Algorithm Lab (Course Code: MC504)

Assignment - 7

Submission Deadline: within the class timing, (10/03/2023)
Total Marks: 30

Instructions:

- Proper indentation is mandatory.
- Program files must be compiled using linux gcc compiler.
- VERY IMPORTANT: You must add comments whenever necessary, to make the code understandable.
- Markings will be based on the correctness and soundness of the outputs. Marks will be deducted in case of plagiarism.
- Take inputs from users. Make necessary assumptions if required.
- ANSWER FILE: Source code: (file name) e.g. A7_Q1.c, A7_PP.c

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Q1 (BASED ON DIVIDE AND CONQUER TECHNIQUE).

Implement the following sorting algorithm complying with divide and conquer technique. First pick an element from the MIDDLE position of the array, this element is called a root(pivot) element. Then divide the unsorted array of elements in two arrays with values less than the root coming in the first sub array, while all elements with values greater than the root come in the second sub-array (equal values can go either way). This step is called the partition operation. Now recursively repeat until the sub-arrays are sorted. One sub-array contains elements with smaller values compared to root and separately to other sub-array of elements with greater values.Assume the input array to be of homogeneous numeric type which should be user-defined.

Also comment on the time and space complexity of the algorithm.

Practice Problem (PP)

Consider an organization where a log register for employees's arrival and departure times, is maintained. Find the time at which there are maximum employees in the company. Note that entries in the register are not in any order.

Input:

```
arr[] = {1, 2, 10, 5, 5}
dept[] = {4, 5, 12, 9, 12}
```

First employee in array arrives at 1 and leaves at 4,
the second employee arrives at 2 and leaves at 5, and so on.

Output: 5

Explanation:
There are a maximum of 3 employees at time 5.

Time	*Event Type*	*Total Number of Guests Present*	
1	Arrival	1	
2	Arrival	2	
4	Exit	1	
5	Arrival	2	
5	Arrival	3	// Max Employees
5	Exit	2	
9	Exit	1	
10	Arrival	2	
12	Exit	1	
12	Exit	0	