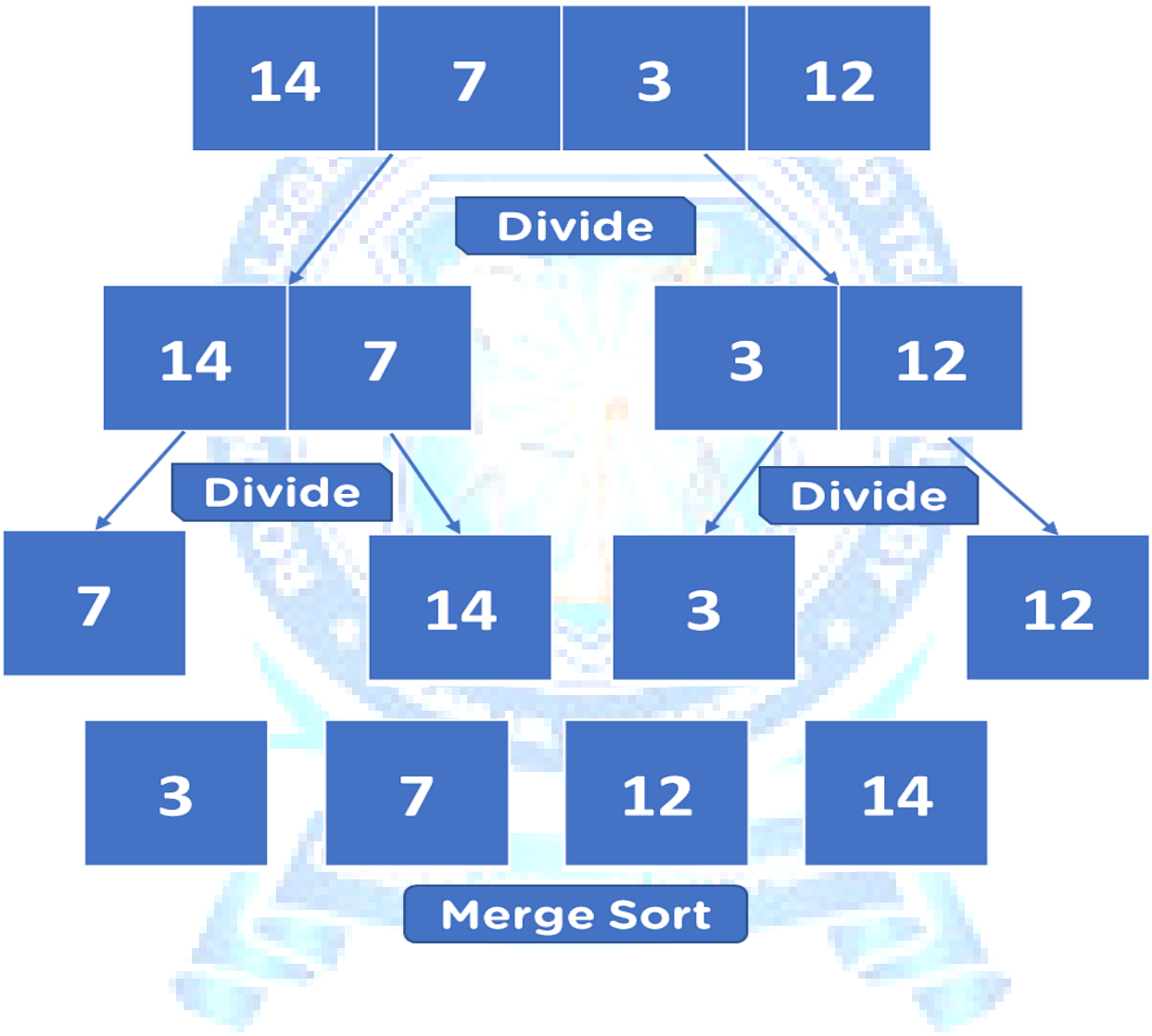
Merge Sort Algorithm

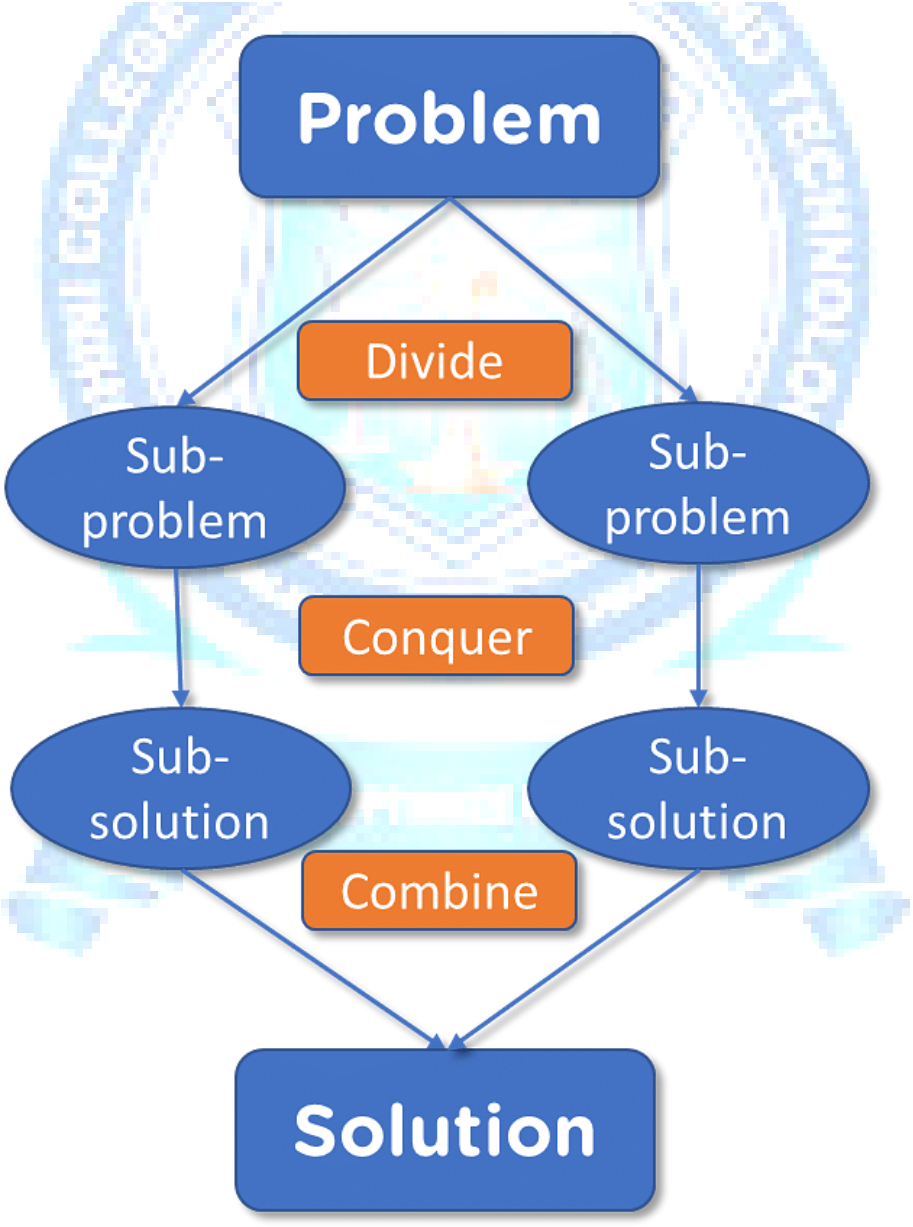
Merge sort is one of the most efficient sorting algorithms. It is based on the divide-and-conquer strategy. Merge sort continuously cuts down a list into multiple sublists until each has only one item, then merges those sublists into a sorted list.



What Is a Divide and Conquer Algorithm?

