Design & Analysis of Algorithm (Lab)

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B-33

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https://github.com/ananya438/DAALAB_ANANYA-590013832

Merge Sort.....

```
import java.util.*;
public class merge_sort {
    public static void merge(int arr[],int left,int mid,int right){
        int n1= (mid-left)+1;
        int n2=(right-mid);
        int L[]=new int[n1];
        int R[]=new int[n2];
        for(int i = 0;i<n1;i++)
        L[i]=arr[left+i];

        for(int j = 0;j<n2;j++)
        R[j]=arr[mid+1+j];
        int i=0;
        int j=0;
        int k = left;
        while(i<n1 && j<n2){
            if(L[i]<R[j]){
                arr[k]=L[i];
                i++;   }
            else{
                arr[k]=R[j];
                j++;   }
            k++;  }

        while(i<n1){
            arr[k]=L[i];
                i++;
                k++;
        }
        while(j<n2){
            arr[k]=R[j];
```

```
            j++;
            k++;
        }
    }
    public static void mergeSort(int []arr,int left,int right){
        if(left<right){
            int mid= left+(right-left)/2;

            mergeSort(arr,left,mid);
            mergeSort(arr,mid+1,right);

            merge(arr,left,mid,right);
        }
    }
    public static void main(String arg[]){
         Scanner sc=new Scanner(System.in);
        System.out.println("Enter size of array you want to input: ");
        int n= sc.nextInt();
        int arr[]=new int[n];
        System.out.println("Enter elements : ");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();  }
        System.out.println("Original" + Arrays.toString(arr));
        mergeSort(arr,0,n-1);
        System.out.println("Updated" + Arrays.toString(arr));
}}
```

```
PS C:\Users\nannu>  & 'C:\Program Files\Java\jdk-22\bin\java.exe' '-X
ge_sort'
Original[1, 2, 4, 66, 8, 3, 99]
Updated[1, 2, 3, 4, 8, 66, 99]
PS C:\Users\nannu>
```

TEST CASES

Test Case	User Input	Expected Output
1.	Size: 6 Elements: 12 11 13 5 6 7	Original: [12, 11, 13, 5, 6, 7] Sorted: [5, 6, 7, 11, 12, 13]
2.	Size: 7 Elements: 38 27 43 3 9 82 10	Original: [38, 27, 43, 3, 9, 82, 10] Sorted: [3, 9, 10, 27, 38, 43, 82]
3.	Size: 5 Elements: 1 2 3 4 5	Original: [1, 2, 3, 4, 5] Sorted: [1, 2, 3, 4, 5]
4.	Size: 5 Elements: 5 4 3 2 1	Original: [5, 4, 3, 2, 1] Sorted: [1, 2, 3, 4, 5]
5	Size: 5 Elements: 10 20 10 30 20	Original: [10, 20, 10, 30, 20] Sorted: [10, 10, 20, 20, 30]
6	Size: 4 Elements: 7 7 7 7	Original: [7, 7, 7, 7] Sorted: [7, 7, 7, 7]
7	Size: 8 Elements: 9 -3 5 2 6 8 -6 1	Original: [9, -3, 5, 2, 6, 8, -6, 1] Sorted: [-6, -3, 1, 2, 5, 6, 8, 9]
8	Size: 4 Elements: 100 90 80 70	Original: [100, 90, 80, 70] Sorted: [70, 80,90, 100]
9	Size: 1 Elements: 1	Original: [1] Sorted: [1]
10	Size: 0 Elements: -	Original: [] Sorted: []

SCREENSHOTS:

1.

```
PS C:\Users\nannu>  & 'C:\Program Files\Java\jdk-22\bin\java.exe
ge_sort'
Enter size of array you want to input:
6
Enter elements :
12
11
13
5
6
7
Original[12, 11, 13, 5, 6, 7]
Updated[5, 6, 7, 11, 12, 13]
```

2.

```
PS C:\Users\nannu>  & 'C:\Program Files\Java\jdk-22\bin\java.exe' '-
owCodeDetailsInExceptionMessages' '-cp' 'C:\Users\nannu\AppData\Loca
\vscodesws_97006\jdt_ws\jdt.ls-java-project\bin' 'merge_sort'
Enter size of array you want to input:
7
Enter elements :
38
27
43
3
9
82
10
Original[38, 27, 43, 3, 9, 82, 10]
Updated[3, 9, 10, 27, 38, 43, 82]
```

3.

```
PS C:\Users\nannu>  & 'C:\Program Files\Java\jdk-22\bin
owCodeDetailsInExceptionMessages' '-cp' 'C:\Users\nannu
\vscodesws_97006\jdt_ws\jdt.ls-java-project\bin' 'merge
Enter size of array you want to input:
5
Enter elements :
1
2
3
4
5
Original[1, 2, 3, 4, 5]
Updated[1, 2, 3, 4, 5]
```

4.

```
PS C:\Users\nannu>  & 'C:\Program Files\Java\jdk-22\bin\java.exe
owCodeDetailsInExceptionMessages' '-cp' 'C:\Users\nannu\AppData\
\vscodesws_97006\jdt_ws\jdt.ls-java-project\bin' 'merge_sort'
Enter size of array you want to input:
5
Enter elements :
5
4
3
2
1
Original[5, 4, 3, 2, 1]
Updated[1, 2, 3, 4, 5]
```

5.

```
PS C:\Users\nannu>  & 'C:\Program Files\Java\jdk
owCodeDetailsInExceptionMessages' '-cp' 'C:\User
\vscodesws_97006\jdt_ws\jdt.ls-java-project\bin'
Enter size of array you want to input:
5
Enter elements :
10
20
10
30
20
Original[10, 20, 10, 30, 20]
Updated[10, 10, 20, 20, 30]
```

6.

```
PS C:\Users\nannu> & 'C:\Program Files\Java\jdk-22\
owCodeDetailsInExceptionMessages' '-cp' 'C:\Users\na
\vscodesws_97006\jdt_ws\jdt.ls-java-project\bin' 'me
Enter size of array you want to input:
4
Enter elements :
7
7
7
7
Original[7, 7, 7, 7]
Updated[7, 7, 7, 7]
```

7.

```
\vscodesws_97006\jdt_ws\jdt.ls-java-project\bin' 'merg
Enter size of array you want to input:
8
Enter elements :
9
-3
5
2
6
8
-6
1
Original[9, -3, 5, 2, 6, 8, -6, 1]
Updated[-6, -3, 1, 2, 5, 6, 8, 9]
```

8.

```
\vscodesws_97006\jdt_ws\jdt.ls-java-project\b
Enter size of array you want to input:
4
Enter elements :
100
90
80
70
Original[100, 90, 80, 70]
Updated[70, 80, 90, 100]
```

9.

```
owCodeDetailsInExceptionMessages -cp C:
\vscodesws_97006\jdt_ws\jdt.ls-java-project
Enter size of array you want to input:
1
Enter elements :
1
Original[1]
Updated[1]
```

10.

```
owCodeDetailsInExceptionMessages
\vscodesws_97006\jdt_ws\jdt.ls-j
Enter size of array you want to
0
Enter elements :
Original[]
Updated[]
```