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