Divide-and-conquer recursively solves subproblems; each subproblem must be smaller than the original problem, and each must have a base case. A divide-and-conquer algorithm has three parts:

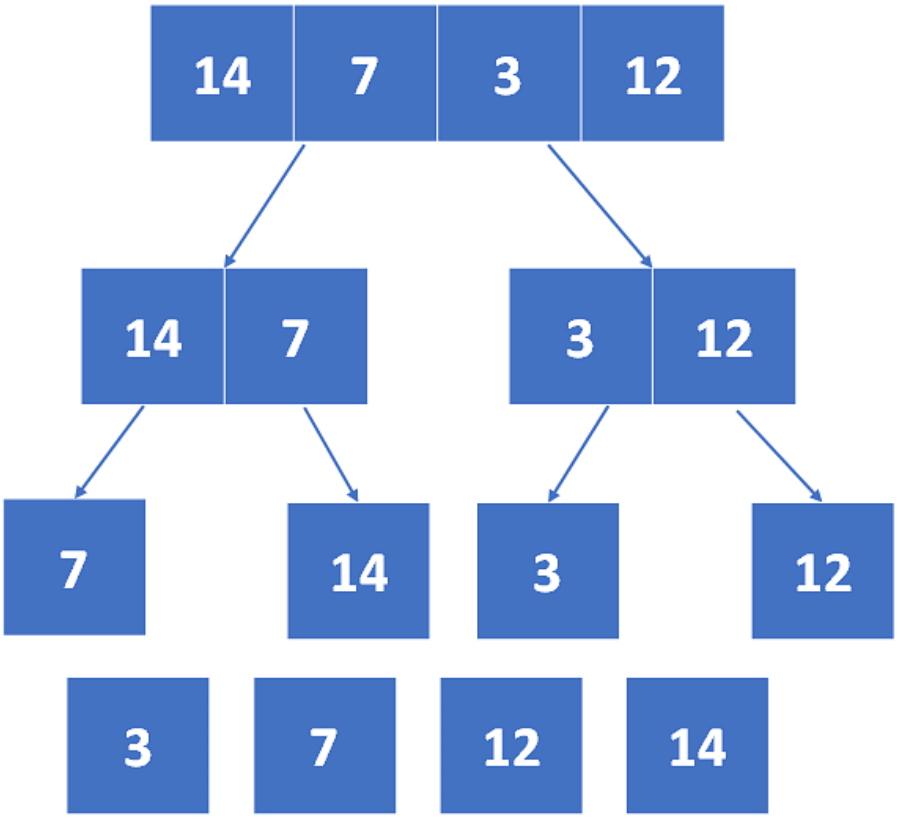
- Divide up the problem into a lot of smaller pieces of the same problem.
- Conquer the subproblems by recursively solving them. Solve the subproblems as base cases if they're small enough.
- To find the solutions to the original problem, combine the solutions of the subproblems.



