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CSC22000-D

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Sort Lists Report

Sorts the elements in the list, altering their position within the container. This comparison shall produce a strict weak ordering of the elements (i.e., a consistent transitive comparison, without considering its reflexiveness). The resulting order of equivalent elements is stable: i.e., equivalent elements preserve the relative order they had before the call. The entire operation does not involve the construction, destruction or copy of any element object. Elements are moved within the container.

I will going to used five algorithm sorts in my programming. There are Insertion Sort, Merge Sort, Heap Sort, Quick Sort V1(pick the pivot from beginning to the end) and Quick Sort V2(pick the pivot randomly).

General Time & Space Complexity

Algorithm	Time Complexity			Space Complexity
	Best Case	Average Case	Worst Case	Worst Case
Insertion Sort	O(n)	O(n^2)	O(n^2)	O(1)
Merge Sort	O(n log(n))	O(n log(n))	O(n log(n))	O(n)
Heap Sort	O(n log(n))	O(n log(n))	O(n log(n))	O(1)
Quick Sort	O(n log(n))	O(n log(n))	O(n^2)	O(log(n))

Exactly Running Time Complexity

Randomly Generated Array Size	Insertion Sort	Merge Sort	Heap Sort	Quicksort V1(Pivot: From beginning to the end)	Quicksort V2(Pivot:Random)
10	0.000259s	0.000347s	0.00366s	0.000394s	0.000407s
100	0.000305s	0.000405s	0.000468s	0.000607s	0.000681s
1000	0.003284s	0.003976s	0.004869s	0.005871s	0.006558s
10000	0.133113s	0.139313s	0.146771s	0.155815s	0.165055s
100000	12.2284s	12.3011s	12.3841s	12.4779s	12.5607s

In my code, I would like to use "double(clock()-starttime)/CLOCKS_PER_SEC" to calculate the running time complexity. Absolutely, there is need to contain " #include <time.h>". There will be some small difference of time when you run the code each time.

In the code, "rand()%max" will produce the random numbers in the range of maximum size of array. For example, if you input the 100 as max, the random numbers will never exceed the 100.

The program prefer to let user input the size of array first, after the computer access this order, that will automatically show the random numbers with five algorithm sorts and running time of each method.