

# Divide and Conquer

## Step 01 Sort Cards

Imagine you have a deck of cards that needs to be sorted in ascending order, by applying the divide and conquer approach to sort a deck of cards:

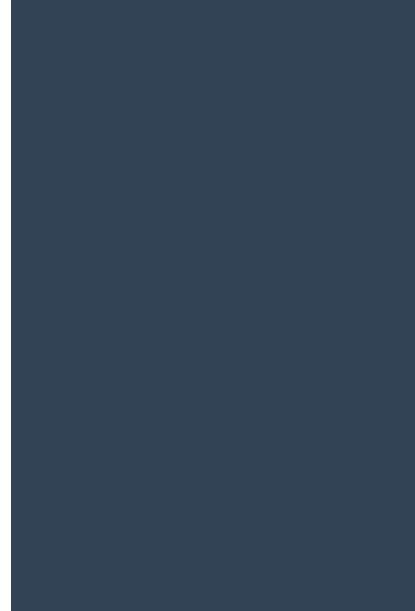
- Divide the deck into smaller subgroups.
- Conquer each subgroup by sorting them independently.
- Combine the sorted subgroups by merging them back together, and finally obtain a fully sorted deck.

## Step 02 What is a Divide and Conquer Algorithm

Divide and Conquer is a problem-solving technique that involves breaking a larger problem into subproblems, solving the subproblems independently, and combining the solutions of those subproblems to get the solution of the larger problem.

A divide-and-conquer is a technique of estimating a large problem by:

- Splitting the problem into sub-parts (divide)
- Resolving the related problems (conquer)
- Mixing them together will produce the final output (combine)



### NOTE

Some algorithms follow the divide-and-conquer paradigm like Quick Sort and Merge Sort.

## Step 03 How to Implement Divide-and-Conquer

```

01 import java.util.Arrays;
02
03 public class DivideConquer {
04     public static int findMax(int[] numbers){
05         if(numbers.length == 1){ //if the array contains only one element
06             return it
07             return numbers[0];
08         }
09         int mid = numbers.length/2; //divide the array into two
10         int[]left = Arrays.copyOfRange(numbers,0,mid);
11         int[]right = Arrays.copyOfRange(numbers,mid,numbers.length);
12         // conquer the array
13         int maxleft = findMax(left);
14         int maxright = findMax(right);
15         return Math.max(maxleft, maxright);
16     }
17     public static void main(String[] args) {
18         int[] numbers = {16,3,24,47,21,32}; // create the array
19         int max = findMax(numbers); // create variable
20         System.out.println("The maximum numbers is: " + max);
21     }
22 }
```

### CODE

we find the maximum number in an array using the divide-and-conquer algorithm

### OUTPUT

The maximum number is: 47