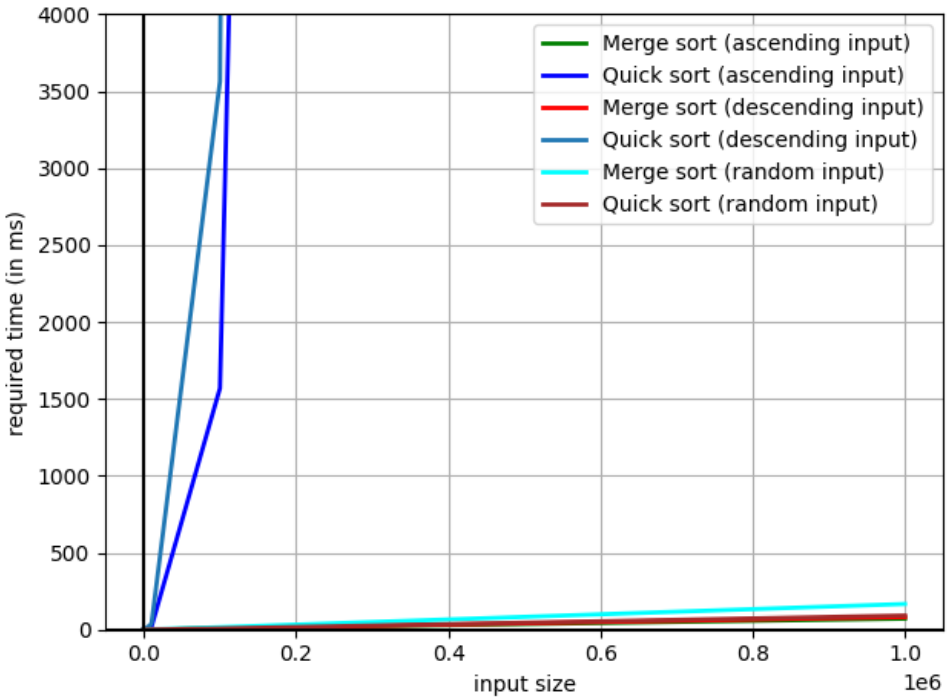
Offline-07 on Quick Sort & Merge Sort

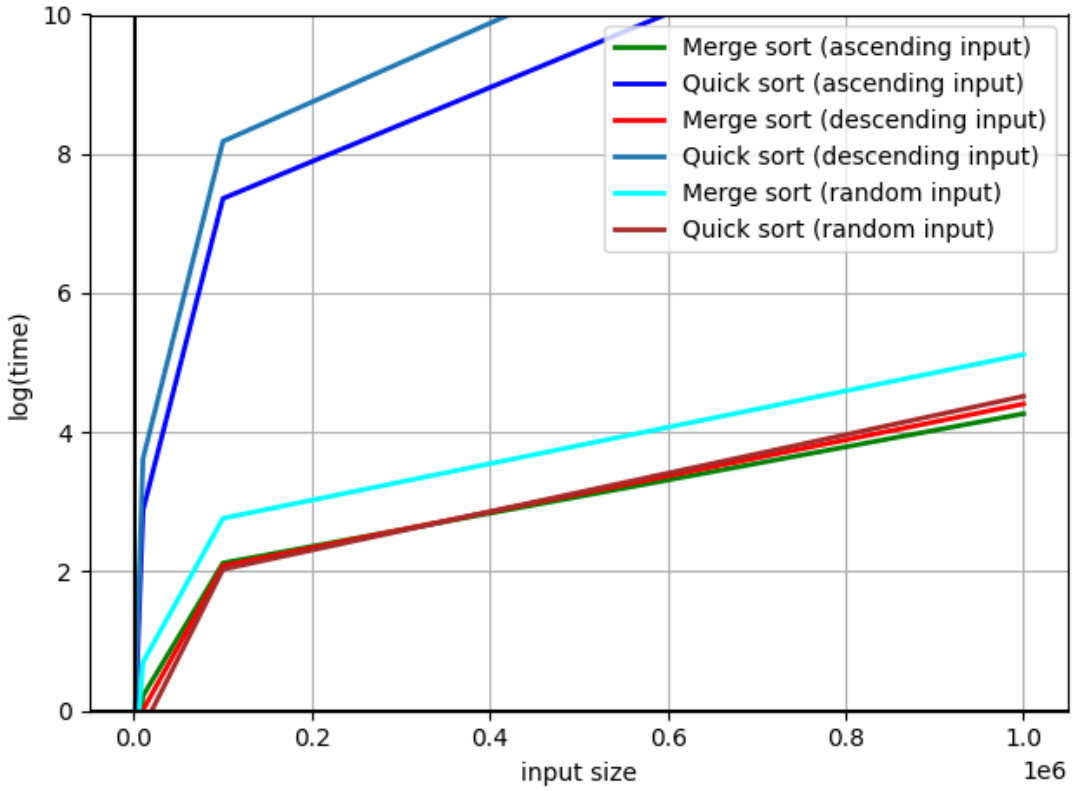
1. Table: *Average time required (in ms) by the sorting algorithm for sorting n integers of ascending, descending & random order*

Input Order	n (size) / Algorithm	10	100	1000	10000	10^5	10^6
Ascending	**Merge Sort**	0.134	0.16	0.4	1.24	8.36	71.33
	Quick Sort	0.004	0.08	0.79	17.77	1569.84	186345
Descending	**Merge Sort**	0.12	0.14	0.27	1.01	8.02	82.11
	Quick Sort	0.004	0.06	0.89	37.28	3564.82	577669
Random	**Merge Sort**	0.13	0.18	0.45	2.01	15.88	166.89
	Quick Sort	0.003	0.02	0.14	0.78	7.63	91.66

2. Graph



Graph 2.1: Required time vs input size



Graph 2.2: log(time) vs input size

3. Complexity Analysis

Merge Sort:

Best case/Worst case/Average case: $\boldsymbol{\theta(nlogn)}$

Quick Sort:

Best case: $\boldsymbol{O(nlogn)}$

Worst case: $\boldsymbol{O(n^2)}$

Average case: $\boldsymbol{O(nlogn)}$

4. Machine Configuration

Processor: Intel® Core ™ i-5 8265U CPU @1.60 GHz – 3.90 GHz

Installed memory (RAM): 16.0 GM (15.8 GB usable)

System type: 64-bit operating system, x64-based processor

Operating system: Windows 10 Home