S.No: 4	Exp. Name: ***Merge Sort***	**Date:2025-08-25**

Aim:

Write a C program to perform Merge sort. Display the partial pass-wise sorting done.

Source Code:

mergeSortAlgo.c

```
#include <stdio.h>
#include <stdlib.h>

void print_subarray(int a[], int l, int r){
for (int i=l;i<=r; i++){
printf("%d",a[i]);
if(i<r)
printf(" ");
}
printf(" \n");
}

void merge(int a[], int l, int m, int r, int temp[]){
int i=l, j=m+1, k=l;
while(i<=m && j<= r){
if (a[i]<=a[j])
temp[k++]=a[i++];
else
temp[k++] = a[j++];
}
while(i<=m)
temp[k++] =a[i++];
while(j<=r)
temp[k++]=a[j++];
for(i=l;i<=r;i++)
a[i]=temp[i];
printf("Pass: ");
print_subarray(a,l,r);
}

void mergesort(int a[],int l, int r, int temp[]){
if(l>=r)
return;
int m=(l+r)/2;
mergesort(a,l,m,temp);
mergesort(a,m+1,r,temp);
merge(a,l,m,r,temp);
}

int main(){
int n;
printf("no of elements: ");
scanf("%d",&n);

int *a=(int *)malloc(n*sizeof(int));
int *temp=(int *)malloc(n*sizeof(int));
printf("elements: ");
for(int i=0;i<n;i++)
scanf("%d", &a[i]);

printf("Given array:\n");
for(int i=0;i<n;i++){
printf("%d",a[i]);
if(i<n-1)
printf(" ");
}
printf(" \n");

mergesort(a,0,n-1,temp);
printf("Sorted array:\n");
for(int i=0;i<n;i++){
printf("%d",a[i]);
if(i<n-1)
printf(" ");
}
printf(" \n");
free(a);
free(temp);
return 0;
}
```

Execution Results - All test cases have succeeded!

Test Case - 1

User Output

```
no of elements:  5
elements:  5 3 7 1 9
Given array:
5 3 7 1 9
Pass: 3 5
Pass: 3 5 7
Pass: 1 9
Pass: 1 3 5 7 9
Sorted array:
1 3 5 7 9
```

Test Case - 2

User Output

```
no of elements:  8
elements:  8 4 2 7 1 5 3 6
Given array:
8 4 2 7 1 5 3 6
Pass: 4 8
Pass: 2 7
Pass: 2 4 7 8
Pass: 1 5
Pass: 3 6
```

```
Pass: 1 3 5 6
Pass: 1 2 3 4 5 6 7 8
Sorted array:
1 2 3 4 5 6 7 8
```