

Merge Sort

16/Apr/2023

Divide & Conquer: \downarrow

<https://upload.wikimedia.org/wikipedia/commons/c/cc/Merge-sort-example-300px.gif>

Q.) Merge two sorted array into a 3rd array in sorted order.

eg: A

1	3	5	7	9
---	---	---	---	---

 sorted

B

2	4	12
---	---	----

 sorted

} I/p

C

1	2	3	4	5	7	9	12
---	---	---	---	---	---	---	----

 } O/p

A

0	1	2	3	4
1	3	5	7	

$\text{len}(A) = 4$

B

\cancel{j}	\cancel{j}	\cancel{j}	\cancel{j}	i		
2	4	6	8	12	16	17

$\text{len}(B) = 7$

$\text{len}(C) = 4 + 7 = 11$

C

0	1	2	3	4	5	6	7	8	9	10	11
\cancel{k}	\cancel{k}	\cancel{k}	\cancel{k}	\cancel{k}	\cancel{k}	\cancel{k}	\cancel{k}	\cancel{k}	\cancel{k}	\cancel{k}	\cancel{k}
1	2	3	4	5	6	7	8	12	16	17	

```
static int[] mergeSortedArrays(int arr1[], int arr2[])  
{  
    int merged[] = new int[arr1.length + arr2.length];  
    int i, j, k;  
    i = j = k = 0;
```

```
    while(i < arr1.length && j < arr2.length)  
    {  
        if(arr1[i] < arr2[j])  
        {  
            merged[k] = arr1[i];  
            i++;  
            k++;  
        }  
        else  
        {  
            merged[k] = arr2[j];  
            j++;  
            k++;  
        }  
    }
```

```
    while(i < arr1.length)  
    {  
        merged[k] = arr1[i];  
        k++; i++;  
    }
```

```
    while(j < arr2.length)  
    {  
        merged[k] = arr2[j];  
        k++;  
        j++;  
    }
```

return merged;

}

← →

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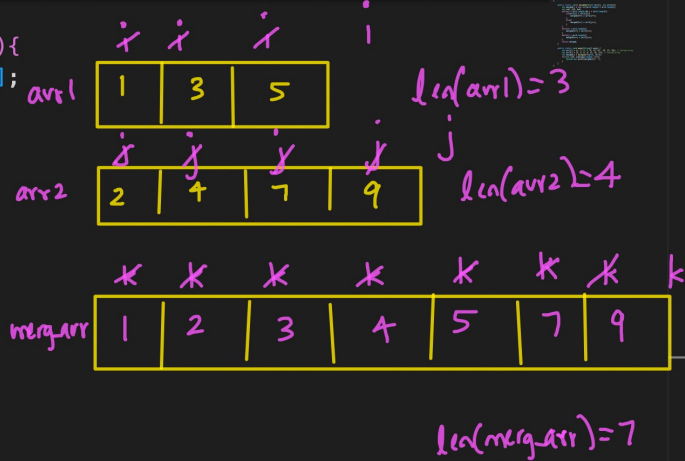
J Main.java x

J Main.java > Main > main(String[])

```

3
4 public static int[] mergeSort(int arr1[], int arr2[]){
5     int merged[] = new int[arr1.length + arr2.length];
6     int i=0, j=0, k=0;
7     while(i < arr1.length && j < arr2.length){
8         if(arr1[i] < arr2[j]){
9             merged[k++] = arr1[i++];
10        }
11        else{
12            merged[k++] = arr2[j++];
13        }
14    }
15    while(i < arr1.length){
16        merged[k++] = arr1[i++];
17    }
18    while(j < arr2.length){
19        merged[k++] = arr2[j++];
20    }
21    return merged;
22 }
23

```



Run | Debug

```

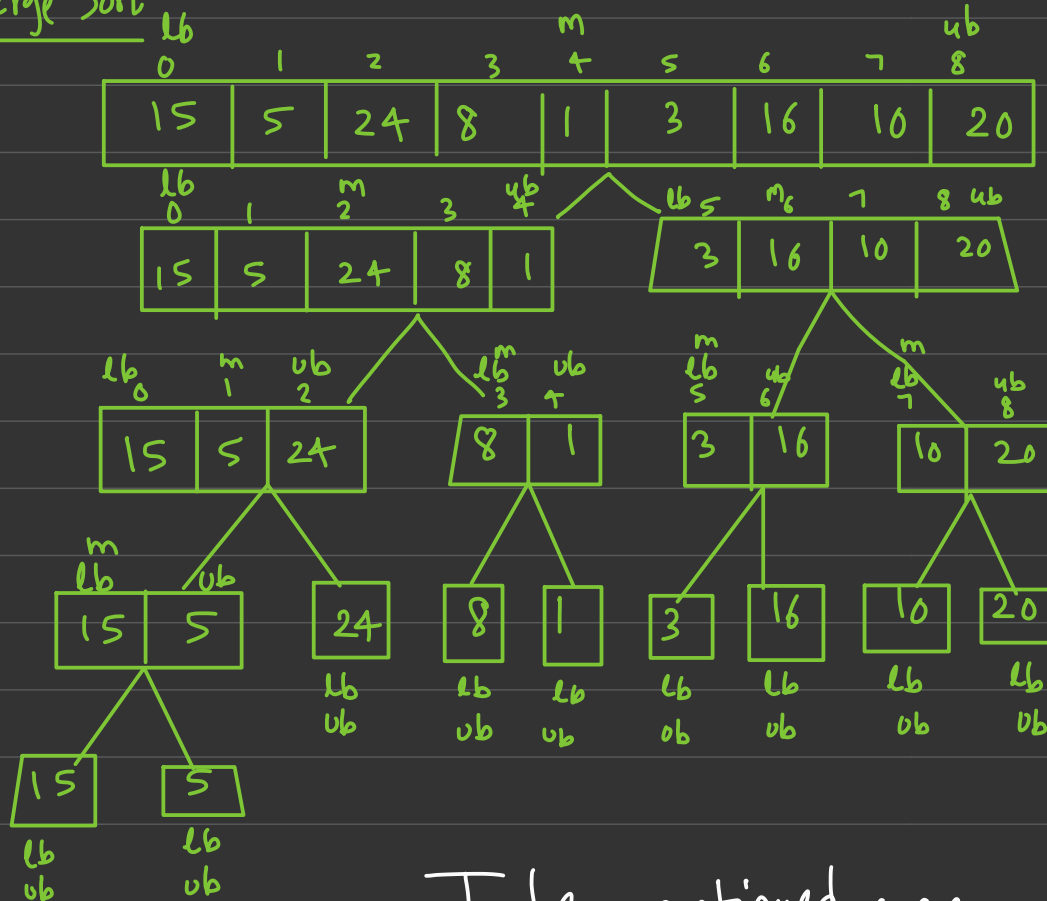
24 public static void main(String[] args) {
25     int arr1[] = {1, 3, 5, 7, 9, 13, 24, 25, 27, 29}; // Sorted array
26     int arr2[] = {2, 4, 6, 8, 12, 16, 17}; // Sorted array
27     int merged[] = mergeSort(arr1, arr2);
28     for(int i=0; i<merged.length; i++){

```

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Ln 26, Col 63 Tab Size: 4 UTF-8 LF {} Java

Merge Sort



ms(A, lb, ub)

{ if (lb < ub)

{ m = (lb + ub) / 2;

ms(A, lb, m);

ms(A, m + 1, ub);

merge(A, lb, m, ub);

}

To be continued . . .