CSE373

REPORT

LAB 1: SORTING

Class: 15ECE2

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**Problem 1:**

Create random array integer of 30000 elements:

|  |
| --- |
| #define MY\_ARRAY\_LENGTH 30000  void give\_random\_array(int \*arr)  {  srand(time(NULL));  for (int i = 0; i < MY\_ARRAY\_LENGTH; ++i)  arr[i] = i+1;  for (int i = 1; i < MY\_ARRAY\_LENGTH; ++i)  {  int num = rand() % i + 1;  swap(arr[i],arr[num]);  }  swap(arr[0],arr[rand() % MY\_ARRAY\_LENGTH + 1]);  } |

[](../Lab%20+%20Assignment/Sorting_using_chrono_clock.cpp)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Insertion sort | Selection sort | Bubble sort | Quick sort | Merge sort |
| Time 1 | 679 ms | 1034 ms | 4851 ms | 9 ms | 5 ms |
| Time 2 | 680 ms | 1018 ms | 5082 ms | 8 ms | 5 ms |
| Time 3 | 669 ms | 1012 ms | 4890 ms | 11 ms | 5 ms |
| Time 4 | 670 ms | 1052 ms | 4893 ms | 10 ms | 4 ms |
| Time 5 | 673 ms | 1044 ms | 4905 ms | 8 ms | 5 ms |
| Average | **674 ms** | **1032 ms** | **4924 ms** | **9 ms** | **4 ms** |

**Problem 2:**

Sort function by C++ STL:

|  |
| --- |
| #include <iostream>  #include <bits/stdc++.h>  #define MY\_ARRAY\_LENGTH 30000  using namespace std;  int main()  {  int arr[MY\_ARRAY\_LENGTH];  int n = sizeof(arr)/sizeof(arr[0]);  give\_random\_array(arr);  sort(arr,arr+n);  return 0;  } |

Running time of function Sort by C++ STL with a 30000-elements-random-array:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Insertion sort | Selection sort | Bubble sort | Quick sort | Merge sort | Sort by STL |
| Time 1 | 679 ms | 1034 ms | 4851 ms | 9 ms | 5 ms | 0 ms |
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| Average | **674 ms** | **1032 ms** | **4924 ms** | **9 ms** | **4 ms** | **5 ms** |

Complexity & Fleibility compare:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Insertion sort | Selection sort | Bubble sort | Quick sort | Merge sort | Sort by STL |
| Complexity | n2 | n2 | n2 | n log n | n log n | n log n |
| Flexibility  (memory) | 1 | 1 | 1 | log *n* | n |  |