**Institute of Engineering & Management**

**Department of Computer Science & Engineering**

**Data Structure Laboratory for 2nd year 3rd semester 2017**

**Code: CS 392**

**Date:** 6/9/17

**ASSIGNMENT-7**

**Problem-1**

**Problem Statement:** Implement merge sort in an array

**Algorithm:** Step-1: START  
Step-2: Inside main(), declare integer variables i & max  
Step-3: print command & scan for max  
Step-4: declare integer arrays array1[max] & array2[max]  
Step-5: print “Enter the array elements (separated by spaces)”  
Step-6: for i = 0 to i = max repeat  
 scan for array1[i]  
 array2[i] = array1[i] & i = i+1  
Step-7: call sort( array1, array2, max-1 )  
Step-8: for i = 0 to i = max repeat  
 print array1[i]  
Step-9: Inside sort( int \*array1, int \*array2, int max ), if max != 0 then  
 call sort( array2, array1, (max-1)/2 )  
 call sort( &array2[(max+1)/2], &array1[(max+1)/2], max/2 )  
 merge( array1, array2, max )  
Step-10: Inside merge( int \*base0, int \*base1, int max ), declare integer variables I, i0 = 0 & i1 = (max+1)/2  
Step-11: for i = 0 to i = max repeat  
 if i0 = (max+1)/2, then  
 base0[i] = base1[i1] & i1 = i1 + 1  
 else if i1 = max+1, then  
 base0[i] = base1[i0] & i0 = i0 + 1  
 else if base1[i0] < base1[i1], then  
 base0[i] = base1[i0] & i0 = i0 + 1  
 else base0[i] = base1[i1] & i1 = i1 + 1  
 i = i + 1  
Step-12: STOP

**Source code:** #include <stdio.h>  
#include <string.h>  
  
void sort(int \*, int \*, int);  
void merge(int \*, int \*, int);  
  
int main()  
{  
 int i, max;  
 printf("Enter the no. of elements\n");  
 scanf("%d", &max);  
 int array1[max], array2[max];  
 printf("Enter the array elements (separated by spaces)\n");  
 for(i=0;i<max;i++)  
 {  
 scanf("%d", &array1[i]);  
 array2[i]=array1[i];  
 }  
 sort(array1, array2, max-1);  
 printf("The sorted array is\n");  
 for(i=0;i<max;i++)  
 {  
 printf(" %d,", array1[i]);  
 }  
}  
  
void sort(int \*array1, int \*array2, int max)  
{  
 if(max!=0)  
 {  
 sort(array2, array1, (max-1)/2);  
 sort(&array2[(max+1)/2], &array1[(max+1)/2], max/2);  
 merge(array1, array2, max);  
 }  
}  
  
void merge(int \*base0, int \*base1, int max)  
{  
 int i, i0=0,i1=(max+1)/2;  
 for(i=0;i<=max;i++)  
 {  
 if(i0==(max+1)/2)  
 base0[i]=base1[i1++];  
 else if(i1==max+1)  
 base0[i]=base1[i0++];  
 else if(base1[i0]<base1[i1])  
 base0[i]=base1[i0++];  
 else base0[i]=base1[i1++];  
 }  
}

**Input/Output:** Enter the no. of elements  
6  
Enter the array elements (separated by spaces)  
3 4 1 5 2 3  
The sorted array is  
 1, 2, 3, 3, 4, 5