How Does the Merge Sort Algorithm Work?

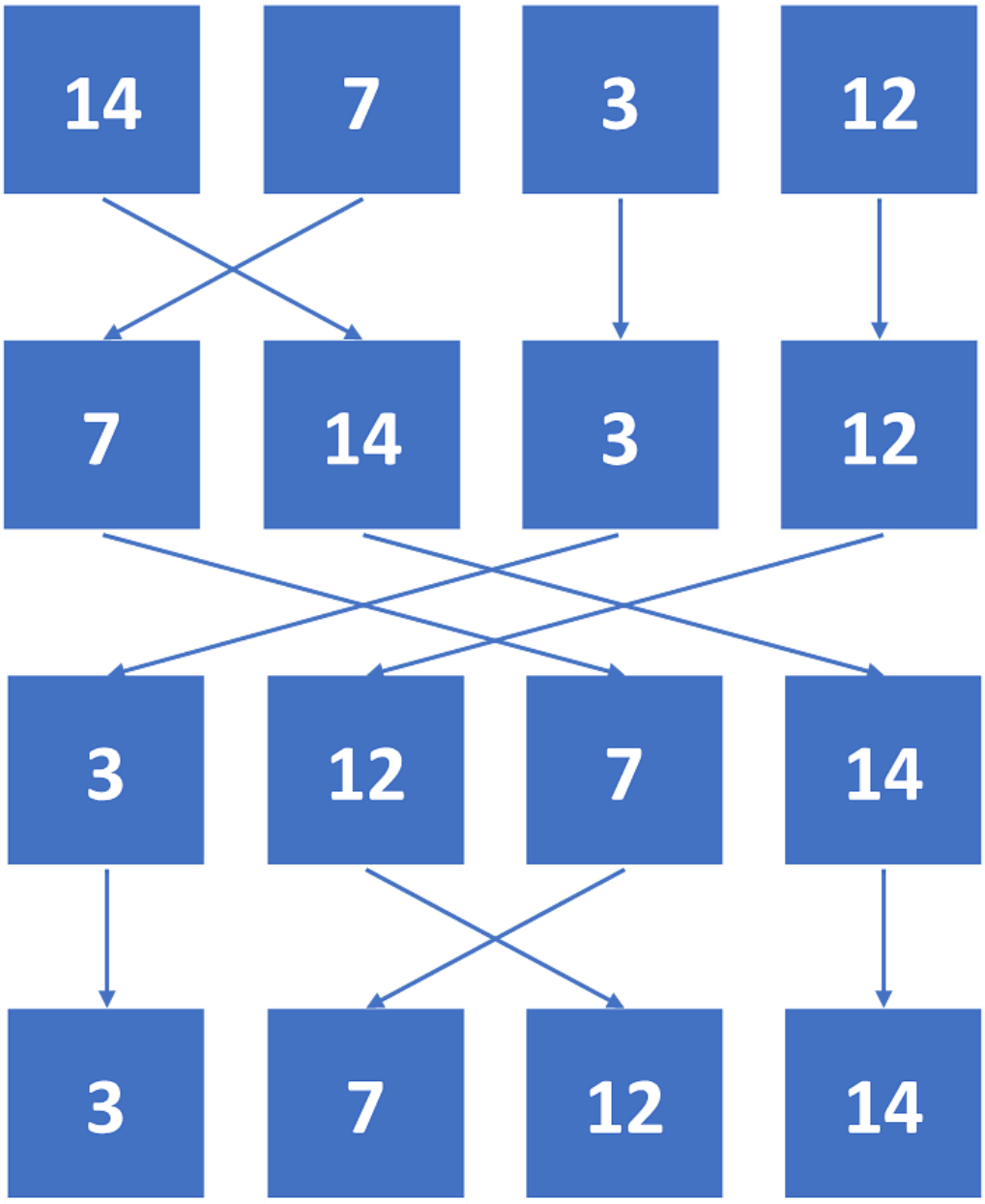
Merge sort algorithm can be executed in two ways:

- **Top-down Approach**



It starts at the top and works its way down, splitting the array in half, making a recursive call, and merging the results until it reaches the bottom of the array tree.

- **Bottom-Up Approach**



The iterative technique is used in the Bottom-Up merge sort approach. It starts with a "single-element" array and then merges two nearby items while also sorting them. The combined-sorted arrays are merged and sorted again until only one single unit of the sorted array remains.