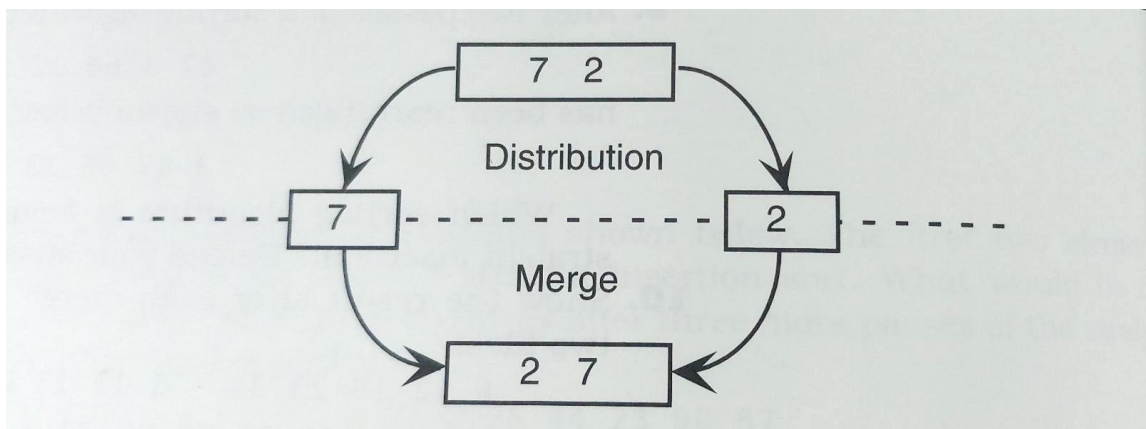


Program Assignment 3

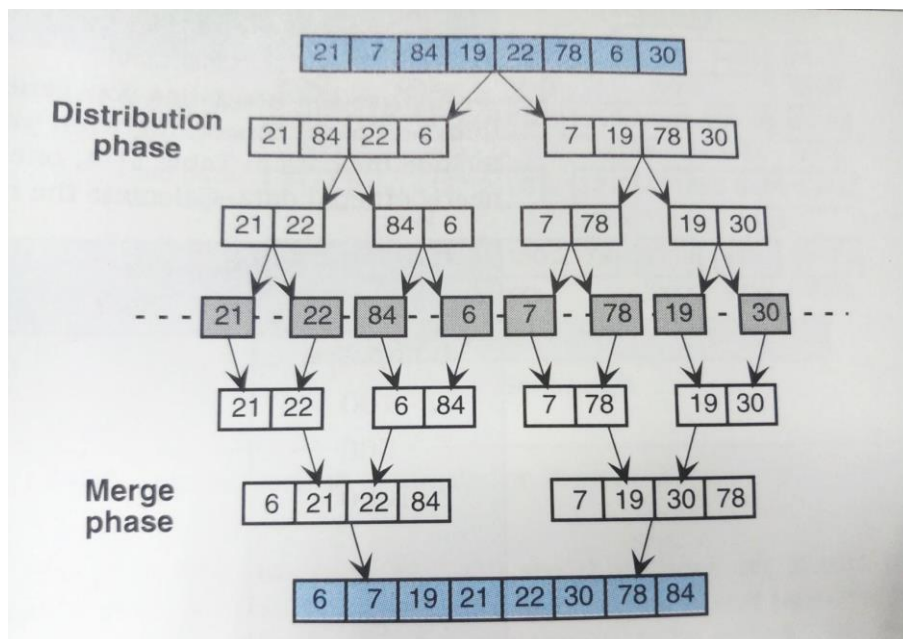
Data Structures and Object-oriented Programming

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1. Merge sorting is an example of a divide-and-conquer paradigm. In our discussions, we used merge only as an external sorting method. It can also be used for internal sorting. Let's see how it works. If we have a list of only two elements, we can simply divide it into two halves and then merge them. In other words, the merge sort is totally dependent on two processes, distribution and merge. This elementary process is shown in Figure below.



Given a list longer than two elements, we can sort by repeating distribution and merge processes. Because we don't know how many elements are in the input list when we begin, we can distribute the list originally by writing the first element to one output list, the second element to a second output list, and then continue writing alternatively to the first list and then the second list until the input list has been divided into two output lists. The output lists can then be sorted using a balanced two-way merge. This process is shown in the figure below. It could be called the *sortless sort* because it sorts without ever using a sort phase.



The Sortless Sort

Write a C++ program to sort an array of 500 random numbers using this approach. Print the data before and after the sort.