Kathmandu University

Department of Computer Science and Engineering

Dhulikhel, Kavre

Lab report -2

Merge and Quick Sorting

[COMP 314]

<u>Submitted by:</u>

Soniya Sharma

Group: CE(III/II)

Roll no.: 47

<u>Submitted to:</u>

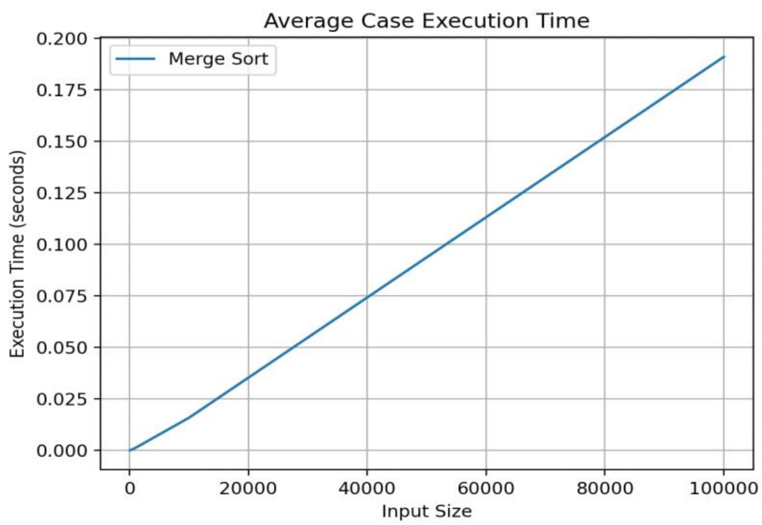
Dr. Rajani Chulyadyo

Department of Computer Science and Engineering

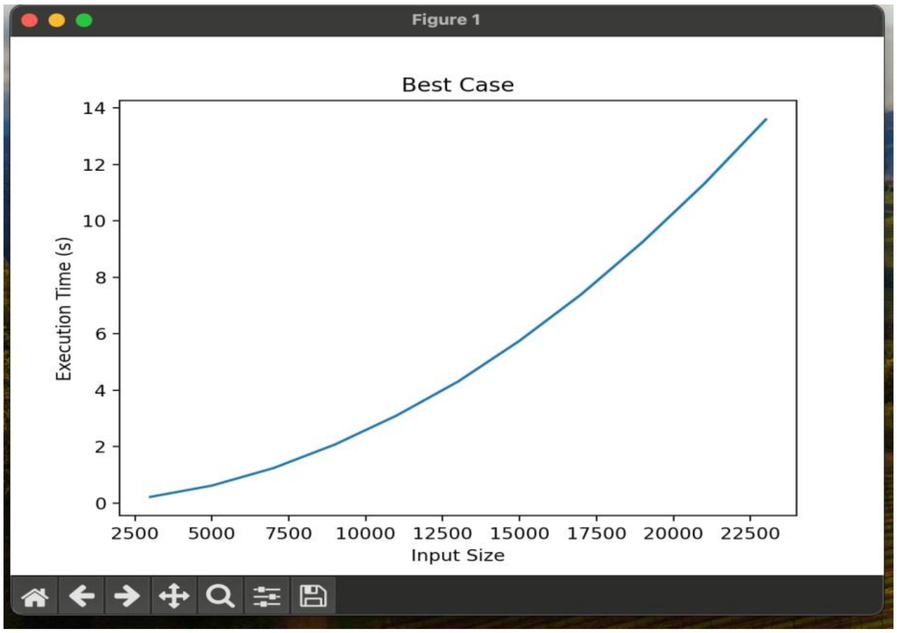
<u>Submission Date:</u>

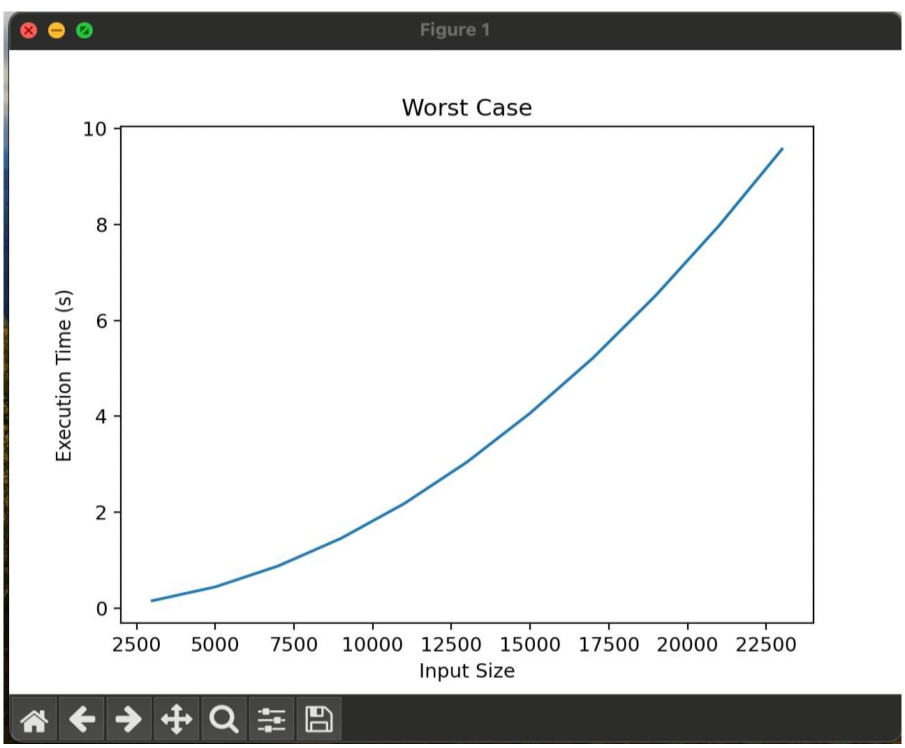
2024/05/30

Merge Sort graph for best, average and worst case :



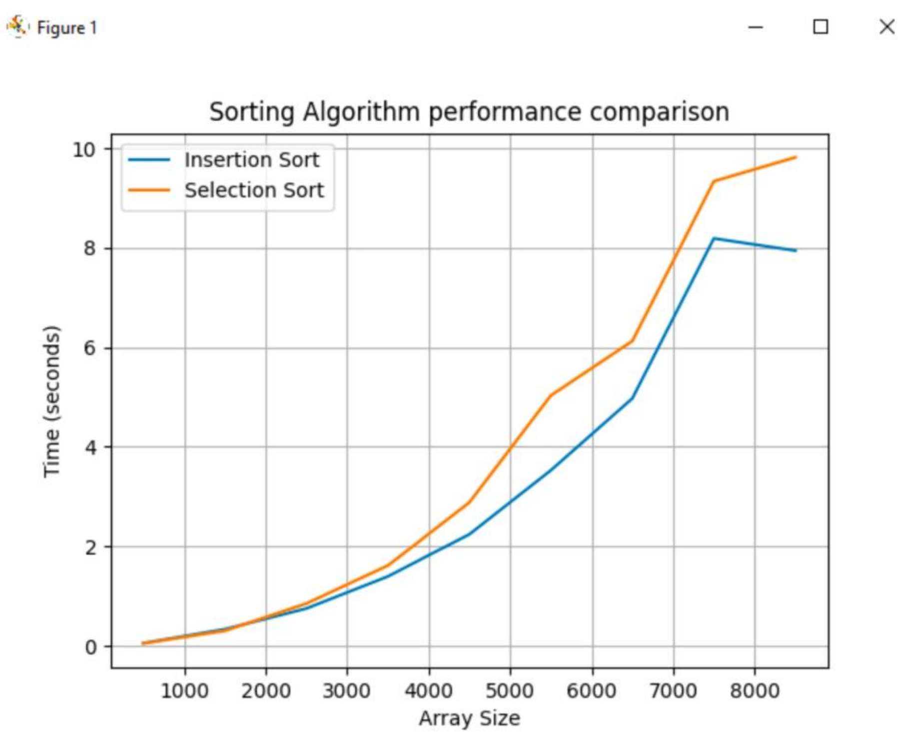
Quick Sort graph for best and worst case :





Merge Sort Vs Quick Sort vs Lab1:

Comparison with result from Lab1:



In this lab, we implemented and compared two essential sorting algorithms: Quicksort and Merge Sort. Merge Sort, with a consistent time complexity of O(nlogn), splits arrays into halves, recursively sorts, and merges them, providing stable performance regardless of input size. Quicksort, also averaging O(nlogn), partitions arrays around a pivot but can degrade to O(n^2) in worst-case scenarios. We tested both algorithms on random inputs of varying sizes, measuring execution times to analyze best and worst cases. The results, plotted on a graph, showed Merge Sort's stable performance and Quicksort's faster average performance but potential for poor worst-case efficiency. Compared to Insertion Sort and Selection Sort from Lab 1, both of which have $O(n^2)$ time complexities, Quicksort and Merge Sort exhibited significantly superior efficiency. Overall, Quicksort's average efficiency makes it preferred for many applications, while Merge Sort is reliable for ensuring consistent worst-case performance.

	Best case	**Worst case**	**Average case**
Insertion sort	O(n)	O(n^2)	O(n^2)
Selection sort	O(n^2)	O(n^2)	O(n^2)
Merge sort	O(nlogn)	O(nlogn)	O(nlogn)
Quick sort	O(nlogn)	O(n^2)	O(nlogn)

Conclusion :

Quicksort and Merge Sort, both with O(nlogn) average complexities, are significantly more efficient for large datasets compared to Insertion Sort and Selection Sort O(n^2). While Quicksort is faster on average, Merge Sort guarantees better performance in the worst case.