

1. 146. You are given an unsorted array 31,23,35,27,11,21,15,28. Write a program for Merge Sort and implement using any programming language of your choice.

Test Cases :

Input : N= 8, a[] = {31,23,35,27,11,21,15,28}

Output : 11,15,21,23,27,28,31,35

Code:

```
def merge_sort(arr):
    if len(arr) > 1:
        mid = len(arr) // 2
        left_half = arr[:mid]
        right_half = arr[mid:]

        merge_sort(left_half)
        merge_sort(right_half)

    i = j = k = 0

    while i < len(left_half) and j < len(right_half):
        if left_half[i] < right_half[j]:
            arr[k] = left_half[i]
            i += 1
        else:
            arr[k] = right_half[j]
            j += 1
        k += 1

    while i < len(left_half):
        arr[k] = left_half[i]
        i += 1
        k += 1

    while j < len(right_half):
        arr[k] = right_half[j]
        j += 1
        k += 1

def print_array(arr):
    for i in range(len(arr)):
        print(arr[i], end=" ")
    print()

arr = [31, 23, 35, 27, 11, 21, 15, 28]
print("Input array:")
print_array(arr)

merge_sort(arr)

print("Sorted array:")
print_array(arr)
output:
```

```
PS C:\Users\karth>
PS C:\Users\karth> & c:/Users/karth/AppData/Local/Programs/Python/Python312/python.exe c:/Users/karth/OneDrive/Documents/OriginLab/problem.py
Input array:
31 23 35 27 11 21 15 28
Sorted array:
11 15 21 23 27 28 31 35
PS C:\Users\karth> █
```

Time complexity: $f(n)=o(n^2)$