Experiment 2.1

Student Name:Rajiv Paul **UID:20BCS1812**
Branch: CSE **Section/Group:709A**
Semester: 3rd **Date of Performance: 29/09/2021**
Subject Name:Data Structure Lab **Subject Code:20CSP-219**

Q1. Write a program to sort an array of integers in descending order using merge sort.

1) **Aim/Overview of the practical:**

To write a program to sort an array of integers in descending order using merge sort.

2) Software required:

Vs Code

3) Source Code:

```cpp
#include <iostream>
using namespace std;

void merge(int array[], int const left, int const mid, int const right)
{
    auto const m1 = mid - left + 1;
    auto const m2 = right - mid;
    auto *arr1 = new int[m1],
         *arr2 = new int[m2];

    for (auto i = 0; i < m1; i++)
        arr1[i] = array[left + i];
    for (auto j = 0; j < m2; j++)
        arr2[j] = array[mid + 1 + j];

    auto i = 0, j = 0;
    int t = left;

    while (i < m1 && j < m2)
    {
        if (arr1[i] <= arr2[j])
        {
            array[t] = arr1[i];
            i++;
        }
        else
        {
            array[t] = arr2[j];
            j++;
        }
        t++;
    }
```

```
    while (i < m1)
    {
        array[t] = arr1[i];
        i++;
        t++;
    }

    while (j < m2)
    {
        array[t] = arr2[j];
        j++;
        t++;
    }
}

void mergeSort(int array[], int const begin, int const end)
{
    if (begin >= end)
        return;
    auto mid = begin + (end - begin) / 2;
    mergeSort(array, begin, mid);
    mergeSort(array, mid + 1, end);
    merge(array, begin, mid, end);
}

void printArray(int A[], int size)
{
    for (auto i = 0; i < size; i++)
        cout << A[i] << " ";
}

int main()
{
    int arr[] = {7, 3, 9, 11, 18, 6};
    auto arr_size = sizeof(arr) / sizeof(arr[0]);

    cout << "Given array is \n";
    printArray(arr, arr_size);

    mergeSort(arr, 0, arr_size - 1);

    cout << "\nSorted array is \n";
    printArray(arr, arr_size);
    return 0;
}
```

4. Output:

```
Given array is
7 3 9 11 18 6
Sorted array is
3 6 7 9 11 18 %
```

Q2. Write a program to sort an array of floating-point numbers in descending order using merge sort ?

1) Aim/Overview of the practical:

To write a program to sort an array of floating-point numbers in descending order using merge sort.

2) Software required:

Vs Code

3) Source Code:

```cpp
#include <iostream>
#include <algorithm>
using namespace std;

void merge(float arr[], int l, int m, int h){

    int n1=m-l+1, n2=h-m;
    float left[n1],right[n2];
    for(int i=0;i<n1;i++)
        left[i]=arr[i+l];
    for(int j=0;j<n2;j++)
        right[j]=arr[m+1+j];
    int i=0,j=0,k=l;
    while(i<n1 && j<n2){
        if(left[i]>=right[j])
            arr[k++]=left[i++];
        else
            arr[k++]=right[j++];
    }
    while(i<n1)
        arr[k++]=left[i++];
    while(j<n2)
        arr[k++]=right[j++];
}

void mergeSort(float arr[],int l,int r){
    if(r>l){
        int m=l+(r-l)/2;
        mergeSort(arr,l,m);
        mergeSort(arr,m+1,r);
        merge(arr,l,m,r);
    }
}

int main() {

    float a[]={9.3,5.5,30.6,15.6,7.8};
    int l=0,r=4;
    cout<<"\nThe numbers arranged in descending order are: ";

    mergeSort(a,l,r);
    for(float x: a){
        cout<<x<<" ";
    }
}
```

4. Output:

```
The numbers arranged in descending order are: 30.6 15.6 9.3 7.8 5.5
```