Name: Ziad Sherif Muhammed *BN:27* *Sec:1*

Design and Analysis of Algorithms

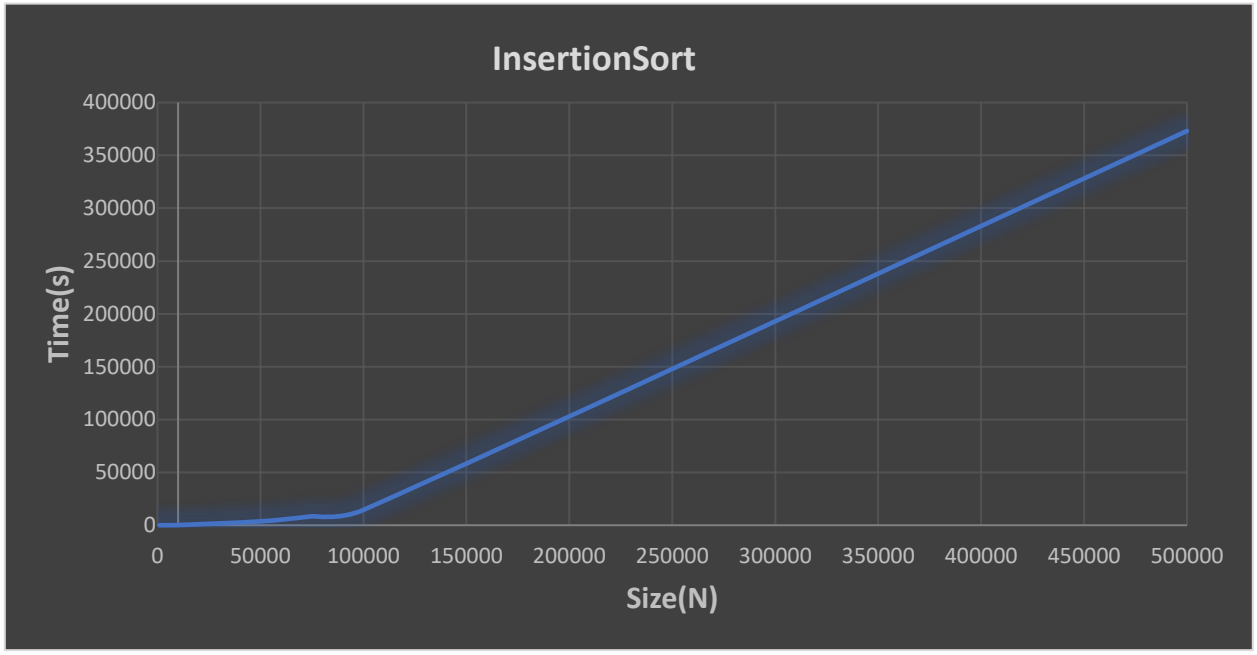
Assignment #2

1-Selection Sort

Selection sort is an in-place comparison sorting algorithm. It has an O (n2) time complexity, which makes it inefficient on large lists, and generally performs worse than the similar insertion sort.

2-Insetions Sort

Insertion sort is a simple sorting algorithm that works like the way you sort playing cards in your hands. The array is virtually split into a sorted and an unsorted part. Values from the unsorted part are picked and placed at the correct position in the sorted part

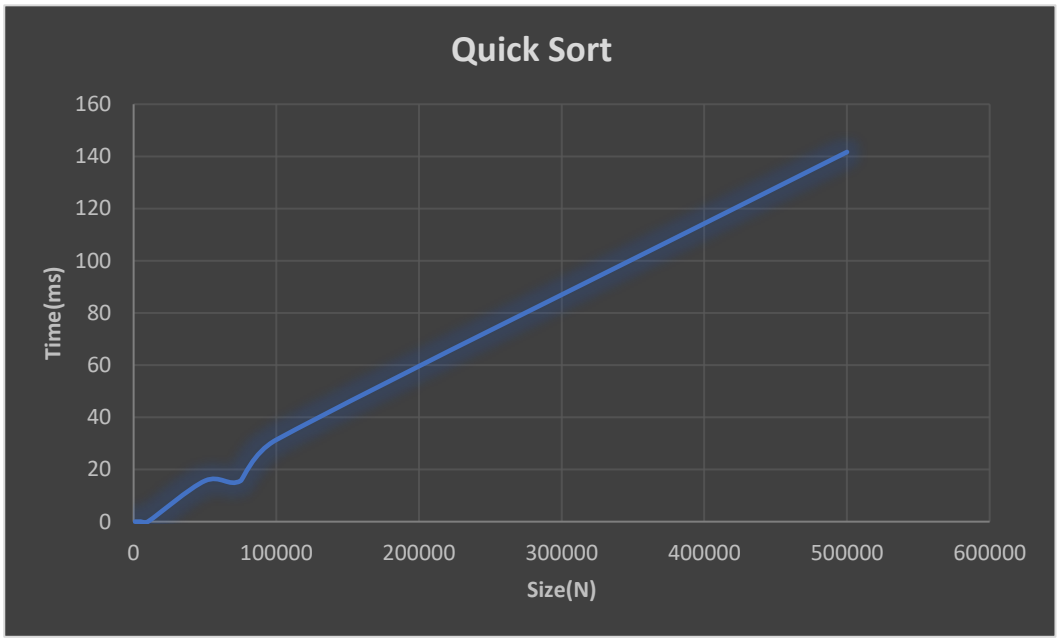


3-Merge Sort

Merge sort is a divide-and-conquer algorithm based on the idea of breaking down a list into several sub-lists until each sub-list consists of a single element and merging those sub-lists in a manner that results into a sorted list.

