S.No: 11	Exp. Name: ***Write a C program to Sort given elements using Merge sort***	Date:2023-05-11

Aim:

Write a program to `sort` (`Ascending order`) the given elements using `merge sort` technique.

At the time of execution, the program should print the message on the console as:

```
Enter array size :
```

For example, if the user gives the **input** as:

```
Enter array size : 5
```

Next, the program should print the following message on the console as:

```
Enter 5 elements :
```

if the user gives the **input** as:

```
Enter 5 elements : 34 67 12 45 22
```

then the program should **print** the result as:

```
Before sorting the elements are : 34 67 12 45 22
After sorting the elements are : 12 22 34 45 67
```

Note: Do use the **printf()** function with a **newline** character (`\n`).

Source Code:

MergeSortMain.c

```
#include<stdio.h>
void main()
{
   int arr[15],i,n;
   printf("Enter array size : ");
   scanf("%d",&n);
   printf("Enter %d elements : ",n);
   for(i=0;i<n;i++)
   {
      scanf("%d",&arr[i]);
   }
   printf("Before sorting the elements are : ");
   display(arr,n);
   splitAndMerge(arr,0,n-1);
   printf("After sorting the elements are : ");
   display(arr,n);
}
void display(int arr[15],int n)
{
   int i;
   for(i=0;i<n;i++)
      printf("%d ",arr[i]);
      printf("\n");
}
```

```
void merge(int arr[15],int low,int mid,int high)
{
   int i=low,h=low,j=mid+1,k,temp[15];
   while(h<=mid&&j<=high)
   {
      if(arr[h]<arr[j])
      {
         temp[i]=arr[h];
         h++;
      }
      else
      {
         temp[i]=arr[j];
         j++;
      }
      i++;
   }
   if(h>mid)
   {
      for(k=j;k<=high;k++)
      {
         temp[i]=arr[k];
         i++;
      }
   }
   else
   {
      for(k=h;k<=mid;k++)
      {
         temp[i]=arr[k];
         i++;
      }
   }
   for(k=low;k<=high;k++)
   {
      arr[k]=temp[k];
   }
}
void splitAndMerge(int arr[15],int low,int high)
{
   if(low<high)
   {
      int mid=(low+high)/2;
      splitAndMerge(arr,low,mid);
      splitAndMerge(arr,mid+1,high);
      merge(arr,low,mid,high);
   }
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter array size : 5

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Enter 5 elements : 34 67 12 45 22
Before sorting the elements are : 34 67 12 45 22
After sorting the elements are : 12 22 34 45 67

Test Case - 2
User Output
Enter array size : 8
Enter 8 elements : 77 55 22 44 99 33 11 66
Before sorting the elements are : 77 55 22 44 99 33 11 66
After sorting the elements are : 11 22 33 44 55 66 77 99

Test Case - 3
User Output
Enter array size : 5
Enter 5 elements : -32 -45 -67 -46 -14
Before sorting the elements are : -32 -45 -67 -46 -14
After sorting the elements are : -67 -46 -45 -32 -14

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