Design and Analysis of Algorithms

Lab - 5

Divide and Conquer

A divide and conquer algorithm is a strategy of solving a large problem by breaking the problem into smaller sub-problems, solving the sub-problems, and combining them to get the desired output.

A. Write a C/C++ program for the implementation of Quicksort .

Randomized Algorithm

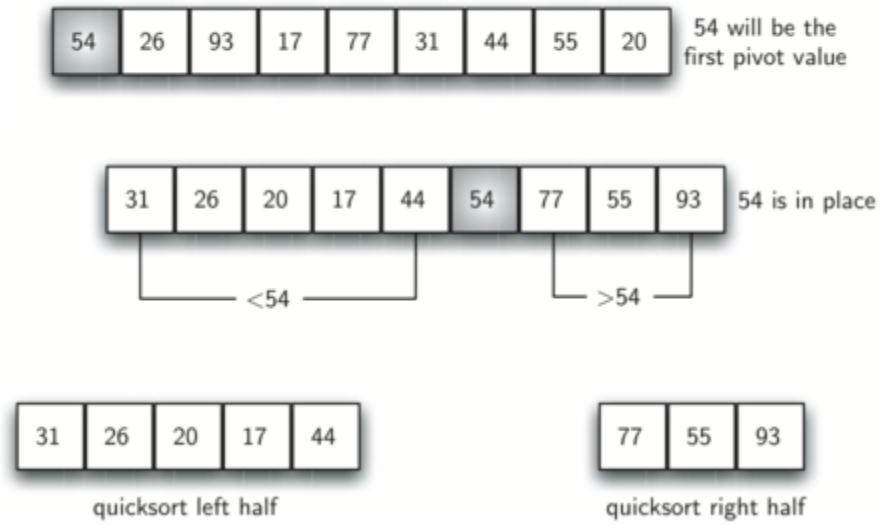
An algorithm that uses random numbers to decide what to do next anywhere in its logic is called Randomized Algorithm.

B. Write a C/C++ program for the implementation of randomized quicksort (use the random number to pick the pivot element.

Do the run time analysis and time complexity analysis with the different values of input size. Maintain the tabular data (n, execution time) and plot it graphically using data plotting tools.

Suggestion:

Quicksort algorithm uses divide and conquer approach to sort the elements of an array.
Divide by choosing an element of the given array, that is called the pivot element, generally it is the first, last or middle element of the array. Rearrange the elements of the array such that all elements of the array that are less than or equal to the pivot element are to be in the left of the pivot and all elements greater than the pivot are to its right. This procedure is known as partitioning.
For example:



Conquer by recursively sorting the subarrays using the same procedure of partitioning.

Randomized quicksort algorithm using the same quicksort algorithm except it randomizes the pivot selection. (i.e, choose the pivot element randomly at each step)