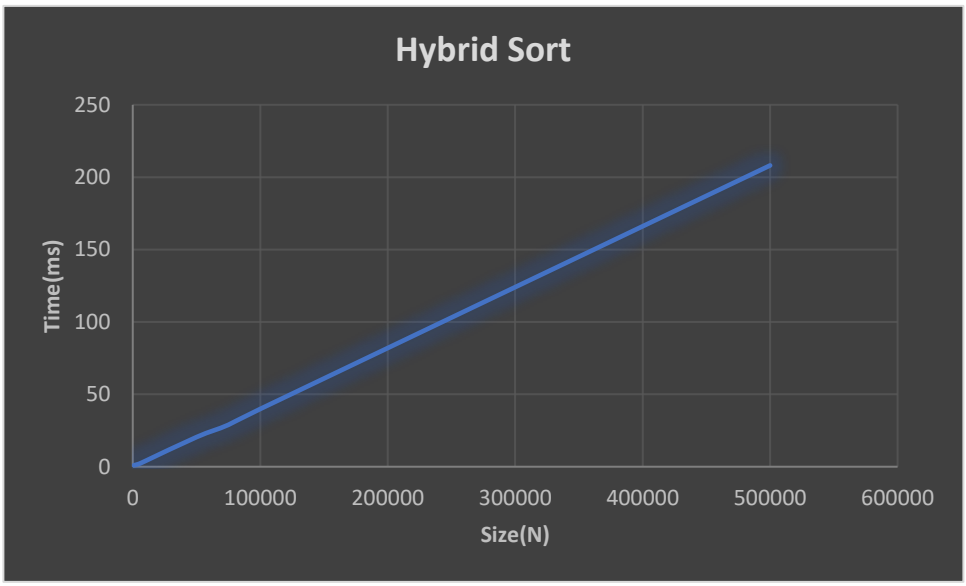
4-Qucik Sort

Like Merge Sort, Quicksort is a Divide and Conquer algorithm. It picks an element as pivot and partitions the given array around the picked pivot. There are many different versions of quicksort that pick pivot in different ways (In this implementation using randomized pivot which gives better complexity).



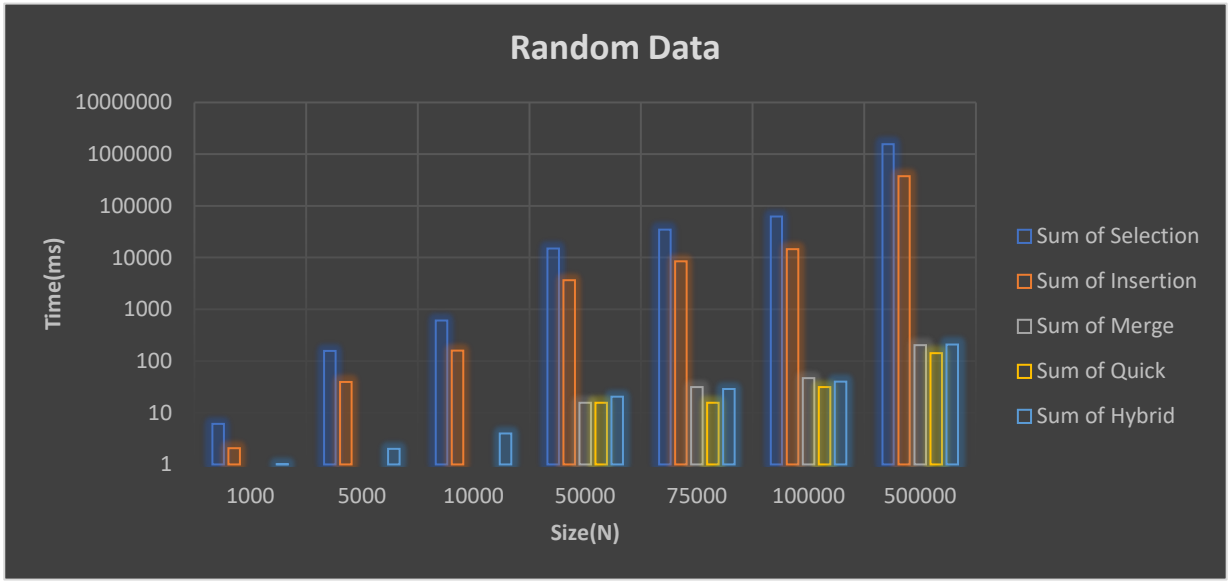
5-Hybrid Sort

it’s a composite sort, which contains two different sorting (Quick and insertion sort). It’s used insertion sort when size of data is small while if too large, used quick sort till reach the partitioning`s size is small, so it used insertion sort. This sorting nearly O(NlogN).



Random data

	1000	5000	10000	50000	75000	100000	500000
Selection(ms)	6.064	155.901	609.599	14890.213	34892.993	62683.854	1559613.793
Insertion(ms)	2.064	39.35	158.318	3643.579	8455.052	14497.049	373071.383
Merge(ms)	0	0	0	15.659	31.278	46.866	203.144
Quick(ms)	0	0	0	15.653	15.67	31.37	141.689
Hybrid(ms)	1.014	1.994	3.996	20.455	28.923	39.893	208.101



Sorted data

	1000	5000	10000	50000	75000	100000	500000
Selection(ms)	2.991	66.821	271.346	7063.268	16181.471	26763.241	723321.788
Insertion(ms)	0	0	0	0	0.999	0	4.020
Merge(ms)	1.037	1.995	3.008	15.431	21.941	28.929	143.188
Quick(ms)	0	0.998	0.998	7.942	13.963	19.947	144.655
Hybrid(ms)	0.998	1.995	3.988	18.950	27.971	40.939	222.126